

NPIV Setup and Configuration to Virtualize Fibre-channel card on IBM p5

Document Author: Sridhar Puvvala1 Additional Author(s): Sridhar Puvvala1, sspd database Document ID: TD105286

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Product(s) covered:

Abstract: SSPD - With N_Port ID Virtualization (NPIV), you can configure the managed system so that multiple logical partitions can access independent physical storage through the same physical fibre channel adapter. To access physical storage in a typical storage area network (SAN) that uses fibre channel, the physical storage is mapped to logical units (LUNs) and the LUNs are mapped to the ports of physical fibre channel adapters. Each physical port on each physical fibre channel adapter is identified using one worldwide port name (WWPN).NPIV is a standard technology for fibre channel networks that enables you to connect multiple logical partitions to one physical port of a physical fibre channel adapter.Each logical partition is identified by a unique WWPN, which means that you can connect each logical partition to independent physical storage on a SAN.

Solution Scenario Profile Transcription

Feedback Information:

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Document Information:

Solution Title: NPIV Setup and Configuration to Virtualize Fibre-channel card on IBM p5

This profile describes a solution created by IBM for test or demonstration purposes. The solution as documented here has been tested and demonstrated to work as expected.

Solution Source: Other

SSPD ID: SSPD-SPUA-7VN8KA

Customer Profile:

The following information is intended to provide insight into the nature of the customer involved in this solution.

Customer Annual Revenue: Number of Employees: Industry: Customer's Business:

General Solution Description:

IBM Revenue: (in US\$) Solution Industry: Cross-Industry Market Play: Cross-Industry eBusiness On Demand: Cross-Industry General Solution Description and Overview: SSPD -Problem Addressed By Solution: With N_Port ID Virtualization (NPIV), you can configure the managed system so that multiple

logical partitions can access independent physical storage through the same physical fibre channel adapter

Solution Components:

IBM p5/p6 server, HBA card supporting NPIV, VIO enabled LPAR

How Solution Components Operate Together to Address Problem:

To access physical storage in a typical storage area network (SAN) that uses fibre channel, the physical storage is mapped to logical units (LUNs) and the LUNs are mapped to the ports of physical fibre channel adapters. Each physical port on each physical fibre channel adapter is identified using one worldwide port name (WWPN).NPIV is a standard technology for fibre channel networks that enables you to connect multiple logical partitions to one physical port of a physical fibre channel adapter. Each logical partition is identified by a unique WWPN, which means that you can connect each logical partition to independent physical storage on a SAN.

Business Value of Solution: a) Saves on cost, as a single HBA can be shared among multiple LPARs on a server. Infrastructure Solution: Yes: IT Optimization ISRA Used: Solution Diagrams:



Work Products: Relative URLs: Attachments:

Methods Used: No

General Operational Characteristics: Size single physical HBA card can be virtualized to multiple hosts Type of Traffic Usage Performance & Capacity Scalability horizontally,by adding more HBAs in a single server. Availability More than 1 HBA can be used to provide redundancy Security

Detailed Product/Platform/Logical Implementation Block Descriptions:

Logical Implementation Block Name NPIV Setup and Configuration to Virtualize Fibrechannel card on IBM p5 Main function of this logical implementation block Host Types of data stored or manipulated in this block

Actions performed on the data in this block

Operating System(s) used:

AIX, Linux Hardware used: IBM p6 server Software Products used: AIX 6.1 and VIOS 2.1

Attached Documentation:

The following additional documentation contains more complete details about the solution. Please ensure that it does not contain the details you need before contacting the person named in the Contact Information section.



Attachment Language is: English

Contact Information:

For additional information about the solution described in this profile, you may contact the person described below. Before contacting this person, ensure that the details you are seeking are not contained within any documentation described above:

Contact Name: Sridhar Puvvala1 Job Title: Senior IT Specialist Organization: IBM India Country: India Phone Number: 020-40602124 Tieline: Fax: Lotus Notes: Sridhar Puvvala1/India/IBM@IBMIN eMail: srpuvval@in.ibm.com

> Classification: Hardware; Software Platform(s): Cross-Platform

Category: Planning and Design

Platform(s): Cross-Platform O/S: AIX; Linux

Keywords: SSPD Solution Scenario Profile

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Summary

With N_Port ID Virtualization (NPIV), you can configure the managed system so that multiple logical partitions can access independent physical storage through the same physical fibre channel adapter.

