

SERVER CONNECTIVITY

Technical Brief: How to Configure NPIV on VMware ESX Server 3.5

Provides step-by-step instructions on how to configure NPIV on VMware ESX Server 3.5 in a Brocade fabric. Leveraging NPIV gives the administrator the ability to extend all of Brocade's advanced features and apply storage best practices in a virtualized data center.

BROCADE

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INTRODUCTION TO NPIV

N_Port ID Virtualization (NPIV) is an extension to the Fibre Channel industry standard, which is available across the Brocade[®] Host Bus Adapter (HBA) product line and Brocade Storage Area Network (SAN) platforms. NPIV delivers significant advantages for running multiple Virtual Machines (VMs) and managing the workload across multiple physical servers.

NOTE: The term "switches" is used in this document to reference Brocade backbone, director, switch, and embedded switch platforms unless otherwise noted.

Benefits of NPIV

In a server virtualization environment, NPIV allows each VM to have a unique Fibre Channel (FC) World Wide Name (WWN), enabling multiple virtual machines to share a single physical HBA and switch port, a virtual HBA port, as shown in Figure 1. By providing a unique virtual HBA port, storage administrators can implement SAN best practices such as zoning for individual VMs. Administrators can also take advantage of SAN management tools, simplifying migration of VMs and their storage resources.

The benefits of deploying NPIV in your storage environment are real and available today:

- Maintaining fewer physical components reduces the number of points of failure, resulting in improved availability and network uptime.
- Less hardware, portable connections, and VM-level zoning all contribute to simplified SAN and server management.
- NPIV allows the SAN best practices that are available with physical servers to be used in virtual server environments.



Figure 1. NPIV in the SAN

SERVER VIRTUALIZATION ADVANTAGES

A number of enhancements are being introduced into server virtualization products on the market, such as VMware® ESX Server, to augment existing support for Fibre Channel SANs, including NPIV and load balancing across FC ports.

Addressing and Access Control

Each FC port in a fabric has a World Wide Name assigned to it by the equipment manufacturer, which uniquely identifies each node. WWNs play a critical role in determining the visibility and accessibly of storage LUNs (partitions in storage arrays) by servers connected to the fabric. Zoning is the mechanism by which FC ports are grouped together to restrict interference, add security, and simplify management. Zoning utilizes WWNs to allow access to storage. A server can see and access only storage LUNs that share a common zone with that server.

NPIV in a Virtualized Environment

The hypervisor leverages NPIV to assign individual WWNs to each Virtual Machine, so that each Virtual Machine (VM) can be recognized as a specific end point in the fabric. The benefits of this approach are as follows:

- **Granular security.** Access to specific storage LUNs can be restricted to specific VMs using the VM WWN for zoning, in the same way that they can be restricted to specific physical servers.
- Easier monitoring and troubleshooting. The same monitoring and troubleshooting tools used with physical servers can now be used with VMs, since the WWN and the fabric address that these tools rely on to track frames are now uniquely associated to a VM.
- Flexible provisioning and upgrade. Since zoning and other services are no longer tied to the physical WWN "hard-wired" to the HBA, it is easier to replace an HBA. You do not have to reconfigure the SAN storage, because the new server can be pre-provisioned independently of the physical HBA WWN.
- Workload mobility. The virtual WWN associated with each VM follow the VM when it is migrated across physical servers. No SAN reconfiguration is necessary when the workload is relocated to a new server.
- Applications identified in the SAN. Since virtualized applications tend to be run on a dedicated VM, the WWN of the VM now identifies the application to the SAN.

REQUIREMENTS TO IMPLEMENT NPIV

There are a few requirements in both the software and hardware to enable NPIV:

- Switches. NPIV needs to be supported on the switch connected to the HBA. All Brocade FC switches currently support NPIV—specifically starting in FOS 5.3.x or later, M-EOSc 8.1, and M-EOSn 9.6.0. (See the "Troubleshooting" section to find out how to see if NPIV is enabled on the switch.)
- HBAs. HBAs must support NPIV as well. The following vendors and models of HBAs are supported:
 - Brocade. Any 4 Gbit/sec or 8 Gbit/sec HBA
 - Emulex. 4Gbit/sec HBA running firmware level 2.70a5 or later. All Emulex 8 Gbit/sec HBAs running firmware 1.00a9 or later
 - QLogic. Any 4 Gbit/sec or 8 Gbit/sec HBA
- Storage. NPIV is completely transparent to storage arrays, so no specific support is required.

