



Dell S5000 w/ MXL Blade Switch and PowerEdge Blade Servers – Full Fabric Mode Example with Configs

Dell S5000 in Full Fabric Mode: Converged Infrastructure (LAN and SAN) with Dell M1000e and MXL blade switch



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Revisions

Date	Description	Authors
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Summary

- The lab setup referenced in this document was built and used for hands-on lab environments for several Dell events. This document was created to accompany the hands-on lab and is provided publicly for reference purposes.
- In this lab, you will get hands-on experience with an end-to-end converged solution employing Fibre Channel over Ethernet (FCoE) with the Dell S5000 switch. You will touch all nodes of the solution: Dell PowerEdge blade server, CNA, Dell MXL blade switch, Dell S5000 switch, and Dell PowerVault storage array. You will configure the Dell S5000 switch in Full Fabric Mode and configure the Dell MXL as a FIP-snooping bridge (FSB) or FCoE transit switch. Finally, you will test your FCoE and LAN connectivity via 'ping' and passing storage data to the Dell PowerVault storage array.
- Estimated time: 45 minutes

Goals

- Access the Dell PowerEdge blade server running Microsoft Windows Server 2008 R2 Enterprise and confirm the World Wide Port Name (WWPN) of the CNA port.
- Access the Dell PowerVault Storage Array and view storage and server node information.
- Configure the Dell S5000 switch as Full Fabric Mode and configure for LAN and FCoE traffic.
- Configure the Dell MXL blade switch as a FSB.
- Connect two S5000s via ISL links and build a small FC SAN fabric.
- On the Dell S5000 and MXL switch, confirm connectivity and end-node login to the FC fabric.
- View and confirm zoning configuration on the S5000 switch.
- Test LAN and SAN connectivity by passing LAN and SAN traffic.

Resources Utilized

- 2 x Dell S5000 switch
- 1 x Dell MXL blade switch
- 1 x Dell S4810 switch
- 1 x Dell PowerVault storage array (1 x MD3660f)
- 1 x Dell PowerEdge M620 blade server with Broadcom 57810S CNA (Windows Server 2008)

Network Diagram of Pod 2 Lab Setup

In this lab, the Dell S5000 switch is configured in Full Fabric mode or FCoE Forwarder mode (FCF), providing Full Fabric Services such as Fabric Login Server, Name Server, Zoning, and ISL links.

Below is the diagram of the setup you are going to be working on. It consists of a blade server with a CNA connected to the MXL blasé switch; the MXL connects to a Dell S5000 converged switch via port channel. The Dell S5000 switch is connected to the Dell S4810 for LAN connectivity and to another S5000 switch via FC ISL links. The second S5000 switch is connected to a Dell PowerVault storage array consisting of two controllers with 4 x FC ports each.

Note, although possible, it's not necessary to connect two S5000s together like this. In this lab, the S5000s are connected together to demonstrate E_port functionality and to demonstrate that it is possible to build a small SAN via S5000 switches. The yellow cables show the LAN side of the setup where the S5000 connected to the MXL sends all LAN traffic to the S4810 switch. The purple cables show the SAN connectivity from the first S5000 to the second and from the second S5000 to the to the PowerVault FC storage array