To access physical storage in a typical storage area network (SAN) that uses fibre channel, the physical storage is mapped to logical units (LUNs) and the LUNs are mapped to the ports of physical fibre channel adapters. Each physical port on each physical fibre channel adapter is identified using one worldwide port name (WWPN).

NPIV is a standard technology for fibre channel networks that enables you to connect multiple logical partitions to one physical port of a physical fibre channel adapter. Each logical partition is identified by a unique WWPN, which means that you can connect each logical partition to independent physical storage on a SAN.

The figure below illustrates a managed system configured to use NPIV :-



Requirements

You can configure virtual fibre channel adapters on client logical partitions that run the following operating systems:

- AIX® version 6.1 Technology Level 2, or later
- AIX 5.3 Technology Level 9
- SUSE Linux® Enterprise Server 11, or later

Configuring Virtual fibre channel for HMC-Managed systems

This section describes the steps to create a virtual fibre channel adapter on a $\ensuremath{\text{p5}}$ LPAR

Creating a VFC host adapter on the VIO Server

- Select the VIOS and edit the profile
- Go to the "Virtual Adapters" Tab
 - Select 'Actions > Create > Fibre Channel Adapter'

eneral	Processors	Memory	I/O	dapters	Controlling	Settings	Adapters	(LHEA)
Actions	•							
Edit Creat Delete		w for the Ethernet A Fibre Char SCSI Adap	sharing o Adapter. Annel Ada oter	of physical hardw	are betwee	n logical parti Reserved slot	tions. The numbers:	current virtual 0 - 10
elect ^		A Adapt	er ID ^	Connecting Pa	rtition ^ C	onnecting A	lanter ^	Required ^
0	Ethernet	11		N/A	N	I/A		No
0	Server SC	SI 12		Any Partition	A	ny Partition S	lot	No
0	Server Se	rial 0		Any Partition	A	ny Partition S	lot	Yes
0	Server Se	rial 1		Any Partition	A	ny Partition S	lot	Yes
		Tota	al:4 F	Filtered: 4	Selected:	0		

- The type of adapter is "Server" since this is being created on the VIOS.
- Put a 'check' in the box if the adapter is required at the time of partition activation.
 - You would need this box marked if you are using the adapter for SAN boot. I would recommend always checking it.
- Select the client partition you want this Server adapter to be associated with.
- Take a note of the assigned Server Adapter ID (13) and the Client Adapter ID (2). You will need to know this information when you create the client adapter.
 - If the VIO server is already active you will not be able to modify the adapter ID info in the profile once it has been created. Because of this you will need to first check the client for available virtual adapter ID's then when you create the VIO server adapter specify that available ID for the client adapter ID.
- Select 'OK' to create

You now have a Virtual Fibre Channel (VFC) host adapter created. The next step is to go to you client partition and create a Virtual Fibre Channel client adapter which will be associated with the VFC host adapter.

Virtual Fibre Chanı Adapter:	nel adapter * 13	
Type of adapter:	megatron(1)	
This adapter is	megatron01(3) megatron02(4)	tivation.
Client Partition:	megatron01(3)	
Client adapter ID:	2	

Creating a VFC client adapter on the VIO Client

- From the Client Partition that you selected to use when creating the VFC host adapter in the previous steps, go to the "Virtual Adapters" tab then select 'Actions > Create > Fibre Channel Adapter..
- You will see that the next available Virtual Adapter ID on the the client is "3".
- •
- When we created the VFC host adapter the value was set to "2" for the client adapter ID. So you will have to go back and change the VFC host adapter after the VFC client adapter has been created so the client ID matches.
- Put a 'check' in the box if the adapter is required at the time of partition activation.
 - You would need this box marked if you are using the adapter for SAN boot. I would recommend always checking it.
- Select the Server partition which has the VFC host adapter that this VFC client adapter will be associated with.
- Change the Server Adapter ID to match the Server Adapter ID that you took note of when creating the VFC host adapter. In this case it was "13".
- Select "OK" to create

megatron01		
Adapter:	* 3	
Type of adapter:	Client	
2.23		
This adapter is Server partition:	megatrony1(2)	
 This adapter is Server partition: Server adapter ID 	megatronv1(2)	

Linking the VFC host and VFC client adapters

- Now back on the VIO Server Partition, Edit the profile and go back to the "Virtual Adapters" tab, select 'Actions > Edit > Fibre Channel Adapter..
- You will see that the Client Adapter ID is set to "2". We need to change this to match the adapter ID that was assigned when creating the Client Adapter which was "3".
- Type in the Actual Client Adapter ID and Select "OK" to complete the change.