- NPIV can be used only with Raw Device Mappings (RDM) disks. VMFS disks do not support NPIV. For more information on RDMs, refer to the current Fibre Channel SAN Configuration Guide for ESX Server 3.5.
- To implement NPIV, the physical HBAs port WWN on an ESX Server host must have access to all LUNs that are to be accessed by VMs.
- If you deploy a VM from a template or a clone, the new VM does not retain the WWN.

Server Administrator Tasks

NOTE: Do not power on your VM for this procedure; your virtual machine needs to be powered off.

1. Assign or modify WWN or your Virtual machine by following the steps below. These steps are also found in the *ESX* 3.5 *SAN Configuration Guide.*

To assign a WWN to an existing VM using Virtual Center:

- a. From Virtual Center, select the VM to which you want to assign a WW, right click and select **Edit** the Virtual Machine Settings.
- b. Click the Options tab and click Fibre Channel NPIV.
- c. In the dialog box, select **Generate**. Here are the available options:
 - Leave Unchanged: Existing WWNs are retained.
 - Generate New WWN: New set of WWNs are generated.
 - Remove WWN assignment. Removes the WWNs from the VM.
- d. Click **Close** and exit configuration.

To assign a WWN to a new VM using Virtual Center:

- a. Right-click on an ESX server or cluster and click New Virtual Machine.
- b. Click the **Custom** radio button.
- c. Give the VM a name and click Next.
- d. Enter the appropriate information and stop at the Select Disk Type screen.
- e. Select the Raw Disk Mapping and click Next.

f. Select the datastore.

NOTE: To use VMotion for VMs that have NPIV enabled, make sure that the RDM file is located on the same datastore where the virtual machine configuration file resides.

🚱 Add Hardware Wizard		×
Select a Datastore Onto which datastore of	do you want to map this LUN?	
Device Type Select a Disk Select Target LUN Select Datastore Compatibility Mode Advanced Options Ready to Complete	Select the datastore on which to store the LUN mapping. You will use the disk map on this datastore to access the virtual disk. Store with Virtual Machine Specify datastore	
Help	≤ Back Next ≥ Cancel	

g. Select the **Compatibility Mode**. For more information on the different compatibility modes ,refer to the "Fibre Channel SAN Configuration Guide."

🄕 10.66.3.53 - Remote De	sktop		
🔁 New Virtual Machine Wizard			_ 🗆 🗙 🔶
Select Compatibility Mode Which compatibility mode	Virtual Machine Version: 4		
Wizard Tupe Name and Locotian Datastore Guest Coreating System CFUs Metwork Network Vio Adapters Select a Disk Select Torget LUM	The compatibility m affect any other d Compatibility C Physical C Virtual	node you choose will apply only to this virtual disk and will not sks using this LUN mapping. Allow the guest operating system to access the hardware directly, Taking a snapshot of this virtual machine will not include this disk. Allow the virtual machine to use VMware snapshots and other advanced Functionality.	
Select Datastore Compatibility Mode Advanced Options Ready to Complete	1	_≤ BackNe	t ≥ Cancel

- h. Leave the defaults for the Advanced Options and click Next.
- i. In the last screen, click the Edit the virtual machine settings before submitting check box.
- j. Click the **Options** tab and click **Fibre Channel NPIV**.
- k. In the dialog box, select Generate New WWN.
- I. Click Close and exit configuration.

NOTE: Do not power on the VM guest after assigning the RDMs a virtual WWWN. If you do so, it will use the physical HBA WWN.

- 2. Once you have assigned a WWN to the VM, go back into the VM settings by right-clicking the VM and choosing **Edit Settings** from the menu.
- 3. Click the **Options** tab and click **Fibre Channel NPIV** in the left pane.

