

# Troubleshooting Cisco Data Center Unified Fabric

---

Version 5.0

## Lab Guide

Text Part Number: 97-3207-01



---

**Americas Headquarters**  
Cisco Systems, Inc.  
San Jose, CA

**Asia Pacific Headquarters**  
Cisco Systems (USA) Pte. Ltd.  
Singapore

**Europe Headquarters**  
Cisco Systems International BV Amsterdam,  
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at [www.cisco.com/go/offices](http://www.cisco.com/go/offices).

---

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: [www.cisco.com/go/trademarks](http://www.cisco.com/go/trademarks). Third party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

**DISCLAIMER WARRANTY: THIS CONTENT IS BEING PROVIDED "AS IS." CISCO MAKES AND YOU RECEIVE NO WARRANTIES IN CONNECTION WITH THE CONTENT PROVIDED HEREUNDER, EXPRESS, IMPLIED, STATUTORY OR IN ANY OTHER PROVISION OF THIS CONTENT OR COMMUNICATION BETWEEN CISCO AND YOU. CISCO SPECIFICALLY DISCLAIMS ALL IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT AND FITNESS FOR A PARTICULAR PURPOSE, OR ARISING FROM A COURSE OF DEALING, USAGE OR TRADE PRACTICE. This learning product may contain early release content, and while Cisco believes it to be accurate, it falls subject to the disclaimer above.**

# Table of Contents

<b>Lab Guide.....</b>	<b>1</b>
Overview .....	1
Outline .....	1
Lab 1-1: Network Baseline Documentation .....	2
Activity Objective .....	2
Visual Objective.....	2
Required Resources.....	2
Command List .....	3
Job Aids.....	3
Task 1: Verify Connections and Access.....	4
Task 2: Document the Characteristics of the Network.....	4
Lab 2-1: Troubleshoot vPCs .....	9
Activity Objective .....	9
Visual Objective.....	9
Required Resources.....	9
Command List .....	10
Job Aids.....	11
Trouble Ticket.....	11
Lab Setup .....	11
Lab 2-2: Troubleshoot Cisco FabricPath .....	13
Activity Objective .....	13
Visual Objective.....	13
Required Resources.....	13
Command List .....	14
Job Aids.....	14
Trouble Ticket.....	15
Lab Setup .....	15
Lab 2-3: Troubleshoot OTV Issues.....	17
Activity Objective .....	17
Visual Objective.....	17
Required Resources.....	17
Command List .....	18
Job Aids.....	18
Trouble Ticket.....	19
Lab Setup .....	19
Lab 3-1: Troubleshoot Fibre Channel Interfaces .....	21
Activity Objective .....	21
Visual Objective.....	21
Required Resources.....	21
Command List .....	22
Job Aids.....	22
Trouble Ticket.....	23
Lab Setup .....	23
Lab 3-2: Troubleshoot Fibre Channel VSANs, Zones, and Domain Services.....	25
Activity Objective .....	25
Visual Objective.....	25
Required Resources.....	25
Command List .....	26
Job Aids.....	27
Trouble Ticket.....	27
Lab Setup .....	28

Lab 3-3: Troubleshoot NPV Mode .....	30
Activity Objective .....	30
Visual Objective .....	30
Required Resources .....	30
Command List .....	31
Job Aids .....	31
Trouble Ticket .....	32
Lab Setup .....	33
Lab 4-1: Troubleshoot FCoE—Part 1 .....	35
Activity Objective .....	35
Visual Objective .....	35
Required Resources .....	35
Command List .....	36
Job Aids .....	36
Trouble Ticket .....	37
Lab Setup .....	38
Lab 4-2: Troubleshoot FCoE—Part 2 .....	40
Activity Objective .....	40
Visual Objective .....	40
Required Resources .....	40
Command List .....	41
Job Aids .....	41
Trouble Ticket .....	42
Lab Setup .....	43
Lab 5-1: Troubleshoot VDCs .....	45
Activity Objective .....	45
Visual Objective .....	45
Required Resources .....	45
Command List .....	46
Job Aids .....	46
Task 1: Verify Your VDC .....	46
Lab 5-2: Troubleshoot Cisco Fabric Services .....	48
Activity Objective .....	48
Visual Objective .....	48
Required Resources .....	48
Command List .....	49
Job Aids .....	49
Trouble Ticket .....	49
Lab Setup .....	50
Lab 5-3: Troubleshoot the Fabric Extender .....	51
Activity Objective .....	51
Visual Objective .....	51
Required Resources .....	51
Command List .....	52
Job Aids .....	52
Trouble Ticket .....	53
Lab Setup .....	53
Answer Key .....	55
Lab 1-1 Answer Key: Network Baseline Documentation .....	55
Lab 2-1 Answer Key: Troubleshoot vPCs .....	58
Lab 2-2 Answer Key: Troubleshoot Cisco FabricPath .....	59
Lab 2-3 Answer Key: Troubleshoot OTV Issues .....	60
Lab 3-1 Answer Key: Troubleshoot Fibre Channel Interfaces .....	61
Lab 3-2 Answer Key: Troubleshoot Fibre Channel VSANs, Zones and Domain Services .....	62
Lab 3-3 Answer Key: Troubleshoot NPV Mode .....	63
Lab 4-1 Answer Key: Troubleshoot FCoE—Part 1 .....	63
Lab 4-2 Answer Key: Troubleshoot FCoE—Part 2 .....	64
Lab 5-1 Answer Key: Troubleshoot VDCs .....	64
Lab 5-2 Answer Key: Troubleshoot Cisco Fabric Services .....	65
Lab 5-3 Answer Key: Troubleshoot the Fabric Extender .....	65

# Lab Guide

---

## Overview

This guide presents the instructions and other information concerning the lab activities for this course. You can find the solutions in the lab activity Answer Key.

## Outline

This guide includes these activities:

- Lab 1-1: Network Baseline Documentation
- Lab 2-1: Troubleshoot vPCs
- Lab 2-2: Troubleshoot Cisco FabricPath
- Lab 2-3: Troubleshoot OTV Issues
- Lab 3-1: Troubleshoot Fibre Channel Interfaces
- Lab 3-2: Troubleshoot Fibre Channel VSANs, Zones and Domain Services
- Lab 3-3: Troubleshoot NPV Mode
- Lab 4-1: Troubleshoot FCoE—Part 1
- Lab 4-2: Troubleshoot FCoE—Part 2
- Lab 5-1: Troubleshoot VDCs
- Lab 5-2: Troubleshoot Cisco Fabric Services
- Lab 5-3: Troubleshoot the Fabric Extender
- Answer Key

# Lab 1-1: Network Baseline Documentation

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

## Activity Objective

In this activity, you will complete the following objectives:

- Check that you can access the lab environment
- Get familiar with the lab layout
- Check the equipment that has been assigned to you by the instructor

Use the Cisco CLI to log in to the equipment in your pod, and after completing this activity, you will be able to meet these objectives:

- Check that you can access and configure the lab equipment
- Confirm the initial configuration of the devices

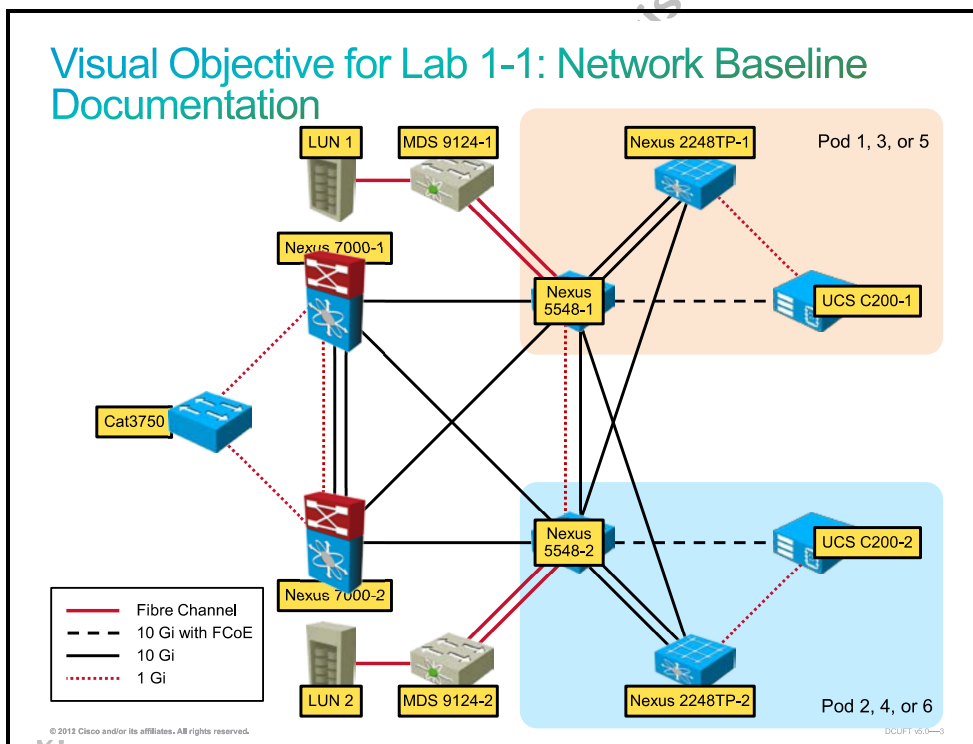
---

**Caution** Do not reload the equipment or erase the configurations. It can take more than 20 minutes to complete the reload.

---

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- Access details for lab equipment, provided by the instructor
- Laptop computer and network access

- 2 Cisco Nexus 7000 switches
- 6 Cisco Nexus 5548UP Switch
- 6 Cisco UCS C-Series servers
- 2 Cisco MDS 9124 switches
- Disk array

## Command List

The table describes the commands used in this activity.

Command	Description
<code>attach module</code>	Connects directly to an individual module
<code>show cdp neighbor</code>	Displays information about neighbor devices using Cisco Discovery Protocol
<code>show interface brief</code>	Displays a summary of a VDC
<code>show inventory</code>	Determines the Cisco Nexus 7010 hardware components
<code>show module</code>	Displays individual module hardware summary information
<code>show redundancy status</code>	Determines the active supervisor
<code>show running-config</code>	Displays the current running configuration
<code>show system resources</code>	Displays module system resources utilization
<code>show vdc</code>	Displays information about VDC
<code>show vdc membership</code>	Displays interface membership in VDC
<code>show version</code>	Determines the system software version that is currently running on the switch
<code>shutdown</code>	Disables the interface

## Job Aids

These job aids are available to help you complete the lab activity.

- Management IP addressing:

Pod	Management IP	Credentials
N7K1-POD1	192.168.10.95	admin / NXos12345
N7K2-POD2	192.168.10.97	admin / NXos12345
N7K1-POD3	192.168.10.96	admin / NXos12345
N7K2-POD4	192.168.10.98	admin / NXos12345
N7K1-POD5	192.168.10.103	admin / NXos12345
N7K2-POD6	192.168.10.104	admin / NXos12345
N5548-1	192.168.10.91	admin / NXos12345
N5548-2	192.168.10.92	admin / NXos12345

Pod	Management IP	Credentials
N5548-3	192.168.10.93	admin / NXos12345
N5548-4	192.168.10.94	admin / NXos12345
N5548-5	192.168.10.99	admin / NXos12345
N5548-6	192.168.10.100	admin / NXos12345
MDS9124-1	192.168.10.2	admin / C1sco123
MDS9124-2	192.168.10.3	admin / NXos12345
C200-1	192.168.10.41	admin / NXos12345
C200-2	192.168.10.42	admin / NXos12345
C200-3	192.168.10.43	admin / NXos12345
C200-4	192.168.10.44	admin / NXos12345
C200-5	192.168.10.45	admin / NXos12345
C200-6	192.168.10.46	admin / NXos12345

## Task 1: Verify Connections and Access

Use the Cisco CLI to verify connections and access to devices in the network.

### Activity Procedure

Complete these steps:

**Step 1** Connect to the lab system.

**Step 2** Use PuTTY to log in and access the network devices in your pod using Telnet.

Can you use Telnet to connect to all devices? If not, why not? What is the alternative?

---



---

**Step 3** Confirm the physical connectivity of the devices in network.

### Activity Verification

You have completed this task when you attain these results:

- You have received lab details and access information from the instructor.
- You have logged in and verified the configuration of the equipment in the lab.

## Task 2: Document the Characteristics of the Network

Prepare a diagram and a table of your pod and connections for your reference during the week. For this course, much time is spent working on challenges and solving the problems that are presented. Therefore, a network diagram and table will help you to work through the labs more quickly and efficiently in the time available.

