# Windows 2012 NPIV on UCS Configuration Example



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# Introduction

This document describes how to configure Windows Server 2012 N\_Port ID Virtualization (NPIV) on Unified Computing System (UCS) Version 2.1(2a). With this feature, a Virtual Machine (VM) that runs on a server can share a single adapter, and still have independent access to its own protected storage.

# Prerequisites

#### Requirements

Cisco recommends that you have knowledge of these topics:

- Windows Fabric Network Interface Controller (fNIC) Driver Compatible with UCS Manager (UCSM) Version 2.1(2)
- UCSM Version 2.1(2) Virtual Interface Card (VIC) Firmware Image
- UCSM Version 2.1(2) on Fabric Interconnect/ I/O Modules (IOMs)
- Hyper-V 2012 and Windows 2012 Guests

#### **Components Used**

The information in this document is based on these software and hardware versions:

- Hyper–V Version 3.0
- Windows Server 2012
- NetApp Storage
- UCS Chassis, Fabric Interconnects, and B-Series Servers

• Cisco Nexus 5000 Series Switches

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

## Configure

Complete these steps in order to configure NPIV:

1. From a UCS perspective, you must configure your service profile with two Virtual Host Bus Adapters (vHBAs), one for each fabric. This image shows the vHBAs for one service profile. You can correlate the World Wide Port Names (WWPNs) with the service profile in the output that is shown later in the document.

*Note*: When you use Storage Area Network (SAN) storage in order to boot Hyper–V hosts, it is *highly recommended* that a separate set of vHBAs be used for VM traffic and for device booting. This example outlines a basic configuration with two vHBAs.



2. Configure your Virtual Storage Area Network (VSAN) from Hyper–V Manager. You must create two VSANs, one for each fabric. When you create a VSAN in other Hyper–V hosts, ensure that you use the same names; otherwise, Live Migration does not work. Click the *host*, and then click *Virtual SAN Manager*.

		Actions
Virtual Machines		 7700HV1
Virtual Machines	Virtual SAN Manager for 7700HV1	 Actions 7700HV1 New Hupper V Settings Virtual Switch Manager Stop Service Remove Server Refresh View Help Merriltrx Connect Settings Start
	OK Cancel Apply	Start         Image: Snapshot         Image: Snapshot

3. Create a new *Fibre Channel SAN* called FabricA, and select the *World Wide Node Name (WWNN)/WWPN* that corresponds to vHBA0–FabricA.



4. Add *FabricB*, and select the *WWNN/WWPN* that corresponds to vHBA1–FabricB.



5. Configure the settings for the Windows Server 2012 VM, and add two fibre channel adapters. With the VM powered off, right–click and choose *Settings*. This is done with the Failover Cluster Manager because these hosts are part of a cluster.

<u>4</u>		Failove	er Clust	er Manag	er				 x
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	Witual Machine 💊	Change Startup Priority	•	8 F	Running			Start	
	Storage 🔝	Information Details		-			6	Shut Down	
	E 🔮 Ouster D	Show Critical Events Add Storage		۵ ک	Inline			Turn Off	-
		Add Resource More Actions	•					Manage	
	×	Remove					1	Replication	·
		Properties						Move Cancel Live Migration	'
	٢					>		Change Startup Priority	F
1	Summary Resources							Information Details	v
7700HV1: SCVMM BDHTEST Resource	e								