🛃 Test¥M41 - Yirtual Machine Properties				
Hardware Options Resources		Virtual Machine Version: 4		
Settings General Options VMware Tools Power Management Advanced General CPUID Mask Boot Options Paravirtualization Fibre Channel NPIV Virtualized MMU Swapfile Location	Summary TestVM41 System Default Suspend Normal Expose Nx flag to Delay 0 ms Disabled Assigned Automatic Use default settings	Fibre Channel Virtual WWNs Virtual machines running on hosts with Fibre Channel hardware that supports NPIV can be assigned virtual WWNs for advanced features. These WWNs are normally assigned by the host or by VirtualCenter. The current WWN assignments were created by VirtualCenter. C Leave unchanged C Generate new WWNs C Remove WWN assignment WWN Assignments: Node WWN: 28:25:00:0c:29:00:00:1a Port WWNs: 28:25:00:0c:29:00:00:1b, 28:25:00:0c:29:00:00:1c, 28:25:00:0c:29:00:00:1d, 28:25:00:0c:29:00:00:1e Note: This virtual machine version only supports virtual WWNs for RDM disks. Normal virtual disks will still use the physical host's WWN values.		
Help		OK Cancel		

- 4. Record the Node WWN and the Port WWNs. Give this information to the storage administrator so that (s)he can zone and LUN-mask the back-end storage. (Please follow the Storage Administrator steps below to zone and LUN-mask)
- 5. After the storage administrator completes zoning and configuration of the storage, you can safely power on the VM.
- 6. To verify that I/O traffic is actually going through the virtual port (depending on the host HBA). SSH into the physical ESX Server (in all cases, replace the number "1" a the end with the number of your HBA:
 - a. Brocade HBA -- cat /proc/bfa/1

[root@esx1 bfa]# cat 2
Chip Revision: Rev-C
Manufacturer: Brocade
Model Description: Brocade-825
Instance Num: 1
Serial Num: ALXO417DOA9
Firmware Version: FCHBA1.0.0
Hardware Version:
Bios Version:
Optrom Version:
Port Count: 2
WWNN: 20:00:00:05:1e:0d:61:4a
WWPN: 10:00:00:05:1e:0d:61:4a
Instance num: 1
Target ID: 0 WWPN: 50:06:01:60:3a:60:0f:7b
VPort list:
WWPN: 28:03:00:0c:29:00:00:07
[root@esx1 bfa]#

- b. QLogic HBA-cat /proc/scsi/qla2300/1
- c. Emulex HBA-cat /proc/scsi/lpfc/1

```
Admin@esx2:/proc/scsi/lpfc
Emulex LightPulse FC SCSI elx_7.4.0.13
Emulex LPe11002-M4 4Gb 2port \overline{\mathsf{FC}}: PCIe SFF HBA on PCI bus 17 device 00 irq 145
BoardNum: 0
SerialNum: BG73857502
Firmware Version: 2.72A2 (Z3F2.72A2)
Hdw: 2057706d
VendorId: 0xfe0010df
Portname: 10:00:00:00:c9:6d:77:72 Nodename: 20:00:00:00:c9:6d:77:72
SLI Rev: 3
   NPIV Supported: VPIs max 127 VPIs used 1
   RPIs max 512 RPIs used 10
   Vports list on this physical port:
   Vport DID 0x10101, vpi 1, state 0x20
Portname: 28:25:00:0c:29:00:00:1b Nodename: 28:25:00:0c:29:00:00:1a
Link Up - Ready:
PortID 0x10100
   Fabric
   Current speed 4G
Current Mapped Nodes on Physical Port:
lpfc0t00 DID 010f00 WWPN 50:06:0e:80:10:09:cd:00 WWNN 50:06:0e:80:10:09:cd:00
[admin@esx2 lpfc]$
```

Everything is working if you see the virtual WWNs (also know as vPorts) listed.

Storage Administrator Tasks

Prior to zoning the VM, be sure that you have zoned all the physical HBA WWNs to the correct storage array port WWN/s. Storage best practices are to zone a single initiator to single target to maintain security and reduce interference. Once you receive the virtual WWNs from the Server administrator, you then need to create unique zones for each VM to the storage array port WWN/s, However, if you have a very small environment, then you may find it easier to place all the physical HBA port WWNs into one zone and then individually zone each VM to an array port.

1. Log in to the Brocade switch using Brocade Web Tools, Brocade Data Center Fabric Manager (DCFM[™]), or the Fabric OS[®] (FOS) Command-Line Interface (CLI) to configure Zoning. This paper will explain how to Zone using Brocade Web Tools and the CLI.