## Activity Procedure

Complete these steps:

**Step 1** Draw a diagram using your preferred tools, such as pen and paper or Visio, for reference in future labs.

**Step 2** Fill in the interface assignments per pod table:

### Pod 1

Device	Interface	Comment
N7K1-POD1		Connection to N7K2-POD2
N7K1-POD1		Connection to N7K2-POD2
N7K1-POD1		Connection to C3750
N7K1-POD1		Connection to C3750
N7K1-POD1		Connection to N5548-1
N7K1-POD1		Connection to N5548-2
N5548-1		Connection to N5548-2
N5548-1		Connection to N5548-2
N5548-1		Connection to C200-1
N5548-1		Connection to MDS9124-1
N5548-1		Connection to N7K1-POD1
N5548-1		Connection to N7K2-POD2
N5548-1	e1/14	Connection to FEX 2248-2
N5548-1	e1/15	Connection to FEX 2248-1
N5548-1	e1/16	Connection to FEX 2248-1
MDS9124-1		Connection to N5548-1
MDS9124-1		Connection to Storage (CX3-SPA)

### Pod 2

Device	Interface	Comment
N7K2-POD2		Connection to N7K1-POD1
N7K2-POD2		Connection to N7K1-POD1
N7K2-POD2		Connection to C3750
N7K2-POD2		Connection to C3750
N7K2-POD2		Connection to N5548-1
N7K2-POD2		Connection to N5548-2
N5548-2		Connection to N5548-1
N5548-2		Connection to N5548-1
N5548-2		Connection to C200-2

Device	Interface	Comment
N5548-2		Connection to MDS9124-2
N5548-2		Connection to N7K1-POD1
N5548-2		Connection to N7K2-POD2
N5548-2	e1/14	Connection to FEX 2248-1
N5548-2	e1/15	Connection to FEX 2248-2
N5548-2	e1/16	Connection to FEX 2248-2
MDS9124-2		Connection to N5548-2
MDS9124-2		Connection to Storage (CX3-SPB)

### Pod 3

Device	Interface	Comment
N7K1-POD3		Connection to N7K2-POD4
N7K1-POD3		Connection to N7K2-POD4
N7K1-POD3		Connection to C3750
N7K1-POD3		Connection to C3750
N7K1-POD3		Connection to N5548-3
N7K1-POD3		Connection to N5548-4
N5548-3		Connection to N5548-4
N5548-3		Connection to N5548-4
N5548-3		Connection to C200-3
N5548-3		Connection to MDS9124-1
N5548-3		Connection to N7K1-POD3
N5548-3		Connection to N7K2-POD4
N5548-3	e1/14	Connection to FEX 2248-4
N5548-3	e1/15	Connection to FEX 2248-3
N5548-3	e1/16	Connection to FEX 2248-3
MDS9124-1		Connection to N5548-3
MDS9124-1		Connection to Storage (CX3-SPA)

### Pod 4

Device	Interface	Comment
N7K2-POD4		Connection to N7K1-POD3
N7K2-POD4		Connection to N7K1-POD3
N7K2-POD4		Connection to C3750
N7K2-POD4		Connection to C3750

Device	Interface	Comment
N7K2-POD4		Connection to N5548-3
N7K2-POD4		Connection to N5548-4
N5548-4		Connection to N5548-3
N5548-4		Connection to N5548-3
N5548-4		Connection to C200-4
N5548-4		Connection to MDS9124-2
N5548-4		Connection to N7K1-POD3
N5548-4		Connection to N7K2-POD4
N5548-4	e1/14	Connection to FEX 2248-3
N5548-4	e1/15	Connection to FEX 2248-4
N5548-4	e1/16	Connection to FEX 2248-4
MDS9124-2		Connection to N5548-4
MDS9124-2		Connection to Storage (CX3-SPB)

#### Pod 5

Device	Interface	Comment
N7K1-POD5		Connection to N7K2-POD6
N7K1-POD5		Connection to N7K2-POD6
N7K1-POD5		Connection to C3750
N7K1-POD5		Connection to C3750
N7K1-POD5		Connection to N5548-5
N7K1-POD5		Connection to N5548-6
N5548-5		Connection to N5548-6
N5548-5		Connection to N5548-6
N5548-5		Connection to C200-5
N5548-5		Connection to MDS9124-1
N5548-5		Connection to N7K1-POD5
N5548-5		Connection to N7K2-POD6
N5548-5	e1/14	Connection to FEX 2248-6
N5548-5	e1/15	Connection to FEX 2248-5
N5548-5	e1/16	Connection to FEX 2248-5
MDS9124-1		Connection to N5548-5
MDS9124-1		Connection to Storage (CX3-SPA)

## Pod 6

Device	Interface	Comment
N7K2-POD6		Connection to N7K1-POD5
N7K2-POD6		Connection to N7K1-POD5
N7K2-POD6		Connection to C3750
N7K2-POD6		Connection to C3750
N7K2-POD6		Connection to N5548-5
N7K2-POD6		Connection to N5548-6
N5548-6		Connection to N5548-5
N5548-6		Connection to N5548-5
N5548-6		Connection to C200-6
N5548-6		Connection to MDS9124-2
N5548-6		Connection to N7K1-POD5
N5548-6		Connection to N7K2-POD6
N5548-6	e1/14	Connection to FEX 2248-5
N5548-6	e1/15	Connection to FEX 2248-6
N5548-6	e1/16	Connection to FEX 2248-6
MDS9124-2		Connection to N5548-6
MDS9124-2		Connection to Storage (CX3-SPB)

**Step 3** Set the descriptions on the interfaces that you will use during the course for your pod.

**Step 4** Put additional information about the interfaces into your diagram from Step 1.

### Activity Verification

You have completed this task when you attain these results:

- You have completed the network diagram.
- You understand how the devices are connected in the network.
- You have filled in the interface assignments per pod table.

# Lab 2-1: Troubleshoot vPCs

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

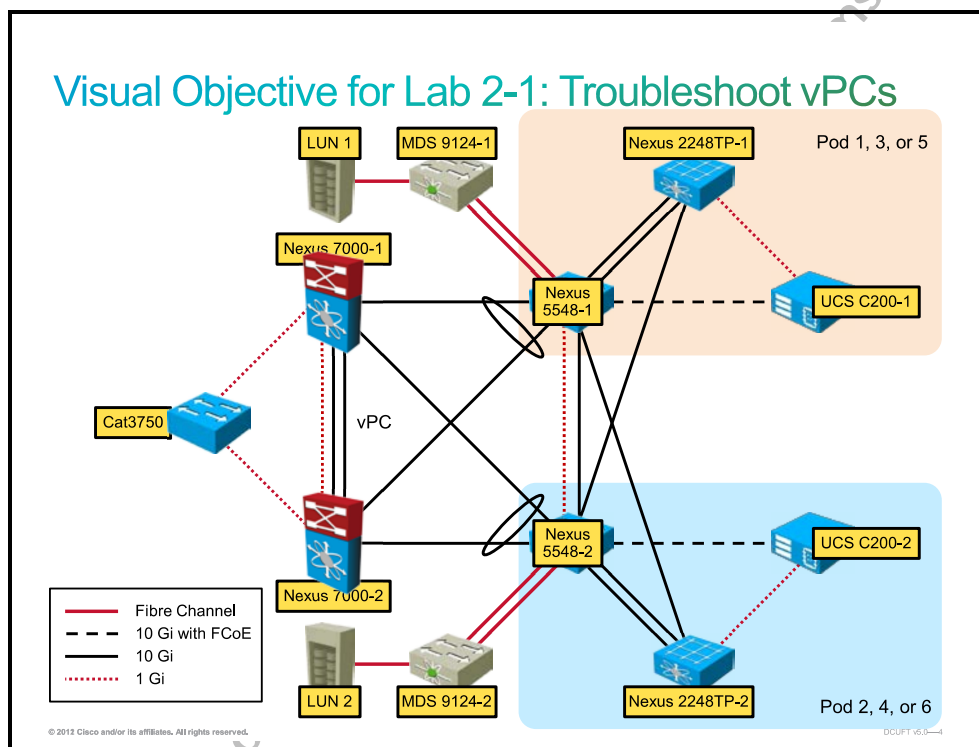
## Activity Objective

In this activity, you will troubleshoot and resolve connectivity in a network using vPCs. After completing this activity, you will be able to meet these objectives:

- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 2 Cisco Nexus 7000 switches
- 6 Cisco Nexus 5548UP switches

## Command List

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

Command	Description
<b>auto-recovery</b>	Configures the vPC for auto recovery if its peer is presumed nonoperational
<b>channel-group <i>group</i> mode active</b>	Assigns and configures a physical interface to a port channel group and puts the interface in active LACP negotiating state
<b>feature lacp</b>	Enables LACP port channeling on the device
<b>feature vpc</b>	Enables vPC
<b>interface portchannel <i>channel</i></b>	Creates a port channel interface and enters interface configuration mode
<b>peer-gateway</b>	Configures the device to send vPC packets to the device MAC address
<b>peer-keepalive destination <i>ip_address</i></b>	Configures the vPC peer-keepalive link and message between vPC peer devices
<b>peer-switch</b>	Enables the vPC switch pair to appear as a single STP root in the Layer 2 topology
<b>reload restore</b>	Configures a vPC device to assume that its peer is not functional and to bring up the vPC
<b>role priority <i>priority</i></b>	Overrides the default selection of vPC primary and secondary devices when you create a vPC domain
<b>show cfs peers</b>	Displays all peers in the physical fabric
<b>show cfs status</b>	Displays the current state of Cisco Fabric Services
<b>show interface brief</b>	Displays a summary of interface statuses
<b>show mac address-table</b>	Displays the information about the MAC address table
<b>show port-channel load-balance <i>options</i></b>	Displays information about load balancing using port channels
<b>show port-channel summary</b>	Displays summary information about the port channels
<b>show running-config vpc</b>	Displays the running configuration information for vPCs
<b>show spanning-tree</b>	Displays information about the STP
<b>show vlan</b>	Displays VLAN information
<b>show vpc</b>	Displays a summary of vPC configuration
<b>show vpc consistency-parameters global</b>	Displays the configuration of all global parameters on both sides of the vPC peer link.
<b>show vpc consistency-parameters interface portchannel <i>channel</i></b>	Displays the configuration of all interface parameters on both sides of the vPC peer link.
<b>show vpc peer-keepalive</b>	Displays the destination IP for the vPC peer-keepalive message and the status of the messages
<b>show vpc role</b>	Displays information about the vPC role of the peer device
<b>show vpc statistics</b>	Displays vPC statistics
<b>spanning-tree mode</b>	Switches between Rapid PVST+ and MST Spanning Tree Protocol modes

Command	Description
<code>switchport mode trunk</code>	Specifies the trunking VLAN interface in Layer 2
<code>switchport trunk allowed vlan <i>vlan-id</i></code>	Sets the list of allowed VLANs on the trunking interface
<code>vlan <i>vlan</i></code>	Adds a VLAN or enters the VLAN configuration mode
<code>vpc <i>vpc</i></code>	Moves the port channel into the vPC
<code>vpc domain <i>domain</i></code>	Creates a vPC domain
<code>vpc peer-link</code>	Creates a vPC peer link

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Trouble Ticket

vPC configured between the Cisco Nexus 5548 and both Nexus 7000 switches is not operational. It is your task to figure out what is wrong and correct it. Work with your partner pod (partners are pods 1 and 2, pods 3 and 4, and pods 5 and 6).

## Activity Procedure

Complete these steps:

- Step 1** Log in to your Cisco Nexus 7000 VDC and Nexus 5548 switch.
- Step 2** Verify that the vPC is not operational.
- Step 3** Start troubleshooting.

## Lab Setup

The instructor will provide you with directions to prepare the lab equipment for this lab. After the instructor indicates that the lab is fully prepared, you are ready to start troubleshooting.



# Lab 2-2: Troubleshoot Cisco FabricPath

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

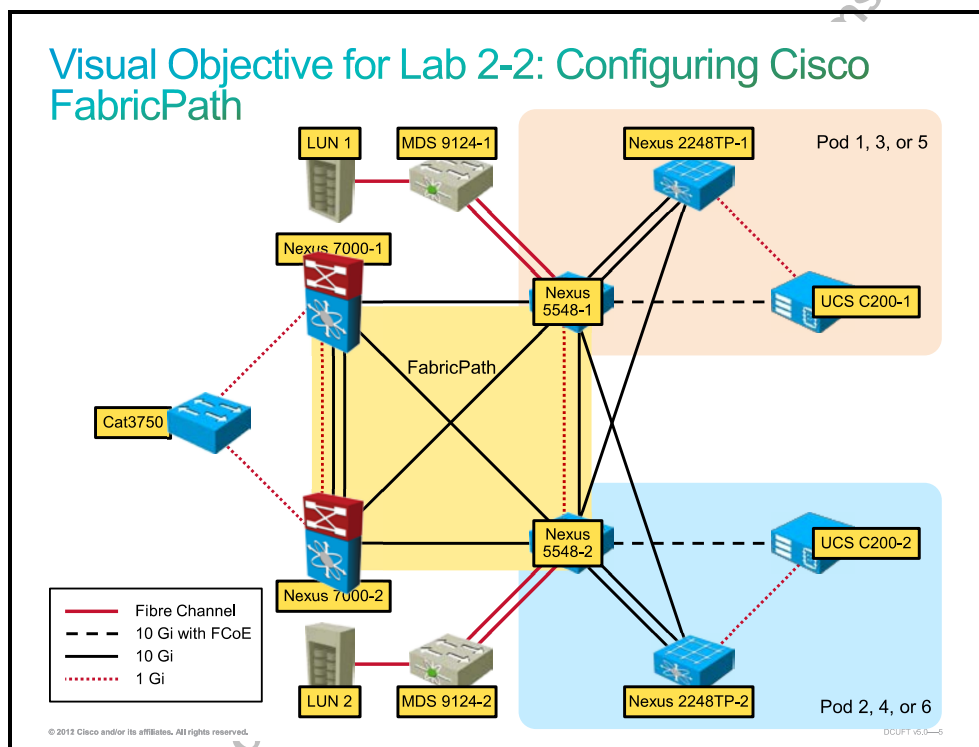
## Activity Objective

In this activity, you will troubleshoot and resolve connectivity in a network using Cisco FabricPath. After completing this activity, you will be able to meet these objectives:

- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 2 Cisco Nexus 7000 switches
- 6 Cisco Nexus 5548UP switches

# Command List

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

Command	Description
<code>fabricpath switch-id id</code>	Configures an emulated switch ID
<code>fabricpath timers {allocate-delay seconds   linkup-delay seconds   transition-delay seconds}</code>	Configures FabricPath timers
<code>feature-set fabricpath</code>	Enables a FabricPath feature set in a VDC
<code>install feature-set fabricpath</code>	Installs a FabricPath feature set
<code>show fabricpath isis route</code>	Displays the FabricPath IS-IS routing table for unicast routes
<code>show fabricpath route</code>	Displays FabricPath route information
<code>show fabricpath switch-id</code>	Displays the FabricPath switch ID
<code>show fabricpath timers</code>	Displays settings for the allocate-delay, linkup-delay, and transition-delay timers for the FabricPath network by the system ID
<code>show feature-set</code>	Displays the status of a feature set
<code>show interface counters</code>	Displays in and out counters for all interfaces in the system
<code>show interface status</code>	Displays the interface line status
<code>show license usage</code>	Displays the license usage table
<code>show mac address-table dynamic</code>	Displays information about the dynamic MAC address table entries
<code>show spanning-tree</code>	Displays information about the STP
<code>show vlan</code>	Displays VLAN information
<code>spanning-tree vlan vlan priority priority</code>	Configures STP parameters on a per-VLAN basis and specifies the STP-bridge priority
<code>switchport mode fabricpath</code>	Specifies interfaces as FabricPath ports
<code>vlan vlan mode fabricpath</code>	Configures the VLAN as a FabricPath VLAN

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings
- IP addressing on interface VLAN 10 (for verification using **ping** between Cisco Nexus 5548 switches within partner pods)

Pod	IP Address
1	192.168.10.221
2	192.168.10.222

Pod	IP Address
3	192.168.10.223
4	192.168.10.224
5	192.168.10.225
6	192.168.10.226

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Trouble Ticket

Cisco FabricPath configured between the Nexus 5548 and both Nexus 7000 switches is not operational. It is your task to figure out what is wrong and correct it. Work with your partner pod (partners are pods 1 and 2, pods 3 and 4, and pods 5 and 6).