6. Click Add Hardware, select Fibre Channel Adapter, and click Add.



7. Select Virtual SAN FabricA for the first adapter, and Virtual SAN FabricB for the second adapter.

Hardware	^	== Fibre Channel Adapter		
1 Add Hardware				
EIOS		You can review and edit the World Wid adapter, and connect the adapter to a	e Names (WWNs) assigned to virtual storage area network	o the Fibre Channel (SAN).
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2048 MB		Not connected		
Processor		Not connected		
4 Virtual processors		FabricA		
🗉 🔝 IDE Controller 0		FabricB		CUIL AUGRESSES
Hard Drive		Port addresses		
BDHTEST_DISK_1.VHDX		Address set A:		
DVD Drive		World Wide Node Name (WANNA-	C003EE0000EEEE00	
None		workd while mode manie (www.wy.		
SCSI Controller	≡	World Wide Port Name (WWPN):	C003FF69D15C0012	
📾 Fibre Channel Adapter				
FabricA		Address set B:		
Fibre Channel Adapter Eabric®		World Wide Node Name (WWNN):	C003FF0000FFFF00	
Eibre Channel Adapter		World Wide Port Name (WWPN):	C003FF69D15C0013	
Not connected				_
B 🏺 Bohtest			Create Addresses	
HyperVCL1_VirtualSwitch				
None		Click Copy to copy the addresses to the	e clipboard.	
TOM 2				Сору
None				
Diskette Drive		To remove the adapter from this virtua	I machine, click Remove.	
None				Remove
Planagement Planagement	-			
BDHTEST				
Integration Services				
All services offered				
Snapshot File Location	$\sim$			

These images show both adapters and their respective WWNNs/WWPNs.

8			-	Settings for BDHTEST on 7700H	V1	_ □
*	На	rdware	~	I Fibre Channel Adapter		
Г	10	Add Hardware				
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		📾 Hard Drive		Port addresses		
	-	BUHTEST_DISK_1.VHDX		Address set A:		
ľ	and :	IDE Controller 1		World Wide Node Name (MMMM)	CD03EE0000EEEE00	
		None		wand while house hence (in while).		_
	٥.	SCSI Controller	=	World Wide Port Name (WWPN):	C003FF69D15C000E	
	æÞ	Fibre Channel Adapter	-			
		FabricA		Address set b:		
		Fibre Channel Adapter		World Wide Node Name (WWNN):	CD03FF0000FFFF00	
l.	向	BOHTEST		World Wide Port Name (WWPN):	C003FF69D15C000F	
[_	w	HyperVCL1_VirtualSwitch				_
	雫	COM 1			Create Addresses	
	-	None				
	4	COM 2		Click Copy to copy the addresses to the	e clipboard.	
	H	Diskette Drive None				Сору
*	Ma	inagement		To remove the adapter from this virtual	machine, click Remove.	
	Ţ	Name BDHTEST				Remove
		Integration Services All services offered				
		Snapshot File Location C:\ClusterStorage\Volume3\BD				
	2252	Smart Paging File Location	$\mathbf{v}$			
-		10.00 0 000 100 0 0000			OK Cancel	Apply

9			5	Settings for BDHTEST on 7700H	<b>V</b> 1	_ □
*		ndware Add Hardware BIOS Boot from CD Memory 2048 M3 Processor	^	<ul> <li>Fibre Channel Adapter</li> <li>You can review and edit the World Wide adapter, and connect the adapter to a Virtual SAN:</li> <li>FabricB</li> </ul>	Names (WWNs) assigned to virtual storage area network	the Fibre Channel (3AN). Y
		4 Virtual processors IDE Controller 0		Clot car Addresses to earl the port acc	<i>nesses</i> .	Edit Addresses
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		DVD Drive None		World Wide Node Name (WWNN):	C033FFC000FFH-00	
	0	SCSI Controller	_	World Wide Port Name (WWPN):	C003FF69D15C0010	
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	- -	FabricB		world wide Node Name (w/wnin):	CD35FFC000FFFF00	_
Ð	1	BDHTEST		World Wide Port Name (WWPN):	C003FF69D15C0011	
	1	HyperVCL1_VirtualSwitch			Create Addresses	
	. <del>Q</del> .	None				
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*	Ma	inagement	.	To remove the adapter from this virtual	machine, dick Remove.	
	T	Name				Remove
	14	Integration Services All services offered				
	3	Snapphot File Location C:\ClusterStorage\Volume3\BD				
		Smart Paging File Location	~			
					OK Cancel	Apply