To zone using Brocade Web Tools (assuming that all the physical HBAs ports and array ports are zoned):

- a. Log in to Web Tools by opening up Internet Explorer and typing in the FQDN or IP address (e.g., https://5100edge1.brocade.com)
- b. Log in to the switch, and click **Zone Admin**.
- c. Click **New Alias**, and type a name for the VM guest Node Name (for example, vmguest1).

Istore-a-200e1 - Zone Administration				
<u>File Edit ⊻iew Zoning Actions T</u> ools				
🖸 New 🔹 Resource View 🔹 🍫 Refresh 🔹 Enable Con	fig Save Config	Clear All		
Alias Zone Zone Config				
Name AMS1000A1_0B	Delete <u>R</u> ename			
Member Selection List Creat	e an Alias	Alias Members		
A Search		1 Member.	件 <u>Search</u>	
 □ Ports & Attached Devices(23 Members) □ □ WWNs(7 Devices) 	Add Member >> << Remove Member Add Other	— 🕼 Hitachi 50:06:0e:80:10:02:f5:d1		
Current View: Fabric View Effective Zone Config: ESX_HDS				
Switch Commit Messages: Zone Admin opened at Mon Feb 11 2008 14:41:40 PST				
Loading information from FabricDone		10.66.24.50 AD0 User: ad	dmin Role: admin 🛛 🕄	

- d. With the Alias selected from the drop-down men, click Add Other.
- e. In the dialog box that displays, enter the Port WWNs generated by vCenter and click OK.

NOTE: When NPIV is enabled, four WWN pairs (WWPN & WWNN) are created for each VM. When the VM is powered on with NPIV enabled, it uses each of these WWN pairs in sequence to try to discover an access path to the storage. The number of virtual WWNs (Also know as a VPORT) that are instantiated equals the number of physical HBA ports present on the host, up to the

maximum of four per VM. A VPORT is created for each physical HBA port that has access to the storage. For example if you have only two physical ports connected to the ESX Server, then use the first two ports. If you have four ports on the ESX Server, then use all four port WWNs. If the HBA doesn't support NPIV or if zoning and LUN masking is not correctly setup, then the VM will failback to the physical HBA port WWN.

Add Other	
Enter WWN or Domain, Port Index value:	
28:25:00:0c:29:00:00:1f	
	<u>O</u> K <u>C</u> ancel

Once you have completed adding Port WWNs, the screen should look similar to this:

FAB_A_5100 - Zone Adm	ninistration		×
Zoning Modes	Basic Zones		
Basic Zones	Print Edit ⊻iew Zoning Actions Tools		
Traffic Isolation Zones	🖂 New 🔹 Resource View 🔹 🤣 Refresh 🦄	 Enable Config Save Config Clear All 	
	Alias Zone Zone Config		
	Name KPNMB2	<u>N</u> ew Alias <u>D</u> elete <u>R</u> ename	
	Member Selection List	Alias Members	
	件 <u>Search</u>	4 Members. A Search	h
	Ports & Attached Devices(52 Members) @ WWNs (12 Devices)	Add Member >> Add Member >> Add Other	
	Current View: Fabric View	실 Effective Zone Config: KP	٧N
Switch Commit Messages: Zone Admin opened at Thu Jan 08	2009 23:10:10 GMT+00:00		
Loading information from Fabric [Done	10.66.18.14 AD0 User: admin Role: admin	8

f. Click the **Zone** tab and click **New Zone**.

	store-a-200e1 - Zone Administration					
E	<u>File Edit Vi</u> ew Zoning <u>A</u> ctions <u>T</u> ools					
l	🖪 New 🔹 Resource View 🔹 🍫 Refresh 🔹 Enable Config Save Config Cle	ar All				
ſ	Alias Zone Zone Config					
	Name ESX1_HDS New Zone gelete Rename Clone					
	Member Selection List Zone Mem	nbers				
	At Search 2 Member	s. And <u>Search</u>				
	E Ports & Attached Devices(23 Members)	iases				
	WWNs(7 Devices)	BSX1(1 Members)				
	Add Members>	I HDS(T Members)				
	<< Remove Member					
	Add Other					
,	Current View: Fabric View	실 Effective Zone Config: ESX_HDS				
z	Zone Admin closed at Wed Feb 13 2008 11:10:18 PST	A				
z	Zone Admin opened at Wed Feb 13 2008 11:11:18 PST					
L	Loading information from Fabric Done 10.	66.24.50 ADD User: admin Role: admin				

g. Enter a name for the zone and click **OK**.