### Activity Procedure

Complete these steps:

- Step 1** Log in to your Cisco Nexus 7000 VDC and Nexus 5548 switch.
- Step 2** Verify that the Cisco FabricPath using FabricPath VLAN 10 is not operational.
- Step 3** Start troubleshooting.

## Lab Setup

The instructor will provide you with directions to prepare the lab equipment for this lab. After the instructor indicates that the lab is fully prepared, you are ready to start troubleshooting.



# Lab 2-3: Troubleshoot OTV Issues

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

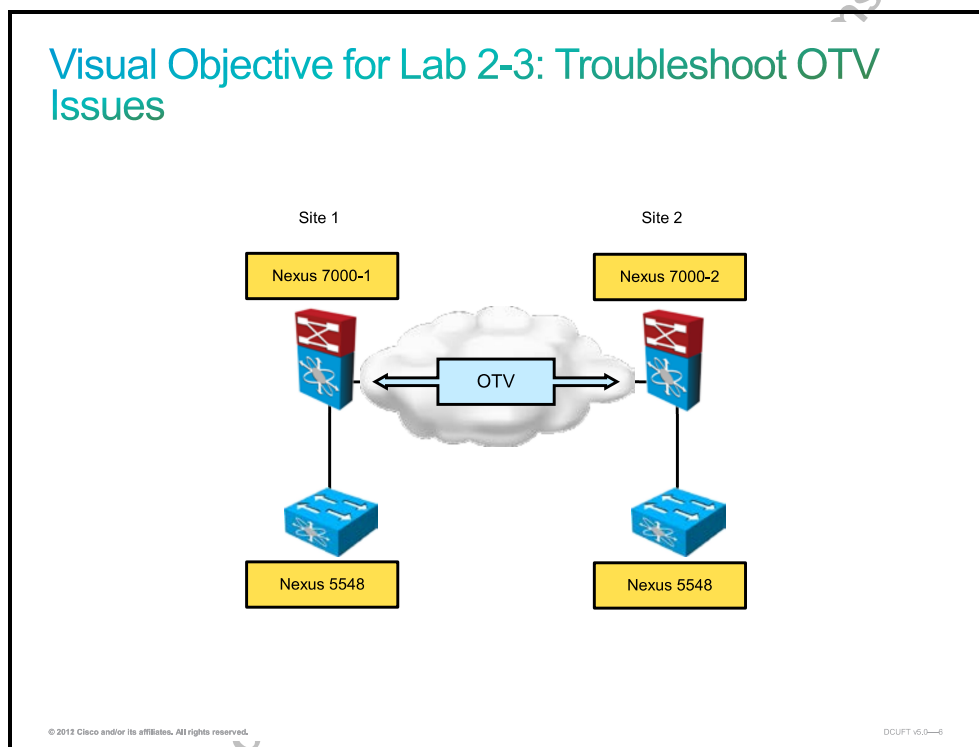
## Activity Objective

In this activity, you will troubleshoot and resolve issues related to OTV. After completing this activity, you will be able to meet these objectives:

- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 2 Cisco Nexus 7000 switches
- 6 Cisco Nexus 5548UP switches

## Command List

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

Command	Description
<code>clear otv isis adjacency *</code>	Clears the IS-IS adjacency state
<code>feature otv</code>	Enables the OTV feature
<code>interface overlay <i>number</i></code>	Creates an overlay interface and enters the interface-overlay configuration mode
<code>ip igmp version 3</code>	Enables IGMPv3 on a specific interface
<code>otv adjacency-server unicast-only</code>	Configures the local edge device as an adjacency server
<code>otv control-group <i>mcast-address</i></code>	Configures the IP multicast group address for the control and broadcast traffic for the specified OTV network
<code>otv data-group <i>mcast-range</i></code>	Configures the list of core provider multicast prefixes for multicast data traffic, for the specified OTV network
<code>otv extend-vlan <i>vlangs</i></code>	Enables VLANs to be part of the specified OTV network and enables OTV advertisements for these VLANs
<code>show ip igmp group</code>	Displays IGMP attached group membership information
<code>otv join-interface ethernet <i>join-interface</i></code>	Associates an OTV overlay interface to an external interface
<code>otv site-identifier <i>identifier</i></code>	Configures the site identifier value
<code>otv site-vlan <i>site-vlan</i></code>	Configures a VLAN on all local OTV edge devices that belong to the same local site
<code>otv suppress-arp-nd</code>	Suppresses sending the ARP and neighbor discovery packets on an overlay network
<code>otv use-adjacency-server <i>primary-ip-address</i> [<i>secondary-ip-address</i>] unicast-only</code>	Configures the local edge device to use a remote adjacency server
<code>show license usage</code>	Displays the license usage table
<code>show mac address-table</code>	Displays information about the MAC address table
<code>show otv</code>	Displays the OTV information
<code>show otv adjacency detail</code>	Displays the OTV adjacency information details
<code>show otv arp-nd-cache</code>	Displays Layer 2 and Layer 3 addresses cached from ARP and neighbor discovery packet inspection
<code>show otv route</code>	Displays OTV IS-IS route information from the OTV RBI
<code>show otv site <i>detail</i></code>	Displays OTV site information details
<code>show otv vlan</code>	Displays the VLAN information for the OTV overlay interface

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings

- IP addressing on interface VLAN 10 (for verification using **ping** between Cisco Nexus 5548 switches within partner pods)

Pod	IP Address
1	192.168.10.221
2	192.168.10.222
3	192.168.10.223
4	192.168.10.224
5	192.168.10.225
6	192.168.10.226

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Trouble Ticket

OTV is configured between both Cisco Nexus 7000 switches but is not operational. It should extend VLANs 10-12. The VLAN ID used for the OTV site VLAN should be different from management VLAN 1. It is your task to figure out what is wrong and correct it. Work with your partner pod (partners are pods 1 and 2, pods 3 and 4, and pods 5 and 6).

### Activity Procedure

Complete these steps:

- Step 1** Log in to your Cisco Nexus 7000 VDC and Nexus 5548 switch.
- Step 2** Verify that OTV is not operational by pinging between the Nexus 5548 switch VLAN 10 IP addresses of the partner pod.
- Step 3** Start troubleshooting.

## Lab Setup

The instructor will provide you with directions to prepare the lab equipment for this lab. After the instructor indicates that the lab is fully prepared, you are ready to start troubleshooting.



# Lab 3-1: Troubleshoot Fibre Channel Interfaces

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

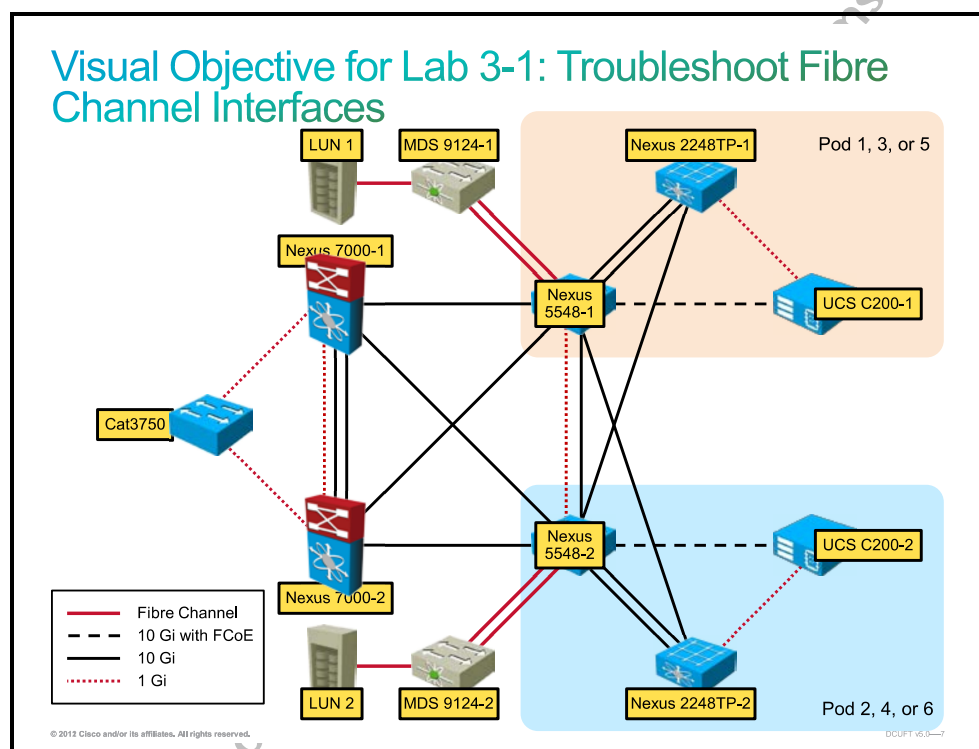
## Activity Objective

In this activity, you will troubleshoot and resolve storage issues related to Fibre Channel interface operation. After completing this activity, you will be able to meet these objectives:

- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 6 Cisco UCS C-Series servers
- 6 Cisco Nexus 5548UP switches
- 2 Cisco MDS 9124 switches
- Disk array

## Command List

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

Command	Description
<code>channel-group group</code>	Assigns and configures a physical interface to a port channel group
<code>interface fc slot/port</code>	Configures a Fiber Channel interface
<code>interface san-port-channel channel</code>	Configures a SAN port channel interface
<code>show fcns database</code>	Displays the contents of the FCNS database
<code>show flogi database</code>	Displays information about FLOGI sessions
<code>show hardware internal fc-mac slot-number port port-number statistics</code>	Gives all non-zero statistics for the port
<code>show interface brief</code>	Displays a table with interface statuses
<code>show interface fc slot/port</code>	Displays the configuration information of a Fiber Channel interface
<code>show license usage</code>	Displays the license usage table
<code>show vsan membership</code>	Displays VSAN membership information
<code>switchport mode mode</code>	Sets the Layer 2 interface type
<code>switchport speed</code>	Sets the speed parameters on an interface
<code>switchport trunk</code>	Configures trunking parameters on an interface
<code>vsan database</code>	Enters the VSAN configuration mode
<code>vsan vsan interface interface</code>	Adds an interface to VSAN

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings
- SAN information:

	Pod 1	Pod 2	Pod 3	Pod 4	Pod 5	Pod 6
VSAN	11	12	11	12	11	12
FCoE VLAN	1011	1012	1011	1012	1011	1012
WWPN	20:00:00:25: B5:C0:40:01	20:00:00:25: B5:C0:40:02	20:00:00:25: B5:C0:40:03	20:00:00:25: B5:C0:40:04	20:00:00:25: B5:C0:40:05	20:00:00:25: B5:C0:40:06
Device-alias	dcuci-c1	dcuci-c2	dcuci-c3	dcuci-c4	dcuci-c5	dcuci-c6

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

# Trouble Ticket

The Cisco C-Series server should be able to boot ESXi from SAN but cannot connect to the storage array. It is your task to figure out what is wrong and correct it.

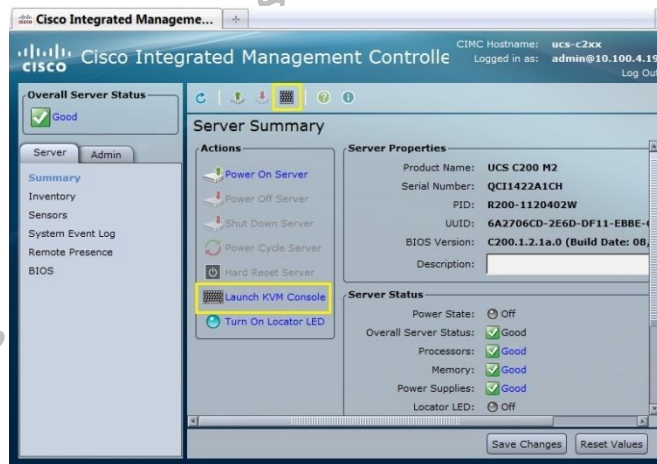
## Activity Procedure

Complete these steps:

- Step 1** Open a web browser and log in to the IP address of the Cisco Integrated Management Controller of your C-Series server (192.168.10.4X, where X is your pod number).



- Step 2** From the Cisco Integrated Management Controller summary screen, click the **Power On Server** link or **Power Cycle Server** in the Actions area of the screen. Click **OK** when prompted to confirm powering on or power cycling the server.
- Step 3** Open a KVM console window inside the Cisco Integrated Management Controller and observe the booting process. When possible, enter the boot order menu by pressing **F6**.



- Step 4** Verify that there is no option to boot from SAN.
- Step 5** Start troubleshooting.

## Lab Setup

The instructor will provide you with directions to prepare the lab equipment for this lab. After the instructor indicates that the lab is fully prepared, you are ready to start troubleshooting.