8. Add zoning on Nexus 5k switches.

Here is an example of how the Nexus 5000 Series switch might look (zoning for WWPNs of the UCS vHBAs are not shown):

```
! Zoning for HYVERTEST Fabric A
fcalias name HYPERVTEST vsan 10
    member pwwn c0:03:ff:69:d1:5c:00:0e
    member pwwn c0:03:ff:69:d1:5c:00:0f
    zone name HYPERVTEST_to_NetApp1 vsan 10
    Member fcalias HYPERVTEST
    Member fcalias NetApp1
zoneset name HyperVZoneset1 vsan 10
    member HYPERVTEST_to_NetApp1
zoneset activate name HyperVZoneset1 vsan 10
```

```
!Zoning for HYPERVTEST Fabric B
fcalias name HYPERVTEST vsan 11
   member pwwn c0:03:ff:69:d1:5c:00:10
   member pwwn c0:03:ff:69:d1:5c:00:11
   Zone name HYPERVTEST_to_NetApp2 vsan 11
   Member fcalias HYPERVTEST
   Member fcalias NetApp2
zoneset name HypervZoneset2 vsan 11
   member HYPERVTEST_to_NetApp2
zoneset activate name HyperVZoneset2 vsan 11
```

9. Add the WWPNs to NetApp in order to make sure they can access the Logical Unit Numbers (LUNs).

LUN Management Initiator Groups						
😼 Create 📝 Edit 🗙 Delete 🛛 🖏 Refresh						
Name	Туре	Operating System	ALUA	Initiator Count	12	
BOHTEST	FC/FCoE	Hyper-V	Enabled	4	A	
HV1_7700	FC/FCoE	Windows	Enabled	2	0	
HV2_7700	FC/FCoE	Windows	Enabled	2		
HV3_7700	FC/FCoE	Windows	Enabled	2		
HV4_7700	FC/FCoE	Windows	Enabled	2		
MSPEX1	FC/FCoE	Windows	Enabled	2		
RELASQL	FC/FCoE	Windows	Enabled	2		
					~	
Initiators c0:03:ff:69:d1:5c:00:0e c0:03:ff:69:d1:5c:00:11 c0:03:ff:69:d1:5c:00:10 c0:03:ff:69:d1:5c:00:0f					<b>~ ~</b>	
Initiators	Mapped LUNs					

### **Live Migration**

Each VM adapter has two sets of WWNN/WWPN. These are used by Hyper–V during a live migration. This image shows how each of the WWPNs is used during live migration.



Source: Hyper-V Virtual Fibre Channel Overview

It is important to note that there is a moment of overlap in which both WWPNs are logged in to the fabric.

This guarantees continuous work on the storage without interruption, even in case of migration failure.

The *Verify Live Migration* section shows the flogi database during the live migration process so you can see both WWPNs for the adapter flogi during the process.

## **Quick Migration**

Unlike live migration, quick migration temporarily suspends the VM that is moved.

Due to this, there is no reason to log in both WWPNs from a set. Instead, the VM can log out from one node and log in from a new node.

## **Verify Live Migration**

If everything is configured correctly, you should see a flogi entry in the flogi database for the UCS vHBAs and the VM fibre channel adapters.

Interface '	VSAN	FCID	Port Name	Node Name	
fc1/31	10	0x930001	50:0a:09:83:8d:80:b7:ae	50:0a:09:80:8d:80:b7:ae	
fc1/32	10	0x930000	50:0a:09:84:9d:80:b7:ae	50:0a:09:80:8d:80:b7:ae	
San-po31	10	0x930002	24:1f:54:7f:ee:57:1d:c0	20:0a:54:7f:ee:57:1d:c1	
San-po31	10	0x930003	20:00:00:25:b5:02:a0:8f	20:00:00:25:b5:02:00:8f	<vhba0-fabrica< td=""></vhba0-fabrica<>
San-po31	10	0x930004	20:00:00:25:b5:02:a0:9f	20:00:00:25:b5:02:00:9f	
San-po31	10	0x930005	20:00:00:25:b5:02:a0:6f	20:00:00:25:b5:02:00:6f	
San-po31	10	0x930006	20:00:00:25:b5:02:a0:7f	20:00:00:25:b5:02:00:7f	
San-po31	10	0x930007	20:00:00:25:b5:02:a0:4f	20:00:00:25:b5:02:00:4f	
San-po31	10	0x930008	20:00:00:25:b5:02:a0:5f	20:00:00:25:b5:02:00:5f	
San-po31	10	0x930009	c0:03:ff:69:d1:5c:00:0e	c0:03:ff:00:00:ff:ff:00	<set a="" for<="" td=""></set>
Adapter Fal	bricA				

```
NEXUS1# show flogi database
```