Dell Networking S5000 - POD 2

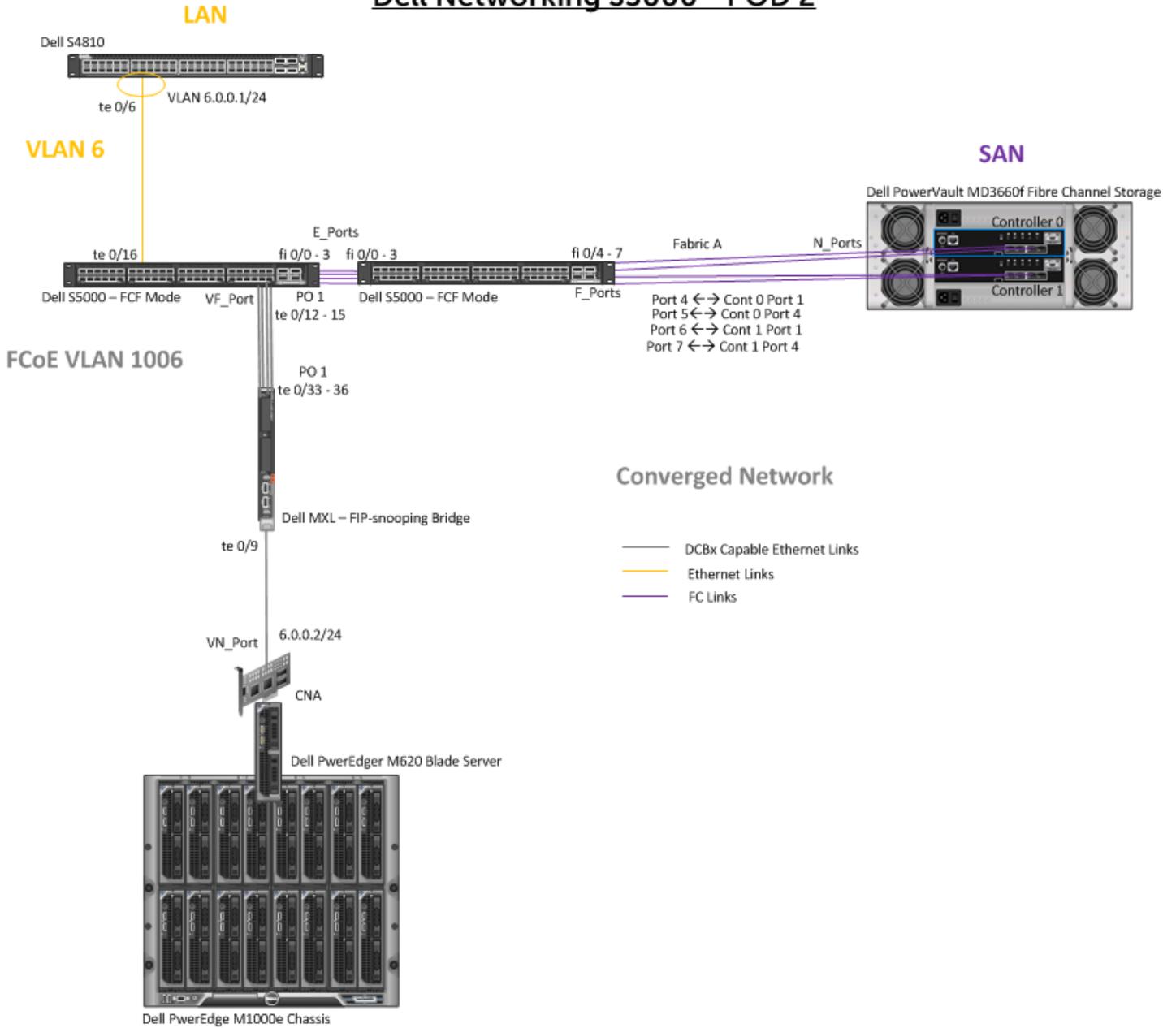


Figure 1: Network Diagram

Lab Exercise

A.) Log into Windows 2008 server and view CNA info. DO NOT MAKE CHANGES, READ ONLY SECTION

1. Open the **'Remote Desktop Connection'** in Windows ('Start->All Programs->Accessories->Remote Desktop Connection').
2. Enter the IP address of the server and click **'Connect'**. Use the correct credentials to login.

Click **'Yes'** on any pop-up dialogs.

3. Double click the **'Broadcom Advanced Control Suite 4'** icon on the desktop. Make sure **'ALL VIEW'** is selected in the **'Filter'** dropdown box at the top. Click the **'+'** symbol next to **'Adapter1'**. Click the **'+'** symbol next to **'Port1'**. This is the port connected to the Dell MXL switch. Note, NIC partitioning (NPAR) could also be utilized here if desired (multi-function mode) to partition the NIC, In this lab, NIC partitioning is not used (single-function mode).
4. Click the **'+'** symbol next to the first entry starting with **'[0128]'**. You now see both the virtual NIC/LAN and FCoE/SAN ports. Click the virtual FCoE adapter (starting with **'[0003]'**). You now see the Worldwide Port Name (WWPN) of the port on the right, **'20:01:C8:1F:66:72:B2:8C'**, as shown below.