# Lab 3-2: Troubleshoot Fibre Channel VSANs, Zones, and Domain Services

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

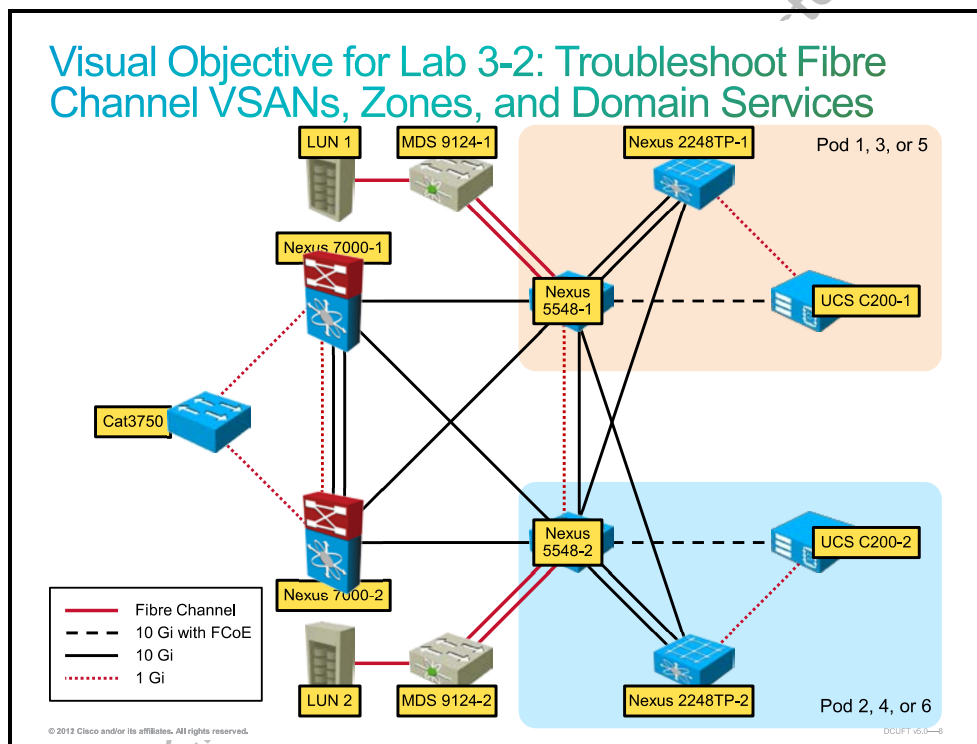
## Activity Objective

In this activity, you will troubleshoot and resolve storage issues related to VSANs, zones and domain services. After completing this activity, you will be able to meet these objectives:

- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 6 Cisco UCS C-Series servers
- 6 Cisco Nexus 5548UP switches
- 2 Cisco MDS 9124 switches
- Disk array

## Command List

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

Command	Description
<code>fcdomain domain <i>domain-id</i> static vsan <i>vsan-id</i></code>	Configures the domain ID for a specific VSAN
<code>fcdomain restart disruptive vsan <i>vsan-id</i></code>	Configures disruptive Fibre Channel domain restart for a specific VSAN
<code>interface fc <i>slot/port</i></code>	Configures a Fiber Channel interface
<code>member device-alias <i>name</i></code>	Adds a device-alias member to a Fibre Channel on a VSAN
<code>member pwwn <i>wwn</i></code>	Adds a member pWWN ID to a Fibre Channel alias on a VSAN
<code>show fcdomain</code>	Displays the Fibre Channel domain information
<code>show fcdomain domain-list vsan <i>vsan-id</i></code>	Displays a list of domain IDs that are provided by the principal switch for a specified VSAN
<code>show fcns database</code>	Displays the contents of the FCNS database
<code>show fcns database detail</code>	Displays all objects in each entry of the FCNS database
<code>show flogi database</code>	Displays information about FLOGI sessions
<code>show hardware internal fc- mac <i>slot-number</i> port <i>port- number</i> statistics</code>	Gives all non-zero statistics for the port
<code>show license usage</code>	Displays the license usage table
<code>show rscn scr-table vsan <i>vsan</i></code>	Displays the SCR table of the RSCN information for a specified VSAN
<code>show vsan membership</code>	Displays VSAN membership information
<code>show zone</code>	Displays zone information
<code>show zone member</code>	Displays all zones that the given member is part of
<code>show zone status</code>	Displays the zone server current status
<code>show zone vsan <i>vsan-id</i></code>	Displays the analysis of the zone database for the specified VSAN
<code>show zoneset active</code>	Displays only active zone sets
<code>switchport mode <i>mode</i></code>	Sets the Layer 2 interface type
<code>vsan database</code>	Enters the VSAN configuration mode
<code>vsan <i>vsan</i> interface <i>interface</i></code>	Adds an interface to a VSAN
<code>zone commit vsan <i>vsan-id</i></code>	Commits any changes done in zone configuration
<code>zone name <i>zonename</i> vsan <i>vsan-id</i></code>	Creates a zone
<code>zoneset activate <i>name</i> vsan <i>vsan</i></code>	Activates a zone set on the specified VSAN
<code>zoneset name <i>name</i></code>	Specifies a name for a zone set

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings
- SAN information:

	Pod 1	Pod 2	Pod 3	Pod 4	Pod 5	Pod 6
VSAN	11	12	11	12	11	12
FCoE VLAN	1011	1012	1011	1012	1011	1012
WWPN	20:00:00:25: B5:C0:40:01	20:00:00:25: B5:C0:40:02	20:00:00:25: B5:C0:40:03	20:00:00:25: B5:C0:40:04	20:00:00:25: B5:C0:40:05	20:00:00:25: B5:C0:40:06
Device-alias	dcuci-c1	dcuci-c2	dcuci-c3	dcuci-c4	dcuci-c5	dcuci-c6

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Trouble Ticket

The Cisco C-Series server should be able to boot ESXi from SAN but cannot connect to the storage array. It is your task to figure out what is wrong and correct it.

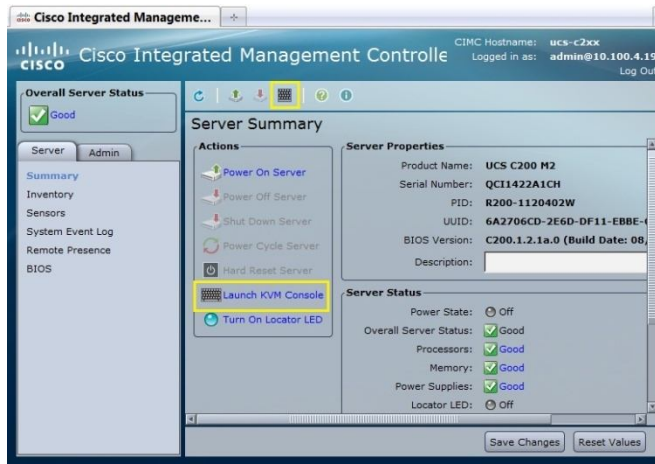
### Activity Procedure

Complete these steps:

- Step 1** Open a web browser and log in to the IP address of the Cisco Integrated Management Controller of your C-Series server (192.168.10.4X, where X is your pod number).



- Step 2** From the Cisco Integrated Management Controller summary screen, click the **Power On Server** link or **Power Cycle Server** in the Actions area of the screen. Click **OK** when prompted to confirm powering on or power cycling the server.
- Step 3** Open a KVM console window inside the Cisco Integrated Management Controller and observe the booting process. When possible, enter the boot order menu by pressing **F6**.



**Step 4** Verify that there is no option to boot from SAN.

**Step 5** Start troubleshooting.

## Lab Setup

The instructor will provide you with directions to prepare the lab equipment for this lab. After the instructor indicates that the lab is fully prepared, you are ready to start troubleshooting.



# Lab 3-3: Troubleshoot NPV Mode

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

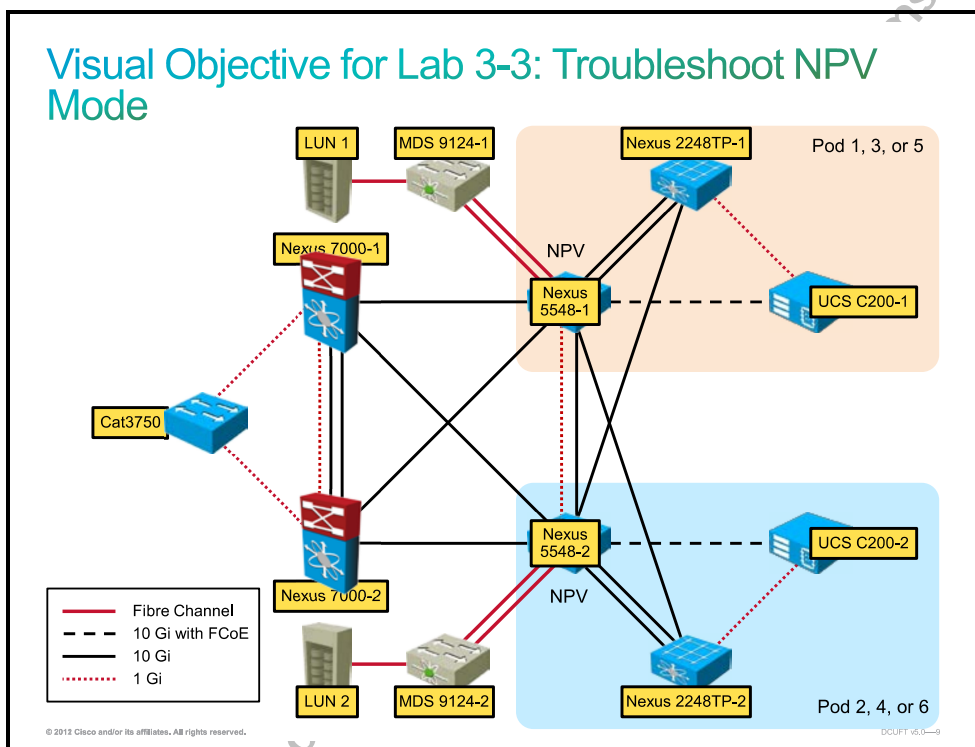
## Activity Objective

In this activity, you will troubleshoot and resolve storage issues related to NPV mode. After completing this activity, you will be able to meet these objectives:

- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 6 Cisco UCS C-Series servers
- 6 Cisco Nexus 5548UP switches
- 2 Cisco MDS 9124 switches
- Disk array

# Command List

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

Command	Description
<code>feature npiv</code>	Enables NPIV for all VSANs on a switch
<code>feature npv</code>	Enables NPV mode
<code>interface fc slot/port</code>	Configures a Fiber Channel interface
<code>npv auto-load-balance disruptive</code>	Enables NPV disruptive load balancing
<code>npv traffic-map server-interface {fc slot/port   vfc vfc-id} external-interface fc slot/port</code>	Configures an NPV traffic map
<code>show fcns database</code>	Displays the contents of the FCNS database
<code>show fcns database npv</code>	Displays NPV entries of the FCNS database
<code>show feature</code>	Displays feature status
<code>show flogi database</code>	Displays information about FLOGI sessions
<code>show interface fc slot/port</code>	Displays the configuration information of a Fiber Channel interface
<code>show license usage</code>	Displays the license usage table
<code>show npv flogi-table</code>	Displays information about the NPV FLOGI session
<code>show npv status</code>	Displays the NPV current status
<code>show npv traffic-map</code>	Displays NPV traffic maps
<code>switchport mode f</code>	Configures F-port mode
<code>switchport mode np</code>	Configures proxy N port mode. Proxy N port mode is valid only when the switch is operating in NPV mode
<code>switchport trunk</code>	Configures trunking parameters on an interface
<code>vsan database</code>	Enters the VSAN configuration mode
<code>vsan vsan interface interface</code>	Adds an interface to a VSAN

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings
- SAN information:

	Pod 1	Pod 2	Pod 3	Pod 4	Pod 5	Pod 6
VSAN	11	12	11	12	11	12
FCoE VLAN	1011	1012	1011	1012	1011	1012

	Pod 1	Pod 2	Pod 3	Pod 4	Pod 5	Pod 6
WWPN	20:00:00:25: B5:C0:40:01	20:00:00:25: B5:C0:40:02	20:00:00:25: B5:C0:40:03	20:00:00:25: B5:C0:40:04	20:00:00:25: B5:C0:40:05	20:00:00:25: B5:C0:40:06
Device-alias	dcuci-c1	dcuci-c2	dcuci-c3	dcuci-c4	dcuci-c5	dcuci-c6

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Trouble Ticket

A customer informs you of its plans to use the virtual environment on their Cisco C-Series server. There is an ESXi installed on that server. They need their Cisco Nexus 5548UP switch to work in NPV mode. The Cisco C-Series server should be able to boot ESXi from SAN but cannot connect to the storage array. It is your task to figure out what is wrong and correct it.

### Activity Procedure

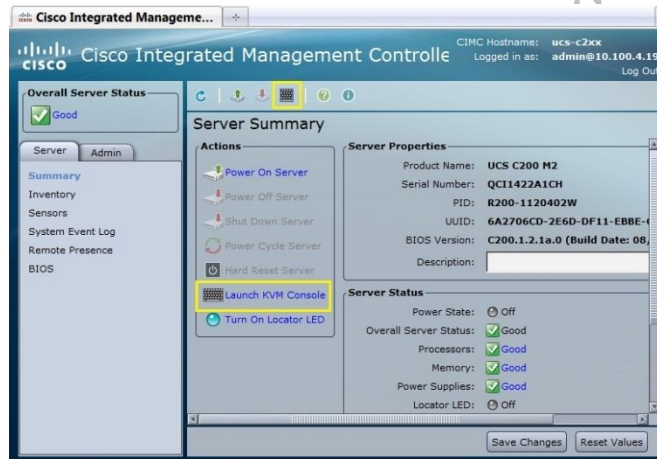
Complete these steps:

- Step 1** Save the running configuration from the Cisco Nexus 5548 switch to your pod desktop. Use the TFTP server on your desktop.
- Step 2** Change the operational mode on the Cisco Nexus 5548 switch to NPV mode, using the **enable feature npv** command. You will have to reload the switch.
- Step 3** Make sure ports 1/31 and 1/32 are configured as Fibre Channel ports, using the following commands:
 

```
N5548-P(config)# slot 1
N5548-P(config-slot)# port 1-30 type ethernet
N5548-P(config-slot)# port 31-32 type fc
N5548-P(config-slot)# copy run start
N5548-P(config-slot)# reload
```
- Step 4** Compare your saved configuration with the new running configuration and correct any missing interface configuration on interfaces Eth1/3, vfc 3, and fc1/31. Make sure you configure the correct port modes.
- Step 5** Open a web browser and login to the IP address of the Cisco Integrated Management Controller of your C-Series server (192.168.10.4X, where X is your pod number).