Interface	VSAN	FCID	Port Name	Node Name	
fc1/31	11	0x9f0001	50:0a:09:84:8d:80:b7:ae	50:0a:09:80:8d:80:b7:ae	
fc1/32	11	0x9f0000	50:0a:09:83:9d:80:b7:ae	50:0a:09:80:8d:80:b7:ae	
San-po32	11	0x9f0002	24:20:54:7f:ee:57:1a:80	20:0b:54:7f:ee:57:1a:81	
San-po32	11	0x9f0003	20:00:00:25:b5:02:b1:8f	20:00:00:25:b5:02:00:8f	<vhba1-fabricb< td=""></vhba1-fabricb<>
San-po32	11	0x9f0004	20:00:00:25:b5:02:b1:9f	20:00:00:25:b5:02:00:9f	
San-po32	11	0x9f0005	20:00:00:25:b5:02:b1:6f	20:00:00:25:b5:02:00:6f	
San-po32	11	0x9f0006	20:00:00:25:b5:02:b1:7f	20:00:00:25:b5:02:00:7f	
San-po32	11	0x9f0007	20:00:00:25:b5:02:b1:4f	20:00:00:25:b5:02:00:4f	
San-po32	11	0x9f0008	20:00:00:25:b5:02:b1:5f	20:00:00:25:b5:02:00:5f	
San-po32	11	0x9f000b	c0:03:ff:69:d1:5c:00:10	c0:03:ff:00:00:ff:ff:00	<set a="" for<="" td=""></set>
Adapter Fa	abricB				

In order to show the LUN, open the Disk Management in the guest VM, and enter the *rescan disks* command. If the LUN appears twice, Multipath I/O (MPIO) is not enabled.

During a live migration, you should see the WWPN for both Address Set A and Address Set B in each of the switches.

#### NEXUS1# show flogi database

Interface	VSAN	FCID	Port Name	Node Name	
fc1/31	10	0x930001	50:0a:09:83:8d:80:b7:ae	50:0a:09:80:8d:80:b7:ae	
fc1/32	10	0x930000	50:0a:09:84:9d:80:b7:ae	50:0a:09:80:8d:80:b7:ae	
San-po31	10	0x930002	24:1f:54:7f:ee:57:1d:c0	20:0a:54:7f:ee:57:1d:c1	
San-po31	10	0x930003	20:00:00:25:b5:02:a0:8f	20:00:00:25:b5:02:00:8f	
San-po31	10	0x930004	20:00:00:25:b5:02:a0:9f	20:00:00:25:b5:02:00:9f	
San-po31	10	0x930005	20:00:00:25:b5:02:a0:6f	20:00:00:25:b5:02:00:6f	
San-po31	10	0x930006	20:00:00:25:b5:02:a0:7f	20:00:00:25:b5:02:00:7f	
San-po31	10	0x930007	20:00:00:25:b5:02:a0:4f	20:00:00:25:b5:02:00:4f	
San-po31	10	0x930008	20:00:00:25:b5:02:a0:5f	20:00:00:25:b5:02:00:5f	
San-po31	10	0x930009	c0:03:ff:69:d1:5c:00:0e	c0:03:ff:00:00:ff:ff:00	<address a<="" set="" td=""></address>
San-po31	10	0x93000a	c0:03:ff:69:d1:5c:00:0f	c0:03:ff:00:00:ff:ff:00	<address j<="" set="" td=""></address>