¹⁰ https://hmc-cow.up	ot.austin.ibm.com - Vi <mark>- D ×</mark>
Virtual Fibre Channel A Virtual Fibre Channel adapt Adapter: * 13 Type of adapter: Serve ✓ This adapter is required Client Partition: megatro Client adapter ID: OK Cancel Help	for partition activation.
Done	hmc-cow.upt.austin.ibm.com

Virtual Fibre Channel Adapter Verification

In the image below is what you should see from both the VIO Server and the Client Partition Profiles.

You see the Server has a "Server Fibre Channel Adapter with and ID of "13", Connecting Partition of "megatron01, and Connecting Adapter of "3" Then from the Client you will see the Client has a "Client Fibre Channel Adapter" with an ID of "3", a Connecting Partition of "megatronv1", and a Connecting Adapter of "13".

• VIO Server:

Server Serial

0

Select ^	Type ^	Adapter ID ^	Connecting Partition ^	Connecting Adapter ^	Required ^
0	Ethernet	11	N/A	N/A	No
۲	Server Fibre Channel	13	megatron01(3)	3	Yes
0	Server SCSI	12	Any Partition	Any Partition Slot	No
0	Server Serial	0	Any Partition	Any Partition Slot	Yes
0	Server Serial	1	Any Partition	Any Partition Slot	Yes
• \	/IO Client:		Connecting Dartition		Poquirod /
Select	Туре		Connecting Partition	Connecting Adapter	Vee
0	Ethemet	2	N/A	N/A	res
۲	Client Fibre Channel	3	megatronv1(2)	13	Yes
0	Server Serial	0	Any Partition	Any Partition Slot	Yes

Any Partition

Total: 4 Filtered: 4 Selected: 1

Any Partition Slot

Yes

Creating VFC client adapter on the IVM Client

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NOTE: For IVM systems you do not need to create the server adapter and link the server and client adapters yourself. The IVM interface takes care of these two steps for you when you create the client adapter

- Open the client properties window. Remember there is no profile for IVM partitions. Click on the "Storage" tab. Find and expand the "Virtual Fibre Channel" section.
- If there is not already an entry showing "Automatically generate" under the WWPN column, click on "Add"
- Select the new entry, and under the "Physical Port" column select the physical adapter, click ok
- After the adapter has been created, you should see the new WWPNs under the "Worldwide Port Names" column

		optical/Tape Devices Physical Adapters
Virtua	I Disks (No devices)	
Physic	cal Volumes	
Uirt	ual Fibre Channel (Table changes pending)	
Virtual I ve multi ort Name ort assig	ual Fibre Channel (Table changes pending) Fibre channel with physical adapters that support iple logical partitions direct access to storage area es table, you can add or remove a port name pair inment for a port name pair that this partition is u Remove	N_Port ID Virtualization (NPIV) ports provides the ability to a devices in a storage area network (SAN). In the Worldwid r for this logical partition. You also can change the physical sing.
Virtual I ve multi ort Name ort assig Add Select	ual Fibre Channel (Table changes pending) Fibre channel with physical adapters that support iple logical partitions direct access to storage area es table, you can add or remove a port name pair imment for a port name pair that this partition is u Remove Worldwide Port Names	N_Port ID Virtualization (NPIV) ports provides the ability to a devices in a storage area network (SAN). In the Worldwid r for this logical partition. You also can change the physical sing. Physical Port

• To verify connections and look up client WWPNs, click on the "View Virtual Fibre Channel" option from the main menu