- Step 6** From the Cisco Integrated Management Controller summary screen, click the **Power On Server** link or **Power Cycle Server** in the Actions area of the screen. Click **OK** when prompted to confirm powering on or power cycling the server.
- Step 7** Open a KVM console window inside the Cisco Integrated Management Controller and observe the booting process. When possible, enter the boot order menu by pressing **F6**.



- Step 8** Verify that there is no option to boot from SAN.
- Step 9** Start troubleshooting.
- Step 10** When you finish, put the switch back in switching mode. Disable the NPV feature by using the **no feature npv** command (you will have to reload the switch) and use your saved configuration to correct any missing interface configuration on interfaces Eth1/3, vfc 3, and fc1/31. Make sure ports 1/31 and 1/32 are configured as Fibre Channel ports (you will have to reload the switch again).

## Lab Setup

The instructor will provide you with directions to prepare the lab equipment for this lab. After the instructor indicates that the lab is fully prepared, you are ready to start troubleshooting.



# Lab 4-1: Troubleshoot FCoE—Part 1

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

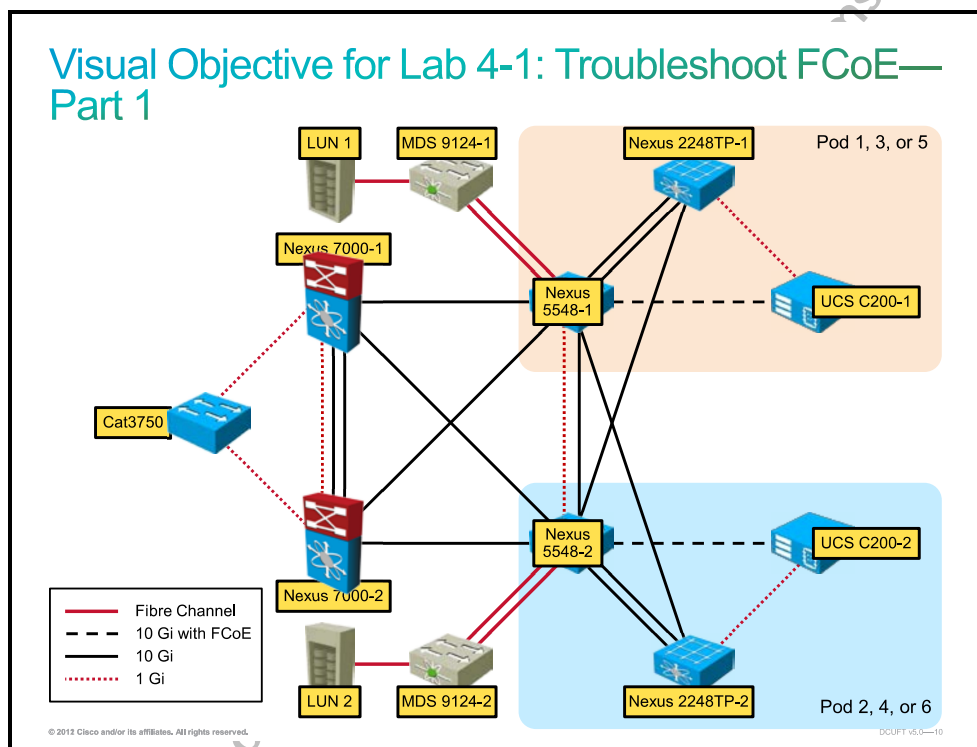
## Activity Objective

In this activity, you will troubleshoot and resolve issues in connectivity in a network that uses FCoE. After completing this activity, you will be able to meet these objectives:

- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 6 Cisco UCS C-Series servers
- 6 Cisco Nexus 5548UP switches
- 2 Cisco MDS 9124 switches
- Disk array

## Command List

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

Command	Description
<code>bind interface {ethernet chassis-id/slot/port   port-channel channel-num   vethernet veth-num}</code>	Binds an interface to a virtual Fibre Channel interface
<code>fcoe fcf-priority fabric-priority priority</code>	Configures the FIP priority value advertised by the FCF to FCoE nodes (ENodes)
<code>fcoe fc-map map</code>	Configures the FCoE MAC address prefix (FC-Map) that is used to associate the ENode
<code>fcoe vsan vsan</code>	Maps a VSAN to a VLAN that carries FCoE traffic
<code>feature fcoe</code>	Enables the FCoE feature
<code>interface vfc number</code>	Configures a virtual Fibre Channel interface
<code>show fcns database</code>	Displays the name server database for a specified VSAN or for all VSANs
<code>show fcoe</code>	Displays the status of FCoE parameters on the switch
<code>show fcoe database</code>	Displays information about the FCoE database
<code>show flogi database</code>	Lists all the FLOGI sessions through all interfaces across all VSANs
<code>show interface brief</code>	Displays a table with interface statuses
<code>show interface ethernet slot/port fcoe</code>	Displays information about the FCoE for an interface
<code>show interface fc slot/port</code>	Displays the configuration information of a Fiber Channel interface
<code>show interface vfc number</code>	Displays the configuration information of virtual Fibre Channel interfaces
<code>show license usage</code>	Displays the license usage table
<code>show vlan fcoe</code>	Displays information about the FCoE VLAN to VSAN mappings
<code>show vsan membership</code>	Displays VSAN membership information
<code>shutdown lan</code>	Shuts down the Ethernet traffic on an FCoE link
<code>vsan vsan interface interface</code>	Adds an interface to a VSAN
<code>vsan database</code>	Enters the VSAN configuration mode

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings
- SAN information:

	Pod 1	Pod 2	Pod 3	Pod 4	Pod 5	Pod 6
VSAN	11	12	11	12	11	12
FCoE VLAN	1011	1012	1011	1012	1011	1012
WWPN	20:00:00:25: B5:C0:40:01	20:00:00:25: B5:C0:40:02	20:00:00:25: B5:C0:40:03	20:00:00:25: B5:C0:40:04	20:00:00:25: B5:C0:40:05	20:00:00:25: B5:C0:40:06
Device-alias	dcuci-c1	dcuci-c2	dcuci-c3	dcuci-c4	dcuci-c5	dcuci-c6

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Trouble Ticket

The Cisco C-Series server should be able to boot ESXi from SAN but cannot connect to the storage array. It is your task to figure out what is wrong and correct it.

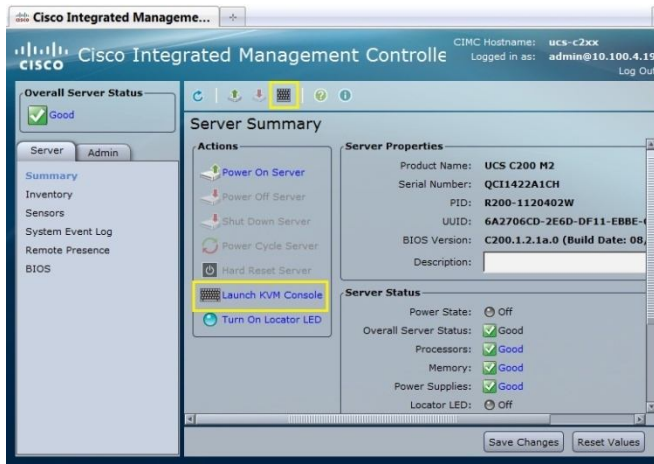
### Activity Procedure

Complete these steps:

- Step 1** Open a web browser and login to the IP address of the Cisco Integrated Management Controller of your C-Series server (192.168.10.4X, where X is your pod number).



- Step 2** From the Cisco Integrated Management Controller summary screen, click the **Power On Server** link or **Power Cycle Server** in the Actions area of the screen. Click **OK** when prompted to confirm powering on or power cycling the server.
- Step 3** Open a KVM console window inside the Cisco Integrated Management Controller and observe the booting process. When possible, enter the boot order menu by pressing **F6**.



**Step 4** Verify that there is no option to boot from SAN.

**Step 5** Start troubleshooting.

## Lab Setup

The instructor will provide you with directions to prepare the lab equipment for this lab. After the instructor indicates that the lab is fully prepared, you are ready to start troubleshooting.



# Lab 4-2: Troubleshoot FCoE—Part 2

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

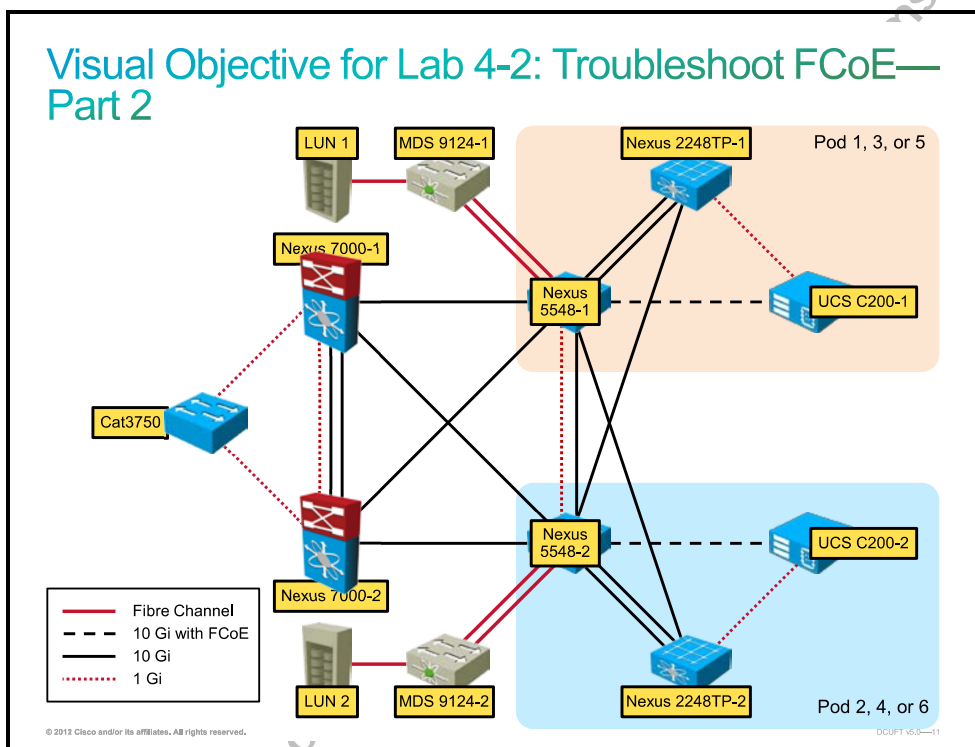
## Activity Objective

In this activity, you will troubleshoot and resolve issues in connectivity in a network that uses FCoE. After completing this activity, you will be able to meet these objectives:

- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 6 Cisco UCS C-Series servers
- 6 Cisco Nexus 5548UP switches
- 2 Cisco MDS 9124 switches
- Disk array

# Command List

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

Command	Description
<code>bind interface {ethernet chassis-id/slot/port   port-channel channel-num   vethernet veth-num}</code>	Binds an interface to a virtual Fibre Channel interface
<code>feature fcoe</code>	Enables the FCoE feature
<code>lldp receive</code>	Specifies that the interface receives LLDP packets
<code>lldp transmit</code>	Specifies that the interface transmits LLDP packets
<code>priority-flow-control mode mode</code>	Configures PFC on an interface
<code>show class-map</code>	Displays the class map
<code>show fcoe</code>	Displays the status of FCoE parameters on the switch
<code>show interface brief</code>	Displays a table with interface statuses
<code>show interface counters errors</code>	Displays interface error counters
<code>show interface ethernet slot/port fcoe</code>	Displays information about the FCoE for an interface
<code>show interface ethernet slot/port priority-flow-control</code>	Displays the status of PFC on an interface
<code>show interface fc slot/port</code>	Displays the configuration information of a Fiber Channel interface
<code>show interface vfc number</code>	Displays the configuration information of virtual Fibre Channel interfaces
<code>show license usage</code>	Displays the license usage table
<code>show lldp interface Ethernet slot/port</code>	Displays LLDP interface information, or LLDP neighbor information on an interface.
<code>show policy-map</code>	Displays policy maps and statistics
<code>show queuing interface Ethernet slot/port</code>	Displays queuing information on a specified interface
<code>show system internal dcbx info interface ethernet slot/port</code>	Displays system internal DCBX information for a specific interface

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings
- SAN information:

	Pod 1	Pod 2	Pod 3	Pod 4	Pod 5	Pod 6
VSAN	11	12	11	12	11	12
FCoE VLAN	1011	1012	1011	1012	1011	1012
WWPN	20:00:00:25: B5:C0:40:01	20:00:00:25: B5:C0:40:02	20:00:00:25: B5:C0:40:03	20:00:00:25: B5:C0:40:04	20:00:00:25: B5:C0:40:05	20:00:00:25: B5:C0:40:06
Device-alias	dcuci-c1	dcuci-c2	dcuci-c3	dcuci-c4	dcuci-c5	dcuci-c6

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Trouble Ticket

The Cisco C-Series server should be able to boot ESXi from SAN but cannot connect to the storage array. It is your task to figure out what is wrong and correct it.