#### NEXUS2# show flogi database

Interface	VSAN	FCID	Port Name	Node Name
fc1/31	11	0x9f0001	50:0a:09:84:8d:80:b7:ae	50:0a:09:80:8d:80:b7:ae
fc1/32	11	0x9f0000	50:0a:09:83:9d:80:b7:ae	50:0a:09:80:8d:80:b7:ae
San-po32	11	0x9f0002	24:20:54:7f:ee:57:1a:80	20:0b:54:7f:ee:57:1a:81
San-po32	11	0x9f0003	20:00:00:25:b5:02:b1:8f	20:00:00:25:b5:02:00:8f
San-po32	11	0x9f0004	20:00:00:25:b5:02:b1:9f	20:00:00:25:b5:02:00:9f
San-po32	11	0x9f0005	20:00:00:25:b5:02:b1:6f	20:00:00:25:b5:02:00:6f
San-po32	11	0x9f0006	20:00:00:25:b5:02:b1:7f	20:00:00:25:b5:02:00:7f
San-po32	11	0x9f0007	20:00:00:25:b5:02:b1:4f	20:00:00:25:b5:02:00:4f
San-po32	11	0x9f0008	20:00:00:25:b5:02:b1:5f	20:00:00:25:b5:02:00:5f
San-po32	11	0x9f000b	c0:03:ff:69:d1:5c:00:10	c0:03:ff:00:00:ff:ff:00 <a< td=""></a<>
San-po32	11	0x9f000c	c0:03:ff:69:d1:5c:00:11	c0:03:ff:00:00:ff:ff:00 <a< td=""></a<>

### Troubleshoot

This section provides information you can use in order to troubleshoot your configuration.

#### **Common Problems**

• The *device or driver does not support virtual fibre channel* message displays under the Status column of a Virtual Fibre Channel SAN in *Hyper–V Manager > Virtual SAN Manager* when the

Microsoft Windows 2012 FNIC driver is not at the correct version. Verify the current FNIC driver version by going to *Device Manager > Storage Controllers > Cisco VIC FCoE Storport Miniport > Properties > Driver*. Use the UCS Interoperability Matrix in order to determine which driver is supported based on the blade model, UCS firmware version, and adapter. If necessary, update the driver.

- Under certain conditions, Live Migration fails with the *Synthetic FibreChannel Port: Failed to finish reserving resources* message. A couple of things should be verified:
  - Whether the WWPNs are added at the storage target initiator groups in NetApp.
  - Whether zoning information accounts for access of both sets of WWPNs assigned to VMs.
  - Whether the latest patches have been applied from Microsoft, whic includes KB 2894032.
- Live migration might fail when the device uses the same pair of HBAs for booting and VM traffic. This is described inUnified Computing System Virtual Machine Live Migration Fails with Virtual Fibre Channel Adapters.

#### **MPIO**

For resiliancy and fault tolerance, MultiPath I/O should be enabled on the operating system.

1. Enable Asymmetric Logical Unit Access (ALUA) on the NetApp for a particular initiator group.

Edit Initiator Group 'VM1'						
General Initiators						
Name:	VM1					
Operating System:	Windows	~				
Туре:	FC/FCoE					
Enable ALUA (Asymm)	etric Logical Unit Access)					

2. Enable the MPIO feature on the Microsoft side. From the *Add Roles and Features*, make sure that MPIO is enabled.

è.	Add Roles and Features Wizard
Select features	
Before You Begin Installation Type	Select one or more features to install on the selected server.
Server Selection	Ink and Handwriting Services
Server Roles	Internet Printing Client
Features	IP Address Management (IPAM) Server
Confirmation	iSNS Server service
Results	LPR Port Monitor
	□ Management OData IIS Extension ≡
	Media Foundation
	Message Queuing
	Multipath I/O (Installed)
	Network Load Balancing
	Peer Name Resolution Protocol
	Quality Windows Audio Video Experience
	RAS Connection Manager Administration Kit (CM/
	Remote Assistance

## **Related Information**

- Hyper-V Virtual Fibre Channel Overview
- Virtual Machine Live Migration Overview
- Technical Support & Documentation Cisco Systems

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