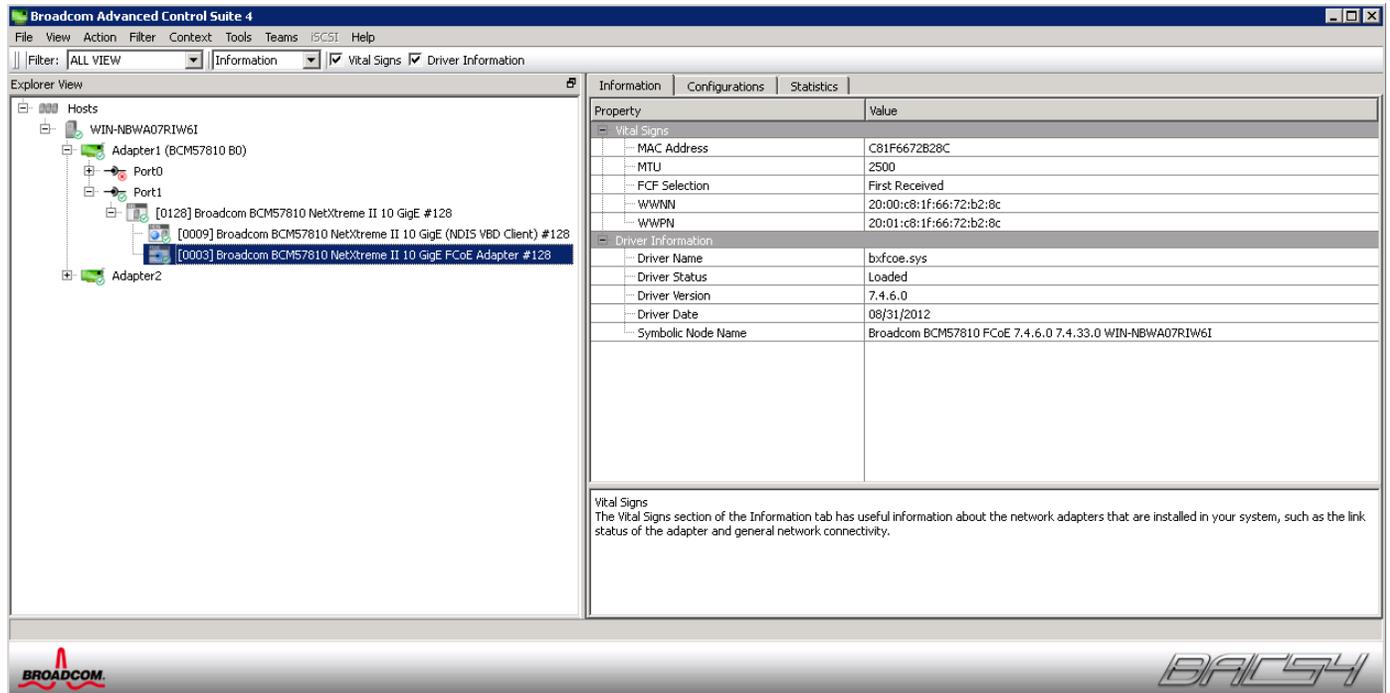


Figure 2: 'Broadcom Advanced Control Suite' management application

- Double click the '**Computer**' icon on the desktop. Notice, there is only one disk drive listed, '**C:**'. Once you are done configuring the Dell MXL switch and Dell S5000s, you will see another disk partition that will represent the remote storage on the Dell PowerVault storage array.
- Next you will access the Dell PowerVault storage array via **Dell PowerVault Modular Disk Storage Manager** on the remote server.

B.) Access the Dell PowerVault storage array via Dell PowerVault Modular Disk Storage Manager and view the volume that will be accessed remotely by the Dell PowerEdge blade server via FCoE. DO NOT MAKE CHANGES. READ ONLY SECTION.

- Double click the '**Modular Disk Storage Manager Client**' icon on the desktop and ensure the '**Devices**' tab is selected. Ensure '**PowerVault-1**' displays on the right and the status is '**Optimal**' as shown below.