NOTE: A SAN best practice is to zone one initiator to one target so that you increase security and to restrict interference from other hosts.

Create New Zone
Zone name vmguþst1_HDS
<u>Q</u> K <u>C</u> ancel

- h. Click the **plus sign (+)** to expand the Aliases folder in the Zone tab.
- i. From the Member Selection List, select the newly created alias (for example, vmguest1) and the alias of the storage array ports. Click the **Add Member** button, which adds the aliases to the zone.

store-a-200e1 - Zone Administration	
<u>File Edit View Zoning Actions T</u> ools	
New Resource View Refresh Enable Cor Alias Zone Zone Config	onfig Save Config Clear All
Name vmguest1_HDS New Zone	Delete Rename Clone
Member Selection List	Zone Members
Ports & Attached Devices(23 Members) WWNs(7 Devices) Attached Devices(23 Members) Ams1000A1_0B(1 Members) AMS1000A5_0B(1 Members) ESX1(1 Members) ESX2(1 Members) ESX2(1 Members) ESX3(1 Members) ESX3(1 Members) WETAPP3050A_0b(1 Members) NETAPP3050A_0c(1 Members) Netapp3050A_0c(1 Members) Wiguest1(1 Members) Wiguest1(1 Members) Wiguest1(1 Members)	Add Member >> Add Other
Current View: Fabric View	실 Effective Zone Config: ESX_HDS
Switch Commit Messages: Zone Admin opened at Mon Feb 11 2008 14:41:40 PST	
Loading information from Fabric Done	10.66.24.50 AD0 User: admin Role: admin

j. Click the Zone Config tab.

store-a-200e1 - Zone Administration		
Elle Edit ∐ew Zoning Actions Icols		
😤 New * Resource View * 🍫 Refresh * E	Enable Config Save Config Clear All	
Alias Zone Zone Config		
Name ESX_HDS	lew Zgne Config Relate Regame Cone Analyze Zone Config Device Accessibility	
Member Selection List	Zone Config Members	
6	A Search 8 Zones.	A Search
ESX1_HDS(2 Members) ESX2_HDS(2 Members) ESX2_HDS(2 Members) ESX2_HDS(2 Members) ESX4_HDS(2 Members) AAP3050A_HDS(3 Members) AAP3050A_HDS(3 Members) NPIV_HDS(2 Members) NPIV_HDS(2 Members) E NPIV_HDS(2 Members) E E NPIV_HDS(2 Members)	Add Member >>	
Current View: Fabric View	Structure Zone Config:	ESX_HOS
Switch Commit Messages: Zone Admin opened at Mon Feb 11 2008 14:41:40 PST		
Loading information from Fabric Done	10.66.24.50 AD0 User: admin Role: ad	imin 😰

i. From the Member Selection List, click the **plus sign (+)** next to Zones, select the newly created zone, and click the **Add Member** button.

ii. Click Save Config at the top.

Be patient as it could take about 15 – 30 seconds to commit. A status pane window at the bottom will let you know when the configuration has been committed.

 iii. Once the configuration has been committed, click Enable Config. This will also take 15 – 30 seconds to commit.

To zone using the FOS CLI, perform all the steps for each switch in the fabric:

a. Telnet to the Brocade switch and create a new alias: alicreate "vmguest1","28:25:00:0C:29:00:00:1b, 28:25:00:0C:29:00:00:1C; 28:25:00:0C:29:00:00:1D; 28:25:00:0C:29:00:00:1E"

NOTE: When NPIV is enabled, four WWN pairs (WWPN & WWNN) are created for each VM. When the VM is powered on with NPIV enabled, it uses each of these WWN pairs in sequence to try to discover an access path to the storage. The number of virtual WWNs (Also know as a VPORT) that are instantiated equals the number of physical HBA ports present on the host, up to the maximum of four per VM. A VPORT is created for each physical HBA port that has access to the storage. For example if you have only two physical ports connected to the ESX Server, then use the first two ports. If you have four ports on the ESX Server, then use all four port WWNs. If the HBA doesn't support NPIV or if zoning and LUN masking is not correctly setup, then the VM will failback to the physical HBA port WWN.

b. Create a Zone to map the guest to storage: Once again the best practices is one initiator to one target.

zonecreate "vmguest1 HDS","vmguest1;HDS"

- c. Add the zone to the configuration: cfgadd "mycfg", "vmguest1_HDS"
- d. Enable the configuration: cfgenable "mycfg"
- e. Press Y to confirm you want to enable the configuration.