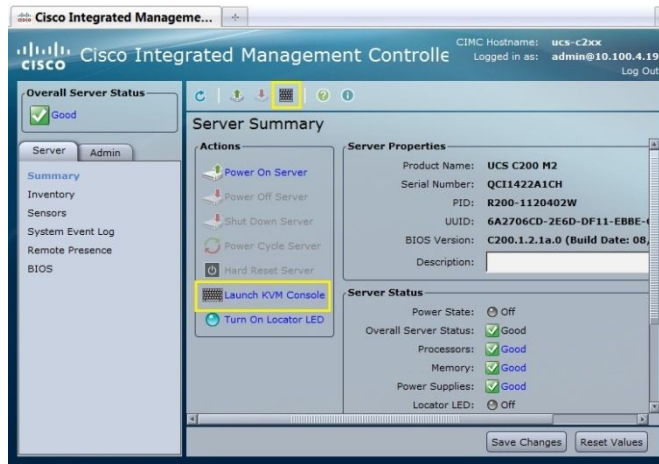
### Activity Procedure

Complete these steps:

- Step 1** Open a web browser and login to the IP address of the Cisco Integrated Management Controller of your C-Series server (192.168.10.4X, where X is your pod number).



- Step 2** From the Cisco Integrated Management Controller summary screen, click the **Power On Server** link or **Power Cycle Server** in the Actions area of the screen. Click **OK** when prompted to confirm powering on or power cycling the server.
- Step 3** Open a KVM console window inside the Cisco Integrated Management Controller and observe the booting process. When possible, enter the boot order menu by pressing **F6**.



**Step 4** Verify that there is no option to boot from SAN.

**Step 5** Start troubleshooting.

## Lab Setup

The instructor will provide you with directions to prepare the lab equipment for this lab. After the instructor indicates that the lab is fully prepared, you are ready to start troubleshooting.



# Lab 5-1: Troubleshoot VDCs

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

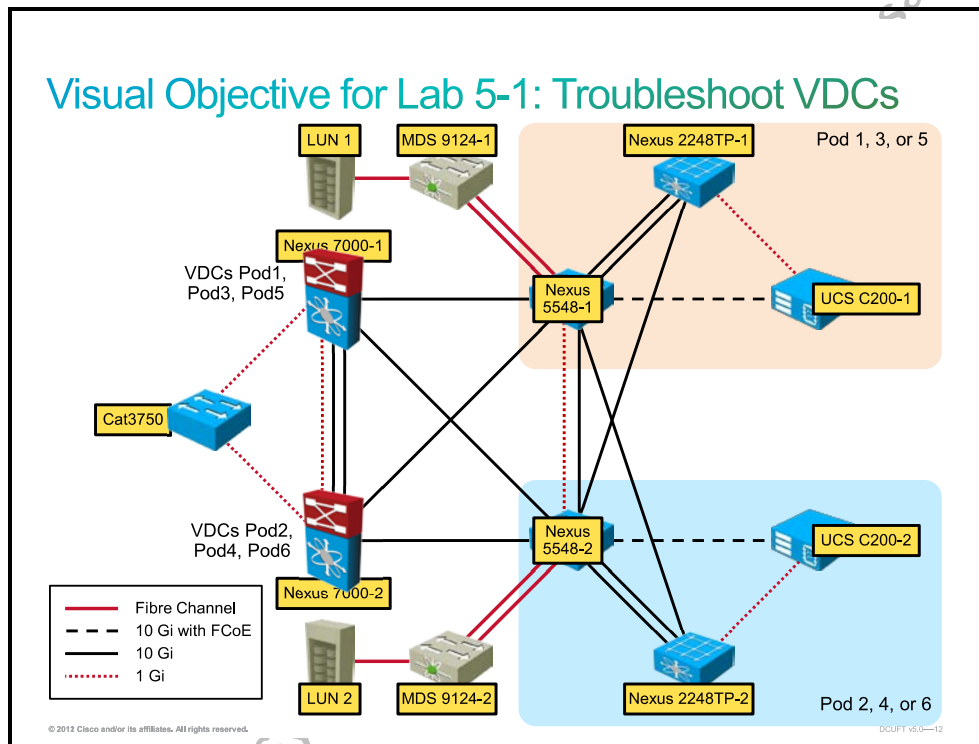
## Activity Objective

In this activity, you will verify issues related to VDCs. After completing this activity, you will be able to meet these objectives:

- Check your VDC resources and resource usage
- Document your VDC

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 2 Cisco Nexus 7000 switches

## Command List

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

Command	Description
<code>show vdc</code>	Displays VDC information
<code>show vdc current-vdc</code>	Displays which VDC you are currently in
<code>show vdc detail</code>	Displays detailed VDC information
<code>show vdc feature-set</code>	Displays VDC feature-set information
<code>show vdc internal bitmaps</code>	Displays kernel bitmap tables
<code>show vdc internal errors</code>	Displays error logs of vdc_mgr
<code>show vdc internal event-history</code>	Displays various event logs of vdc_mgr
<code>show vdc internal mac_address_table</code>	Displays the internal table of MAC addresses
<code>show vdc internal mem-stats</code>	Displays memory allocation statistics of vdc_mgr
<code>show vdc internal msgs</code>	Displays various message logs of vdc_mgr
<code>show vdc internal port-hash</code>	Displays the vdc_mgr port hash table
<code>show vdc internal pss</code>	Displays internal PSS information for vdc_mgr
<code>show vdc membership</code>	Displays VDC interface membership information
<code>show vdc shared</code>	Displays the shared interfaces in a VDC

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Task 1: Verify Your VDC

In this task, you will verify and document your VDC configuration.

### Activity Procedure

To complete the steps, answer these questions:

**Step 1** What is your VDC name and VDC ID?

\_\_\_\_\_

**Step 2** Are the physical interfaces equally shared among all the VDCs on a first-come-first-served basis?

\_\_\_\_\_

**Step 3** Can you see all the device interfaces from your pod? Why or why not?

\_\_\_\_\_

**Step 4** Which interfaces are allocated to your VDC?

---

**Step 5** How can you allocate an additional interface to your VDC?

---

**Step 6** Which feature sets are enabled for your VDC?

---

**Step 7** Which command will you use to see memory allocation statistics of vdc\_mgr?

---

**Step 8** Which command will you use to see error logs of vdc\_mgr? Which error was logged as the last one for your VDC?

---

### Activity Verification

You have completed this task when you attain these results:

- You have documented the information about your VDC.
- All **show** commands have been properly identified and documented.

# Lab 5-2: Troubleshoot Cisco Fabric Services

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

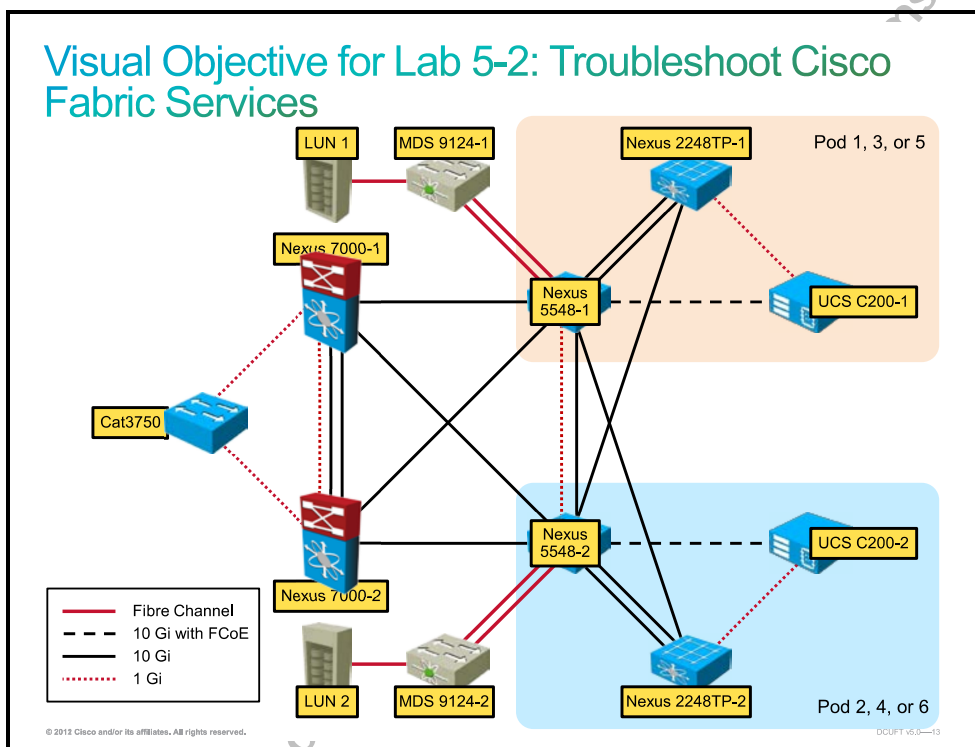
## Activity Objective

In this activity, you will troubleshoot and resolve issues related to Cisco Fabric Services. After completing this activity, you will be able to meet these objectives:

- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 2 Cisco Nexus 7000 switches

# Command List

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

Command	Description
<code>cfs ipv4 distribute</code>	Configures the device to use IPv4 to distribute changes in Cisco Fabric Services-enabled applications
<code>cfs ipv4 mcast-address address</code>	Configures the IPv4 multicast address over which configuration changes are distributed
<code>cfs region</code>	Creates a Cisco Fabric Services region that limits the distribution scope of an application
<code>commit</code>	Distributes a Cisco Fabric Services configuration
<code>show cfs application</code>	Displays locally registered Cisco Fabric Services applications
<code>show cfs lock</code>	Displays the state of application logical and physical locks
<code>show cfs merge</code>	Displays Cisco Fabric Services merge information
<code>show cfs peers</code>	Displays all the peers in the physical fabric
<code>show cfs regions</code>	Displays all the applications with peers and region information
<code>show cfs status</code>	Displays the current status of Cisco Fabric Services

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Trouble Ticket

Cisco Fabric Services infrastructure configured between two Nexus 7000 switches is not operational. It is your task to figure out what is wrong and correct it. Work with your partner pod (partners are pods 1 and 2, pods 3 and 4, and pods 5 and 6).

## Activity Procedure

Complete these steps:

- Step 1** Log in to your VDC on the Cisco Nexus 7000 switch.
- Step 2** Verify that the Cisco Fabric Services infrastructure is not operational.
- Step 3** Start troubleshooting.
- Step 4** Verify the proper operational infrastructure by creating a role named DCUFT-P, where P is your pod number, on one of the Cisco Nexus 7000 switches. The role should be distributed among Cisco Fabric Services peers.



# Lab 5-3: Troubleshoot the Fabric Extender

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

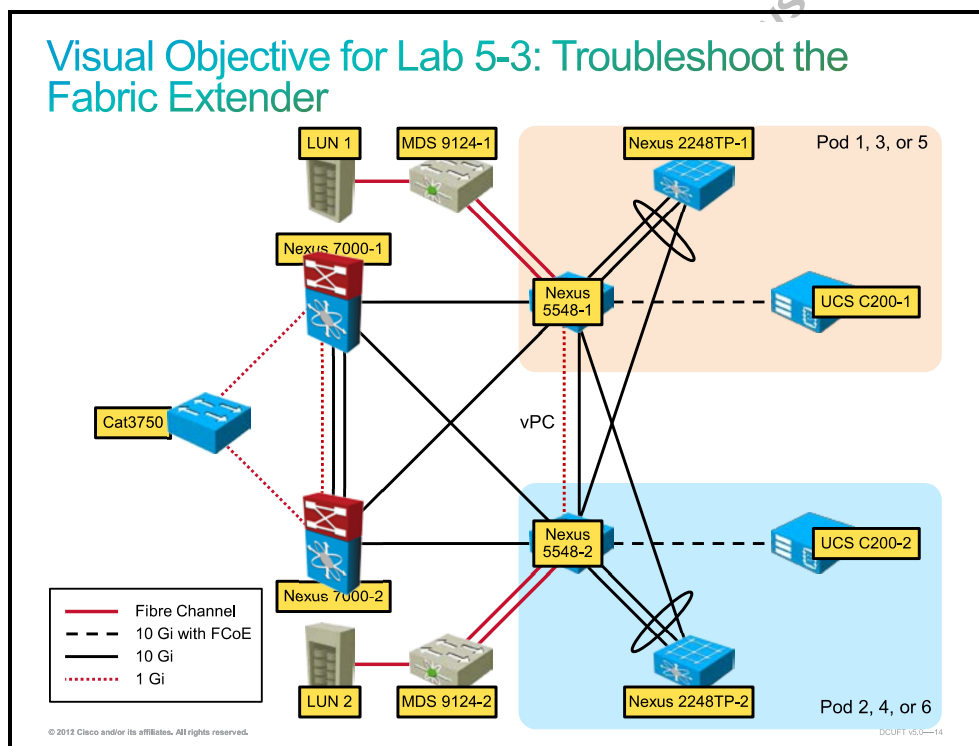
## Activity Objective

In this activity, you will troubleshoot and resolve issues related to Cisco Fabric Extender (FEX). After completing this activity, you will be able to meet these objectives:

- Check and document the connectivity between the Cisco Nexus 2248 Fabric Extender and the Nexus 5548 switch
- Perform troubleshooting and identify the cause of the problem
- Resolve the issue
- Test the network for proper operation

## Visual Objective

The figure illustrates what you will accomplish in this activity.



## Required Resources

These are the resources and equipment that are required to complete this activity:

- 6 Cisco Nexus 5548UP switches
- 6 Cisco Nexus 2248 Fabric Extenders

## Command List

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

Command	Description
<code>channel-group</code>	Adds a channel group to an interface
<code>fex fex-number</code>	Enters the FEX configuration
<code>fex associate fex-number</code>	Associates a port to a FEX
<code>fex pinning redistribute fex-number</code>	Redistributes the host interfaces on a FEX
<code>pinning max-links links</code>	Specifies the number of statically pinned uplinks
<code>serial serial-number</code>	Assigns a serial number to a FEX
<code>show diagnostic result fex fex-number</code>	Displays the results from the diagnostic tests for a FEX chassis
<code>show environment fex fex-number</code>	Displays the environmental sensor status
<code>show fex</code>	Displays information about a specific FEX or all attached chassis
<code>show fex fex-number detail</code>	Displays detailed listings about a specific FEX or all attached chassis
<code>show interface ethernet slot/port fex-intf</code>	Displays the host interfaces pinned to a fabric interface
<code>show fex transceiver</code>	Displays information about the transceiver connecting a FEX to the Cisco Nexus 5500 Series Switch
<code>show interface fex-fabric</code>	Displays all FEX fabric interfaces
<code>show inventory fex fex-number</code>	Displays the FEX physical inventory
<code>show module fex</code>	Displays the information about the FEX module
<code>switchport mode fex-fabric</code>	Sets the interface type to be an uplink port for a FEX
<code>vpc vpc-number</code>	Adds vPC to an interface

## Job Aids

These job aids are available to help you complete the lab activity.