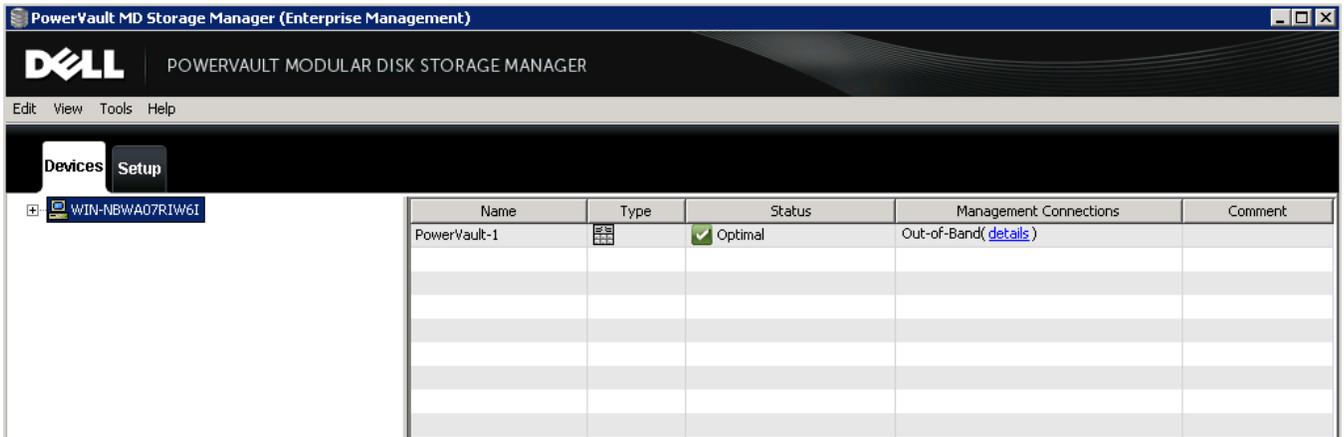


Figure 3: 'Dell PowerVault Modular Disk Storage Manager' application

2. Right-click 'PowerVault-1' and select 'Manage Storage Array'. You should see the below.

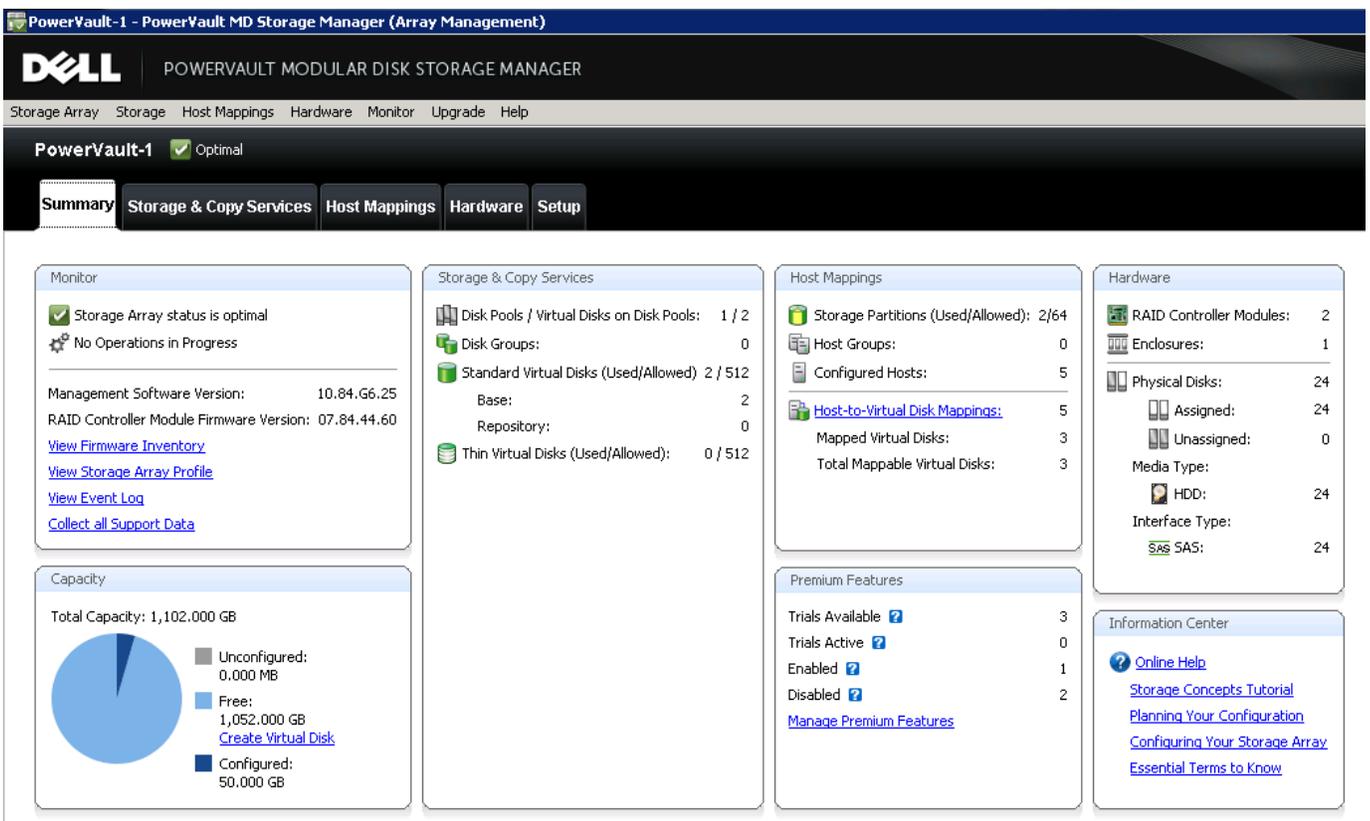


Figure 4: Summary view on 'Dell PowerVault Modular Disk Storage Manager' application