2. Once you have created the zone on the Brocade switch, log in to the storage array and add the Node WWN and Port WWNs of the VM to the LUN(s) that the VM will access. Depending on your storage array, the Node WWN may not be necessary.

You can configure back-end storage using NetApp FilerView or HDS AMS storage array.

Using NetApp FilerView:

- a. Log in to FilerView on the NetApp appliance (for example, http://netapp3050a.brocade.com/na_admin)
- b. If you do not already have an Initiator Group created (An Initiator Group makes the LUNs visible to connected hosts), then create one by clicking **Add**, located below Initiator Groups in the left navigation pane.

C NETAPP3050A: FilerView - Wit	ndows Internet E	Explorer											
🖉 http://10.66.24.62/servlets/netapp.fv	.servlets.FilerView			~									
Network Appliance *		7	FilerV	ew®									
Filer (* ?) Volumes (* ?) Aggregates (* ?)	System Filer → Show	Status ? Status											
Storage (?)		Filer NETAPP3050A solc brocade com											
Operations manager (7 SpapMirror (7)		Model	V3050										
CIES ①		System ID	0101179613										
• NES ⑦		Version	7.2.4										
• HTTP ⑦		Volumes	5 Volumes										
• LUNs 🖹 🕐		Aggregates	5 Aggregates										
Wizard Enable/Disable		Disks	8 Disks (0 spare, 0 failed)										
Manage		Status	The system's global status is normal.										
Add													
Show Statistics													
LUN ConfigCheck													
Initiator Groups ??													
Add • FCP ⑦ • Network ⑦	•												
javascript:loadTaskFrames('netapp.fv.vdisk	k.manage.IGroupList);	🧊 읛 Internet	🔍 100% 🔻 🛒									

- c. In the Add Initiator Group screen, assign it a group name, a type (FCP) and an OS (VMware).
- d. Enter the VMware guest Node WWN and Port WWNs that you received from vCenter and the physical HBA port WWNs of the ESX host in the Initiators section. If you are using VMotion, be sure that you add the other ESX hosts physical HBAs WWNs that participate in the VMotion process. This will ensure that the NPIV connection is maintained when the VMotion takes place. Otherwise the VM will default back to the physical HBA WWN and will not be using NPIV. Also

e. Click Add

🏉 NETAPP3050A: FilerView - W	indows Internet Explorer		
http://10.66.24.62/servlets/netapp.	fv.servlets.FilerView		*
Network Appliance*		FilerView [®]) <u>About</u>
• Filer 🔚 🕐	Add Initiator Group ③		^
• Volumes 📑 ?	LUNs \rightarrow Initiator Groups \rightarrow Add		_
 Aggregates ?? ? Storage ?? Operations Manager ?? 	[Manage Initiator Groups]		_
 SnapMirror ⑦ CIFS ⑦ NFS ⑦ 	Group Name: Enter a group name for the initiator group.	PIV_Host1	
HTTP ⑦ LUNs O Wizard	Select a type for the initiator group.	СР 🔽 🕐	=
Enable/Disable Manage	Operating System: Select the operating system type of the initiators in this group.	Mware 💌 🕐	
Show Statistics LUN ConfigCheck • Initiator Groups ⑦ Manage Add • FCP ⑦	Initiators: 10 Enter a list of initiator names, 11 separated by commas, spaces, 22 or newlines. For an FCP initiator 22 group, enter WWPNs (world wide 22 port names). For an iSCSI 23 initiator group, enter iSCSI node 24 names.	0:00:00:00:c9:6d:77:71 0:00:00:00:c9:6d:77:72 8:25:00:0c:29:00:00:1a 8:25:00:0c:29:00:00:1b 8:25:00:0c:29:00:00:1c 8:25:00:0c:29:00:00:1d 8:25:00:0c:29:00:00:1e	?
Network			_
			× -
		L 🚯 👹 Internet 🔍 1009	/•

REMINDER: The number of physical HBA ports in the ESX Server device determines how many Port WWNs you need to enter in the initiators group.

f. Fill in the requested information and click Add.

g. Select **Add** under LUNs in the left navigation pane.