Integrated Virtualization Manager						1109-51	IBM.
Welcome padmin : mineralv1.upt.austin.ibm.com	n					Edit my profi	le Help Log out
Partition Management	View V	irtual Fib	re Channel				
<u>View/Modify Partitions</u> <u>View/Modify System Properties</u> <u>View/Modify Shared Memory Pool</u>	A virtua partition partition	I Fibre cha ns so that t ns that are	nnel with physical adapters that support N_f he partitions can use these ports to commu using a specific NIPV physical port, select th	Port ID Virtualization (NPIV) ports p licate directly with storage devices e port and click View Partition C	rovides the ability to a in a storage area net onnections.	assign these ports to n vork (SAN). To view th	nultiple logical ne logical
I/O Adapter Management	1	1 View Partition Connections					
<u>View/Modify Host Ethernet Adapters</u> <u>View/Modify Virtual Ethernet</u> <u>View/Modify Physical Adapters</u>	Select	Name ^	Description	Physical Location Code	Connected Partitions	Available Connections	Eabric Support
<u>View Virtual Fibre Channel</u> Virtual Storage Management	0	fcs0	8Gb PCIe FC Blade Expansion Card (df1000f1df1024f1)	U78A5.001.WIH2A0C- P1-C12-T1	5	63	Yes
<u>View/Modify Virtual Storage</u>							
IVM Management							
View/Modify User Accounts View/Modify TCP/IP Settings Guided Setup Enter PowerVM Edition Key Surtaw Black Management							

• You can see each physical adapter and their connections. Select the adapter and click on "View Partition Connections" to bring up the list of client connections and their WWPNs

View Virtual Fibre Channel Partition Connections: fcs0

The table lists all logical partitions with a connection to the selected physical port.

You can change whether a partition has a connection to a specific physical port from the View/Modify Partitions -> Partition Properties (Storage tab) task for the logical partition.

Available connections: 63

ID	Name	Worldwide Port Names
2	mineral02p2	C0507600CF560008; C0507600CF560009
3	mineral02p3	C0507600CF56000A; C0507600CF56000B
4	mineral01p2	C0507600CF560004; C0507600CF560005
5	mineral02	C0507600CF560006; C0507600CF560007
6	mineral01	C0507600CF560000; C0507600CF560001

Mapping the VFC Host Adapter to Physical FC Port

In the previous steps we created the virtual fibre channel adapters however they are not yet associated with any physical fibre channel adapter / port. So the next step is to associate the VFC host adapter on the VIO Server with a physical fibre channel adapter port enabling the vfc host adapter to log into the SAN.

•	Verify the V	<pre>/FC adapters</pre>	are "Available" on the VIOS	,
	\$ ioscli Isdev	/ -dev vfchos	st*	
	name	status	description	
	vfchost0	Available	Virtual FC Server Adapter	

 Show current VFC mappings to physical (In this example the vfchost has no mappings as indicated by the "NONE")
 \$ ioscli lsdev -dev vfchost0 -attr

map_port_NONE_N/A True

• Display the physical fibre channel adapters (You will decide which adapter / port to use based on how you setup you switch zoning and Storage allocation plan)

\$ ioscli lsdev -dev fcs*

name status description

fcs0 Available 8Gb PCI Express Dual Port FC Adapter

(df1000f114108a03)

fcs1 Available 8Gb PCI Express Dual Port FC Adapter (df1000f114108a03)

- Map the virtual fibre channel adapter to the physical fibre channel adapter on the VIOS
 - \$ ioscli vfcmap -vadapter "VFCServerAdapter" -fcp "FCPName" Example: ioscli vfcmap -vadapter vfchost0 -fcp fcs0
- Show the VFC mapping to the physical fibre channel adapter ioscli lsdev -dev vfchost0 -attr map_port fcs0 N/A True

WWPN, Allocations and Zoning Info

When you do your storage allocations you will be allocating the storage directly to the WWPN of the VFC client adapter.

If you are attempting to SAN boot, or do Storage allocations prior to the VIO client partition is activated you can display the VFC client adapter WWPN via the HMC with the following steps.

 Go to the Client Partition profile and select edit > Select the Virtual Adapters Tab > Highlight the VFC adapter > Select 'Actions' > Properties

As shown in the picture below, each VFC client adapter will have 2 WWPN's. When allocating storage you should use the first WWPN in the list. The second WWPN is to be used when performing Partition Migrations (discussed later in this doc).

🥙 https://hmc-	cow.upt.austin.ibm.com - Vi <mark>- 🗆 🗙</mark>
Virtual Fibre Ch	annel Adapter Properties: megatron01
Adapter ID: Type of adapter: Required : WWPNs:	3 Client True c050760001e00000 c050760001e00001
Server partition: Server adapter ID: Close Help	megatronv1(2) 13
Done	hmc-cow.upt.austin.ibm.com 🔗

If the VIO client is booted run the following command to display the active WWPN for the VFC client adapter:

\$ lscfg -vl fcsX <-- where X is the adapter number Network Address.....C05076002A7D0000