- Lab Guide
- Topology drawings
- Port channel information:

Pod	Interface Eth1/14	Interface Eth1/15	Interface Eth1/16
1	Port-channel 102	Port-channel 101	Port-channel 101
2	Port-channel 101	Port-channel 102	Port-channel 102
3	Port-channel 104	Port-channel 103	Port-channel 103
4	Port-channel 103	Port-channel 104	Port-channel 105
5	Port-channel 106	Port-channel 105	Port-channel 105

Pod	Interface Eth1/14	Interface Eth1/15	Interface Eth1/16
6	Port-channel 105	Port-channel 106	Port-channel 106

■ vPC information:

Pod	Port Channel	vPC
1, 2	Port-channel 101	vpc 101
1, 2	Port-channel 102	vpc 102
3, 4	Port-channel 103	vpc 103
3, 4	Port-channel 104	vpc 104
5, 6	Port-channel 105	vpc 105
5, 6	Port-channel 106	vpc 106

For management IP addressing and interface assignments per pod, refer to your lab topology, populated in Lab 1-1.

## Trouble Ticket

Active/active FEX topology that is configured between two Cisco Nexus 5548UP switches (vPC) and both Nexus 2248 Fabric Extenders is not operational. It is your task to figure out what is wrong and correct it. Work with your partner pod (partners are pods 1 and 2, pods 3 and 4, and pods 5 and 6).

## Activity Procedure

Complete these steps:

- Step 1** Log in to your Cisco Nexus 5548UP switch.
- Step 2** Verify the interfaces connecting the Cisco Nexus 5548 switch and Nexus 2248 FEX.
- Step 3** Verify that the active/active FEX topology is not operational.
- Step 4** Start troubleshooting.

## Lab Setup

The instructor will provide you with directions to prepare the lab equipment for this lab. After the instructor indicates that the lab is fully prepared, you are ready to start troubleshooting.



# Answer Key

The correct answers and expected solutions for the activities that are described in this guide appear here.

## Lab 1-1 Answer Key: Network Baseline Documentation

Interface assignments per pod:

### Pod 1

Device	Interface	Comment
N7K1-POD1	e4/3	Connection to N7K2-POD2 (e4/3)
N7K1-POD1	e1/41	Connection to N7K2-POD2 (e3/41)
N7K1-POD1	mgmt0	Connection to C3750
N7K1-POD1	e1/1	Connection to C3750
N7K1-POD1	e4/9	Connection to N5548-1 (e1/9)
N7K1-POD1	e4/11	Connection to N5548-2 (e1/10)
N5548-1	e1/9	Connection to N5548-2
N5548-1	e1/10	Connection to N5548-2
N5548-1	e1/3	Connection to C200-1
N5548-1	fc1/31	Connection to MDS9124-1
N5548-1	e1/1	Connection to N7K1-POD1 (e4/9)
N5548-1	e1/2	Connection to N7K2-POD2 (e4/9)
N5548-1	e1/14	Connection to FEX 2248-2
N5548-1	e1/15	Connection to FEX 2248-1
N5548-1	e1/16	Connection to FEX 2248-1
MDS9124-1	fc1/11	Connection to N5548-1 (fc 1/31)
MDS9124-1	fc1/7	Connection to Storage (CX3-SPA)

### Pod 2

Device	Interface	Comment
N7K2-POD2	e4/3	Connection to N7K1-POD1 (e4/3)
N7K2-POD2	e3/41	Connection to N7K1-POD1 (e1/41)
N7K2-POD2	mgmt0	Connection to C3750
N7K2-POD2	e3/1	Connection to C3750
N7K2-POD2	e4/9	Connection to N5548-1 (e1/9)
N7K2-POD2	e4/11	Connection to N5548-2 (e1/10)
N5548-2	e1/9	Connection to N5548-1
N5548-2	e1/10	Connection to N5548-1

Device	Interface	Comment
N5548-2	e1/3	Connection to C200-2
N5548-2	fc1/31	Connection to MDS9124-2
N5548-2	e1/1	Connection to N7K1-POD1 (e4/11)
N5548-2	e1/2	Connection to N7K2-POD2 (e4/11)
N5548-2	e1/14	Connection to FEX 2248-1
N5548-2	e1/15	Connection to FEX 2248-2
N5548-2	e1/16	Connection to FEX 2248-2
MDS9124-2	fc1/11	Connection to N5548-2 (fc 1/31)
MDS9124-2	fc1/8	Connection to Storage (CX3-SPB)

### Pod 3

Device	Interface	Comment
N7K1-POD3	e4/7	Connection to N7K2-POD4 (e4/7)
N7K1-POD3	e1/45	Connection to N7K2-POD4 (e3/45)
N7K1-POD3	mgmt0	Connection to C3750
N7K1-POD3	e1/3	Connection to C3750
N7K1-POD3	e4/13	Connection to N5548-3 (e1/1)
N7K1-POD3	e4/15	Connection to N5548-4 (e1/1)
N5548-3	e1/9	Connection to N5548-4 (e1/9)
N5548-3	e1/10	Connection to N5548-4 (e1/10)
N5548-3	e1/3	Connection to C200-3
N5548-3	fc1/31	Connection to MDS9124-1 (fc 1/12)
N5548-3	e1/1	Connection to N7K1-POD3 (e4/13)
N5548-3	e1/2	Connection to N7K2-POD4 (e4/13)
N5548-3	e1/14	Connection to FEX 2248-4
N5548-3	e1/15	Connection to FEX 2248-3
N5548-3	e1/16	Connection to FEX 2248-3
MDS9124-1	fc1/12	Connection to N5548-3 (fc 1/31)
MDS9124-1	fc1/7	Connection to Storage (CX3-SPA)

### Pod 4

Device	Interface	Comment
N7K2-POD4	e4/7	Connection to N7K1-POD3 (e4/7)
N7K2-POD4	e3/45	Connection to N7K1-POD3 (e1/45)
N7K2-POD4	mgmt0	Connection to C3750

Device	Interface	Comment
N7K2-POD4	e3/3	Connection to C3750
N7K2-POD4	e4/13	Connection to N5548-3 (e1/2)
N7K2-POD4	e4/15	Connection to N5548-4 (e1/2)
N5548-4	e1/9	Connection to N5548-3 (e1/9)
N5548-4	e1/10	Connection to N5548-3 (e1/10)
N5548-4	e1/3	Connection to C200-4
N5548-4	fc1/31	Connection to MDS9124-2 (fc 1/12)
N5548-4	e1/1	Connection to N7K1-POD3 (e4/15)
N5548-4	e1/2	Connection to N7K2-POD4 (e4/15)
N5548-4	e1/14	Connection to FEX 2248-3
N5548-4	e1/15	Connection to FEX 2248-4
N5548-4	e1/16	Connection to FEX 2248-4
MDS9124-2	fc1/12	Connection to N5548-4 (fc 1/31)
MDS9124-2	fc1/8	Connection to Storage (CX3-SPB)

#### Pod 5

Device	Interface	Comment
N7K1-POD5	e4/19	Connection to N7K2-POD6 (e4/19)
N7K1-POD5	e1/46	Connection to N7K2-POD6 (e3/46)
N7K1-POD5	mgmt0	Connection to C3750
N7K1-POD5	e1/2	Connection to C3750
N7K1-POD5	e4/21	Connection to N5548-5 (e1/1)
N7K1-POD5	e4/23	Connection to N5548-6 (e1/1)
N5548-5	e1/9	Connection to N5548-6 (e1/9)
N5548-5	e1/10	Connection to N5548-6 (e1/10)
N5548-5	e1/3	Connection to C200-5
N5548-5	fc1/31	Connection to MDS9124-1 (fc 1/13)
N5548-5	e1/1	Connection to N7K1-POD5 (e4/21)
N5548-5	e1/2	Connection to N7K2-POD6 (e4/21)
N5548-5	e1/14	Connection to FEX 2248-6
N5548-5	e1/15	Connection to FEX 2248-5
N5548-5	e1/16	Connection to FEX 2248-5
MDS9124-1	fc1/13	Connection to N5548-5 (fc 1/31)
MDS9124-1	fc1/7	Connection to Storage (CX3-SPA)

## Pod 6

Device	Interface	Comment
N7K2-POD6	e4/19	Connection to N7K1-POD5 (e4/19)
N7K2-POD6	e3/46	Connection to N7K1-POD5 (e1/46)
N7K2-POD6	mgmt0	Connection to C3750
N7K2-POD6	e3/2	Connection to C3750
N7K2-POD6	e4/21	Connection to N5548-5 (e1/2)
N7K2-POD6	e4/23	Connection to N5548-6 (e1/2)
N5548-6	e1/9	Connection to N5548-5 (e1/9)
N5548-6	e1/10	Connection to N5548-5 (e1/10)
N5548-6	e1/3	Connection to C200-6
N5548-6	fc1/31	Connection to MDS9124-2 (fc 1/13)
N5548-6	e1/1	Connection to N7K1-POD5 (e4/23)
N5548-6	e1/2	Connection to N7K2-POD6 (e4/23)
N5548-6	e1/14	Connection to FEX 2248-5
N5548-6	e1/15	Connection to FEX 2248-6
N5548-6	e1/16	Connection to FEX 2248-6
MDS9124-2	fc1/13	Connection to N5548-6 (fc 1/31)
MDS9124-2	fc1/8	Connection to Storage (CX3-SPB)

## Lab 2-1 Answer Key: Troubleshoot vPCs

When you complete this activity, your solution will be similar to the results here, with differences that are specific to your device or workgroup:

First, you should issue a **show vpc** command on the Cisco Nexus 7000 switch. You can see that the peer link is down and the vPC peer-keepalive status is misconfigured or the peer is not reachable. You should check the running configuration for vPC (use the **show running-configuration vpc** command).

The first problem is caused by a wrong peer-keepalive destination on the Nexus 7000 for pods 1, 3, and 5 (N7K1). It is configured as 192.168.10.95 (pod 1), 192.168.10.96 (pod 3), or 192.168.10.103 (pod 5), but should be 192.168.10.97 (pod 1), 192.168.10.98 (pod 3), or 192.168.10.104 (pod 5). A student should correct it by issuing the following commands (example for pod 3):

```
vpc domain 34
    peer-keepalive destination 192.168.10.98
```

When you issue the **show vpc** command, you can now see that the peer is alive but that the domain IDs do not match. You should compare vPC domain IDs between two partner pods.

The second problem is caused by a wrongly specified vPC domain on the Cisco Nexus 7000 switch for Pods 2, 4, and 6 (N7K2). It is configured as 21 (pod 2), 43 (pod 4), or 65 (pod 6)

instead of 12 (pod 2), 34 (pod 4) or 56 (pod 6). You can remedy this issue by configuring the following commands on the N7K2 switch (example for pod 4):

```
vpc domain 34
```

By typing the **show vpc** command, you can see that the peer link is still down and port channel 6 (pods 1 and 2), 7 (pods 3 and 4), or 8 (pods 5 and 6) is down. If you issue a **show interface port-channel 6**, **show interface port-channel 7**, or **show interface port-channel 8** command on the Nexus 7000 switch for pods, 1, 3 or 5 (N7K1), you will see the message “port-channel is down (BPDUGuard errDisable, port: error).” You should disable BPDU Guard and then bounce the port:

```
interface port-channel 6 (or 7 or 8)
  no spanning-tree bpduguard enable
  shut
  no shut
```

By typing the **show vpc** command, you will see the message “peer adjacency formed ok.” Still, there is a configuration inconsistency (“STP mode inconsistent”). Use the **show vpc consistency-parameters global** command to compare two vPC peers. Change the STP mode on the Nexus 7000 switch for Pods 1, 3, and 5 (N7K1) to Rapid PVST:

```
spanning-tree mode rapid-pvst
```

There is only one more problem: If you type the **show vpc** command on the Cisco Nexus 7000 switch for pods 2, 4, or 6 (N7K2), in the last column you can see that port channels 51 and 52 (pod 2), 53 and 54 (pod 4) or 55 and 56 (pod 6) are down. Use the **show port-channel summary** command to see the status of all the members. You can see that the member ports Eth4/9 and Eth4/11 (pod 2), Eth4/13 and Eth4/15 (pod 4), or Eth4/21 and Eth4/23 (pod 6) are down. Since everything is OK on this side of the link, you should connect to the Nexus 5548 switch and check the configuration for the port connecting to the interfaces on the Nexus 7000. For all pods, you can see that interface Eth1/2 on the Nexus 5548 is administratively down. Enable the port (for all pods):

```
int eth 1/2
  no shut
```

## Lab 2-2 Answer Key: Troubleshoot Cisco FabricPath

When you complete this activity, your solution will be similar to the results here, with differences that are specific to your device or workgroup:

First, you should check your VLAN 10 since VLAN 10 should be in FabricPath mode. Issue a **show vlan** command on the Cisco Nexus 7000 switch to see the modes for the VLANs. VLAN 10 is in CE mode, so you should change this to FabricPath mode.

```
vlan 10
  mode fabricpath
  exit
```

You still cannot see any Nexus 5548 switches if you type the **show fabricpath switch-id** command. You have to connect to your Nexus 5548 switch. Check the mode of VLAN 10—it is CE. However, you cannot change the mode to FabricPath at this moment. The reason for that

is that the FabricPath feature set is not enabled on this switch. You should enable it and then change the mode for VLAN 10:

```
feature-set fabricpath
vlan 10
  mode fabricpath
exit
```

You still cannot ping the partner pod Nexus 5548 switch on VLAN 10. VLANs should be in FabricPath mode, and so should the interfaces between all switches. Interfaces Eth4/1 and Eth4/3 (pods 1 and 2), Eth4/5 and Eth4/7 (pods 3 and 4), or Eth4/17 and Eth4/19 (pods 5 and 6) should be in FabricPath mode. Correct this by typing the following commands on the Cisco Nexus 7000 switch (example for pods 3 and 4):

```
int eth 4/5
  switchport mode fabricpath
int eth 4/7
  switchport mode fabricpath
```

Correct the mode also by typing the following commands on the Nexus 5548 switch (all pods):

```
int eth 1/1-2
  switchport mode fabricpath
```

You can verify the connectivity by sending a ping to the partner pod Nexus 5548 IP address on VLAN 10.