- h. In the Add LUN screen, enter the required information and click Add.
- i. Once the LUN is created, click **Manage** under LUNs in the left navigation panel and select the LUN you created.
- j. Click Map LUN.
- k. Click Add Groups to Map.

I. Select the Initiator Group you just created and click Add.



m. Now inform your VMware Administrator that (s)he can power on the VM.

Using HDS AMS Storage Navigator:

a. In the Logical Status tab, select the port group in which the LUNS are located in the left navigation pane.

🔁 10.66.2.200 - Remote Desktop							
<u>File View Settings T</u> ools							<u>^</u>
Array Unit	AMS1000A5) 🗐 🔇	1 1 1) 🔟 🗞	9 6 9
Component Status Logical Status							
	RAID Groups						
E-@ RAID Groups	RA	ID Groun	RAID	Level	Total Ca	nacity	Ere
- 🖨 RG-00 (RAID5)		in creat	RAID5(4D+1F)		1071.50	B
RG-01 (RAID5)	i 01		RAID5(4D+1F	ý		1071.50	В
000:G000							
2 Options							
Logical Unit							
⊕ 1 002:ESX2							
🕀 🔂 003:ESX3							
H- 10 Port UB	▲						Þ
E - Ø Port 0C	Logical Units						
🕀 🤣 Port 1A	LUN≜	Capacity	RAID Group	RAID Lev	el D-CTL ·	C-CTL ·	Stripe Siz
🕀 🤣 Port 1B	0000	350.0GB	01	RAID5(4D+1P) 0	0	
⊕-Ø Port1C	0001	20.0GB	00	RAID5(4D+1P) 0	0	
H-100 Port1D	0002	20.0GB	00	RAID5(4D+1P) 0	0	
Spare Drives		20.0GB	00	RAID5(4D+1P) U	0	
Differential Management	0004	20.00B	00	RAID5(4D+1P) 0	0	
Command Devices	0006	20.0GB	00	RAID5(4D+1P) 0	0	
License Key	0007	20.0GB	00	RAID5(4D+1P) 0	0	
- 🗐 LUN Expansion	8000	20.0GB	00	RAID5(4D+1P) 0	0	
		10.0GB	00	RAID5(4D+1P) 0		
	1	0.008	00	INNID3(4D*TE	, 0	0	
	,						
<							>

- b. Click **WWN** to select the WWNs that are available to map to this port group.
- c. Click Modify WWN Information at the bottom right.
- d. In the WWN Information screen, click **Add**.

10.66.2.2	200 - Remote Desk	top					X
<u>File View</u>	<u>S</u> ettings <u>T</u> ools						^
Array Unit	Modify WWN Inforn	nation			×	F	
Component	WWN Inform	ation					
	Port	OA	1				
	Host Group	000:G000					
E-%⊒F	WWN Information	Assigned WWN					
E-4		Name		Port Name			=
			10000000C969B7C7		<u> </u>		
		NPIV1 NPIV1	2825000C2900001A 2825000C2900001B				
[NPIV1_C	2825000C2900001C				
Ĺ		1	2825000C2900001D		Delete		
				Add Ghange	Delete		
Ē-e			Add				
		Assignable WWN					
E-		Name		Port Name			
±−€ ±−€			2100001B3201EA1F				
⊡ 🛱 A			100000000000000000000000000000000000000				
- Š č							
		<u> </u>					
- S i			OK Cancel				
				_			
1					Modify WWN Info	ormation	
	Interver. II	m(3)				~	~
		, m				7	-33

- e. In the WWN dialog box, add the Virtual WWNs that the Server Administrator gave you. Also add the physical HBA WWNs of the ESX Server host and the physical HBA WWNs of the other ESX Server if you are using Vmotion.
- f. Give the WWN a user-friendly name, enter the port WWN without any colons, and click **OK**.

10.66,2.200 - Remote Desktop	
<u>File View Settings Tools</u>	<u>^</u>
Array Unit Modify WWN Information	1 😈 💶 📒
Component WWN Information	
E- AMS Port	
Host Group 000: 6000	
H WWN Information Assigned WWN	
Port 🔼	
NPIV1 NPIV1 Host Group 000: 6000	
NPIVI Name NPIV_hostl_porta	
Port Name 282500002900001B V Change Delete	
OK Cancel	
2100001B3201EA1F	
10000000C96BES25	
OK Cancel	
Modifi (1080)	formation
	> .:

- g. Click OK again
- h. Now inform your VMware Administrator to power on the Virtual Machine.

Verifying that the VM Is Functioning Correctly

- 1. Log in to the Brocade switch.
- 2. Issue the switchShow command.

You should see the NPIV ports with a number greater than 1 ("one") as shown below. If you see only one NPIV port, then the setup has not been successful.

FAB_B_5100	:admir	ı≻ sw:	itchshow											
switchName	=	FAB_	B_5100											
switchType	:	66.1												
switchStat	e:	Onli	ne											
switchMode	=	Nati	Native											
switchRole	-	Prin	Principal											
switchDoma	in:	1												
switchId:		fffc	<u> 1</u>											
switchWwn:		10:0	10:00:00:05:1e:58:03:e8											
zoning		ON C	KPN>											
switchBeac	on:	OFF	OFF											
FC Router:		OFF												
FC Router	BB Fal	pric .	ID: 1											
Area Port =========	Media	Spee	l State	Proto										
0 0	id	N4	Online		F-Port	4 NPIV	public							
1 1	id	N4	Online		F-Port	3 NPIV	public							
22	id	N4	Online		F-Port	3 NPIV	public							
3 3	id	N4	Online		F-Port	2 NPIV	public							
4 4	id	N4	Online		F-Port	50:01:	43:80:01:34:a2:19							
5 5	id	N4	Online		F-Port	50:01:	43:80:01:34:a2:1d							

You can also issue the **nsShow** command to show the ports logged in to the fabric. You should see the Virtual Machine NPIV ports.



You could also use the service console on the ESX Server and check the /proc nodes of the HBA to get the details. The procedure to find this information is documented in the "Server Administrator Tasks" section in this document.

TROUBLESHOOTING

If you experience any problems, make sure that:

- The VM is powered off when you set up NPIV. If the VM is running when you make these changes, you will need to complete shutdown the VM and the power it back on.
- You have properly zoned the VM virtual ports on the Brocade switch.
- You have properly LUN-masked the storage array with the Virtual WWNs of the VM.
- You are using an HBA that supports NPIV, requirements for which are listed in a previous section.
- You have NPIV enabled on the switch. You can check to see if NPIV is enabled on a switch by running the command portCfgShow. If the port is turned off then issue the command portCfgNPIVPort <PortNumber> <Mode>.

Mode 0 - Disables the NPIV capability on the port

Mode 1 – Enable the NPIV capability on the port

FAB_B_5100:admin>	por	tcf	gsl	าอพ													
Ports of Slot Ø	Ø	1	2	3.	4	5	6	7.	8	. 9	.10	.11	12	.13	.14	.15	
+ Speed	AN	AN	AN	AN	ÂN	ÂN	AN	AN	AN	ÂN	ÂN	AN	AN	AN	AN	ÂN	
AL_PA Offset 13																	
Irunk Port	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	ON	UN	UN	UN	
Long Distance	••		••		••	••	••	••			••	••		••	••	••	
Locked L. Powt	••		••			••	••	••			••					••	
Locked G Port																	
Disabled E_Port																	
ISL R_RDY Mode																	
RSCN Suppressed																	
Persistent Disable																	
NPIV capability	NN	UN	UN	UN	UN	NN	NN	UN.	- ON	NN	NN	UN		UN	UN	UN	
405 E_Port	VN	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	UN	
EA FUFC Minnon Pont		••						••							••	••	
Rate Limit		••		••				••					•••			••	
Credit Recovery	ÔN	ÔN	ÔN	ÖN	ÔN	ÖN	ÖN	ÖN	ÓŇ	ÔN	ÔN	ÔN	ÓN	ÔŇ	ÖN	ÓN	

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