## Lab 2-3 Answer Key: Troubleshoot OTV Issues

When you complete this activity, your solution will be similar to the results here, with differences that are specific to your device or workgroup:

The first problem is caused by the OTV site VLAN misconfiguration. VLAN 1 is set as the OTV site VLAN. Since this is also the management VLAN for connectivity to the Cisco Catalyst 3550 switch, both Nexus 7000 switches use this and try to set up OTV as one site only (both OTV site identifiers are the same on both Nexus 7000 switches). A student should change OTV site VLAN to a different VLAN (VLAN 13, 14, or 15 for example).

```
otv site-vlan 13
```

The OTV site identifiers are the same on both of the Nexus 7000 switches. Since the two Nexus 7000 switches are on separate sites, you should also change an OTV site identifier on one of the Nexus 7000 switches:

```
otv site-identifier 0x2
```

By issuing the **show otv overlay 1** command and comparing the values from your partner pod, you can see that you have the same IP address configured on both join interfaces. You can fix this issue by changing the IP address (it has to be in the same subnet). Type the following commands on the Cisco Nexus 7000 switches in pods 1, 3, or 5 (N7K1) (example for pod 3):

```
interf eth 1/45
  ip address 10.7.7.3/24
```

The next problem can also be observed from the output of the **show otv overlay 1** command. The OTV control group is misconfigured on the Nexus 7000 switches. It should be the same for both pods. You can change this IP address on the Nexus 7000 switches in pods 2, 4, or 6 (N7K2) (example for pod 4):

```
int overlay 1
  otv control-group 239.7.7.7
```

The last problem is caused because not enough VLANs are extended over OTV on the Cisco Nexus 7000 switches in pods 1, 3, and 5 (N7K1). You can fix this issue by configuring the following commands on the Nexus 7000 switches in POD 1, 3, and 5 (N7K1):

```
interface overlay 1
  otv extend-vlan 10-12
```

## Lab 3-1 Answer Key: Troubleshoot Fibre Channel Interfaces

When you complete this activity, your solution will be similar to the results here, with differences that are specific to your device or workgroup:

If you see the output of the **show fcns database** command, you can see that on the Cisco MDS switch there are no entries from the C-Series server, and on the Cisco Nexus 5548 switch there are no entries from the disk array. So the problem is most likely in the link between the two devices.

If you then look at the status of these two connecting interfaces (**show interface fc 1/31** on the Nexus 5548 switch, and **show interface fc 1/11** for pods 1 and 2, **fc1/12** for pods 3 and 4, or **fc1/13** for pods 5 and 6 on the MDS switch) you can observe that they are inactive or not connected. From the output on the Nexus 5548 switch, you can also see the message “Port vsan is in isolated mode.” By issuing the **show vsan** command, you do not see anything unusual; all VSANs are active. By using the **show vsan membership** command, you can see that interface fc1/31 is a member of an isolated VSAN. You should correct this and configure it to be a member of VSAN 11 (pods 1, 3, and 5) or VSAN 12 (pods 2, 4, and 6) (example for pods 1, 3, and 5):

```
vsan database
vsan 11 interface fc1/31
```

The interface is still not up, as the **show interface fc 1/31** command output now shows the message “Link failure or not-connected.” You can see that interface on the Cisco Nexus 5548 switch is configured as an “F port.” You should correct this configuration and set the port mode to “E port.”

```
interface fc 1/31
switchport mode E
```

When you compare configurations on both sides of the link, you can see that the speed of the link is misconfigured. You should correct this and configure the same speed on both sides. You can remedy this issue by configuring the following commands on the Nexus 5548 switch:

```
interface fc 1/31
switchport speed 4000
```

## Lab 3-2 Answer Key: Troubleshoot Fibre Channel VSANs, Zones and Domain Services

When you complete this activity, your solution will be similar to the results here, with differences that are specific to your device or workgroup:

If you see the output of the **show fcns database** command, you can see that on the Cisco Nexus 5548 switch there are no entries at all. If you then look at the status of the interface fc1/31 on the Nexus 5548 (**show interface fc 1/31**), you can observe that it is inactive. An interface connecting this switch to the Cisco C-Series server (interface Eth1/3) is up. But by observing the output of the command **show interface vfc 3**—the vFC interface that is bound to the physical interface Eth1/3—you can see a message stating that the interface vfc 3 is “down (Isolation due to no common vsans with peer on trunk).” The next logical step is to check the configuration of the VSANs.

By issuing the **show vsan** command, you can see that VSAN 11 (pods 1, 3, and 5) or VSAN 12 (pods 2, 4, and 6) is suspended and down. You can fix this issue by configuring the following commands on the Cisco Nexus 5548 switch (example for pods 1, 3, and 5):

```
vsan database
no vsan 11 suspend
```

Immediately after doing this, you get an error message saying: "%FCDOMAIN-2-EPORT\_ISOLATED: %\$VSAN 11%\$ Isolation of interface fc1/31 (reason: **domains are overlapping**)"

The next step is to check and compare Fibre Channel domain IDs on the Nexus 5548 and MDS switches for your VSAN. Use the **show fcdomain domain-list** command. You can see that both switches are configured with the same domain ID (238). You should correct the domain ID on the Nexus 5548 switch to something else (possible example for pod 1):

```
fcdomain domain 229 static vsan 11
fcdomain restart disruptive vsan 11
```

Immediately after doing this, you get an error message saying: "%ZONE-2-ZS\_MERGE\_FULL\_DATABASE\_MISMATCH: %\$VSAN 11%\$ Zone merge full database mismatch on interface fc1/31"

and

```
"%ZONE-2-ZS_MERGE_FAILED: %$VSAN 11%$ Zone merge failure, isolating
interface fc1/31 reason: Member mismatch:[reason:0]"
```

The next step is to compare zones between the Nexus 5548 and MDS switches. You can find a mismatch of members in the zone “znFabricA-dcuci-cX”, where X is your pod number. You can correct the member as follows (example for pod 3):

```
zone name znFabricA-dcuci-c3 vsan 11
no member device-alias dcuci-c4
member device-alias dcuci-c3
zone commit vsan 11
```

The last thing to do is to shut and no-shut the interface fc1/31 to bring VSAN 11 on that interface from “isolated” to “up”:

```
interface fc1/31
  shut
  no shut
```

## Lab 3-3 Answer Key: Troubleshoot NPV Mode

When you complete this activity, your solution will be similar to the results here, with differences that are specific to your device or workgroup:

You can start to troubleshoot after changing the Cisco Nexus 5548 switch to NPV mode. Interface fc1/31 should be in NP mode and interface vfc 3 should be in F mode.

The first problem that you can observe by checking interface configuration is caused by the misconfiguration of Fibre Channel switch port mode on the Cisco MDS switch on the interface connecting the MDS switch to the Nexus 5548 switch (fc1/11 for pods 1 and 2, fc1/12 for pods 3 and 4, and fc1/13 for pods 5 and 6). It is configured in E mode. You should correct this configuration and set the mode to “F”. You can remedy this issue by configuring the following commands on the MDS switch (example for pods 3 and 4):

```
interface fc 1/12
  switchport mode F
```

The second problem is caused by the misconfiguration of VSAN membership on the Cisco MDS switch. An interface connecting the MDS switch to the Nexus 5548 switch is a member of VSAN 1. It should be in VSAN 11 for pods 1, 3, and 5, or in VSAN 12 for pods 2, 4, and 6. You should correct this configuration and set the correct VSAN membership (example for pod 3):

```
vsan database
  vsan 11 interface fc 1/12
```

## Lab 4-1 Answer Key: Troubleshoot FCoE—Part 1

When you complete this activity, your solution will be similar to the results here, with differences that are specific to your device or workgroup:

If you see output of the **show fcns database** command, you can see that on the Cisco Nexus 5548 switch there are entries from the disk array but no entry from the C-Series server. The next step is to check interface Eth1/3 connecting the Nexus 5548 switch to the C-Series server. You can see that it is administratively down. You have to enable it:

```
int eth 1/3
  no shut
```

When physical interface Eth1/3 is up, you should also check the virtual Fibre Channel interface bound to this physical interface. You can observe the **show interface vfc 3** command output to see the port VSAN is wrong. It should be 11 for pods 1, 3, and 5, and 12 for pods 2, 4, and 6. You should correct this configuration and set the correct VSAN (example is for pods 1, 3, and 5):

```
vsan database
  vsan 11 interface vfc 3
```

The next step is to check if all the FCoE VLANs are correct. By issuing the **show vlan fcoe** command, you can see the correctly configured VLAN FCoE (1011 for pods 1, 3, and 5, and 1012 for pods 2, 4, and 6) but see that the encapsulated VSAN ID is wrong. It should be VSAN 11 for pods 1, 3, and 5, and VSAN 12 for pods 2, 4, and 6. You should correct this (example for pods 1, 3, and 5):

```
vlan 1011
  no fcoe vsan 12
  fcoe vsan 11
exit
```

## Lab 4-2 Answer Key: Troubleshoot FCoE—Part 2

When you complete this activity, your solution will be similar to the results here, with differences that are specific to your device or workgroup:

If you see output of the **show fcns database** command, you can see that on the Cisco Nexus 5548 switch there are entries from disk array but no entry from C-Series server. The next step is to check the interface Eth1/3 connecting the Nexus 5548 switch to the C-Series server. You can see that it is up. You should also check the virtual Fibre Channel interface bound to this physical interface. You can observe the **show interface vfc 3** command output to see the message “vfc 3 is down (Error disabled – vFC not bound).” You can fix this issue by configuring the following commands on the Nexus 5548 switch:

```
interface vfc 3
  bind interface eth 1/3
```

There are still no entries from the C-Series server in the FCNS database. Use the **show system internal dcbx info interface eth 1/3** command. You can observe that rx\_enabled and tx\_enabled is false. You can also check the **showlldp interface Ethernet 1/3** command to see the same result. You should correct this by using the following command:

```
interface eth 1/3
  lldp receive
  lldp transmit
```

## Lab 5-1 Answer Key: Troubleshoot VDCs

When you complete this activity, your answers will be similar to the results here, with differences that are specific to your device or workgroup:

- Step 1** Use the **show vdc** command to gather this information. Your VDC name is PODX, where X is your pod number. Your VDC ID depends on your pod.
- Step 2** No. They are allocated per VDC.
- Step 3** No. Not all device interfaces are allocated to your pod.
- Step 4** Use the **show vdc membership** command to gather this information.
- Step 5** You have to be in the default VDC and be logged in as a user with the network-admin role.
- Step 6** Use the **show vdc feature-set** command to gather this information. The FabricPath feature set is enabled for your VDC.
- Step 7** The proper command is **show vdc internal mem-stats**.

**Step 8** The proper command is **show vdc internal errors**. The last logged error is specific to your environment.

## Lab 5-2 Answer Key: Troubleshoot Cisco Fabric Services

When you complete this activity, your answers will be similar to the results here, with differences that are specific to your device or workgroup:

First, you should check the output of the **show cfs status** command. Pods 2, 4, and 6 (N7K2) have Cisco Fabric Services distribution over IPv4 disabled. Pods 2, 4, and 6 should use this command:

```
cfs ipv4 distribute
```

If you compare IPv4 multicast addresses, you can see that they are different on both the Cisco Nexus 7000 switches. They should be the same. You should change the address on one of the Nexus 7000 switches (example for changing the multicast address on N7K1 for pod 3):

```
no cfs ipv4 distribute
cfs ipv4 mcast-address 239.255.34.34
cfs ipv4 distribute
```

Now you can also see both of the Nexus 7000 switches in the output of the **show cfs peers** command.

You can verify the proper operational infrastructure by creating a role named DCUFT-P and distributing it to the other Nexus 7000 switch (Cisco Fabric Services peer). Example for pod 1:

```
role name DCUFT-1
role distribute
role commit
```

## Lab 5-3 Answer Key: Troubleshoot the Fabric Extender

When you complete this activity, your answers will be similar to the results here, with differences that are specific to your device or workgroup:

In the output of the **show fex** command, you can see that not all Cisco Fabric Extenders are online on both the Cisco Nexus 5548 switches belonging to you and your partner. In the **show fex detail** output, you can see that the fabric interface state of port channels 101 and 102 (pods 1 and 2), 103 and 104 (pods 3 and 4), or 105 and 106 (pods 5 and 6) are down.

The next step is to check the configurations of port channels. The **show interface port-channel id** command (where *id* represents 101 and 102, 103 and 104, or 105 and 106) shows that the port channel is “down (No operational members).” Interfaces connecting the Nexus 5548 switch and the Nexus 2248 FEX lack the **channel-group** command (the example is for pod 3):

```
interface Ethernet1/14
  channel-group 104
interface Ethernet1/15
  channel-group 103
interface Ethernet1/16
  channel-group 103
```

If you check the **show fex detail** command output again, you can see that the port channel statuses are now up and active. But you also see the message “FCoE FEX AA Configured: false”. Active/active FEX topology is misconfigured. The configuration of port channels that are created for interfaces connecting the Cisco Nexus 5548 switch and the Nexus 2248 FEX should include a proper **vpc** command to the port channel interfaces (example for pods 3 and 4):

```
interface port-channel103
  vpc 103
interface port-channel104
  vpc 104
```