- Click '**Storage & Copy Services**' tab and then the '+' symbol next to '**Disk Pools**' and then click the '+' symbol next to '**Disk_Pool_1**' on the left-side menu. Since this is the '**Pod 2**' lab, the respective volume for this lab is '**S5000_Pod-2**'. Click the '**S5000_Pod-2**' volume on the left-side menu to see the details of the volume displayed on the right. Note, it is 20 GB in size.

The screenshot displays the Dell PowerVault MD Storage Manager interface. The top navigation bar includes 'Storage Array', 'Storage', 'Host Mappings', 'Hardware', 'Monitor', 'Upgrade', and 'Help'. The main header shows 'PowerVault-1' with a green checkmark and 'Optimal' status. Below this are tabs for 'Summary', 'Storage & Copy Services', 'Host Mappings', 'Hardware', and 'Setup'. The left sidebar shows a tree view of the storage array, with 'Disk_Pool_1 (1,108,000 GB)' expanded to show 'S5000_Pod-2 (20,000 GB)' selected. The right pane displays the following details for the selected volume:

Virtual Disk status:	<input checked="" type="checkbox"/> Optimal
Thin provisioned:	No
Capacity:	20,000 GB
Virtual Disk world-wide identifier:	69:0b:11:c0:00:04:a4:84:00:00:14:34:53:33:0f:54
Subsystem ID (SSID):	2
RAID level:	6
LUN:	0
Accessible By:	Host Group S5000_Pod-2
Physical Disk media type:	Physical Disk
Physical Disk interface type:	Serial Attached SCSI (SAS)
Enclosure loss protection:	No
Drawer Loss Protection:	No
Secure:	No
Preferred owner:	RAID Controller Module in slot 0
Current owner:	RAID Controller Module in slot 0
Segment size:	128 KB
Capacity reserved for future segment size changes:	No

Figure 5: Viewing volume information using 'Dell PowerVault Modular Disk Storage Manager' application

- Click the **'Host Mappings'** tab at the top. Next click the **'+'** sign next to the **'Host Group S5000_Pod-2'** Host Group on the left. Click on the icon labeled **'Host S5000_Server_Pod-2'**. This represents the Dell PowerEdge M620 server. If you right click it and click **'Properties'**, you will see the WWPN of the CNA port on the server as shown below.

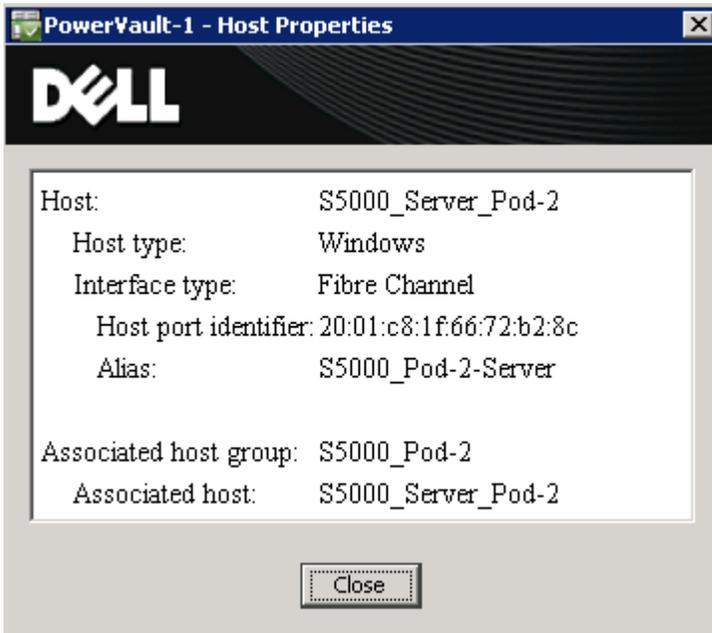


Figure 6: Host information using 'Dell PowerVault Modular Disk Storage Manager' application

- Click the **'Close'** button. Note on the right-side view this server is mapped to have access to the **'S5000_Pod-2'** volume you took a look at in the prior step.

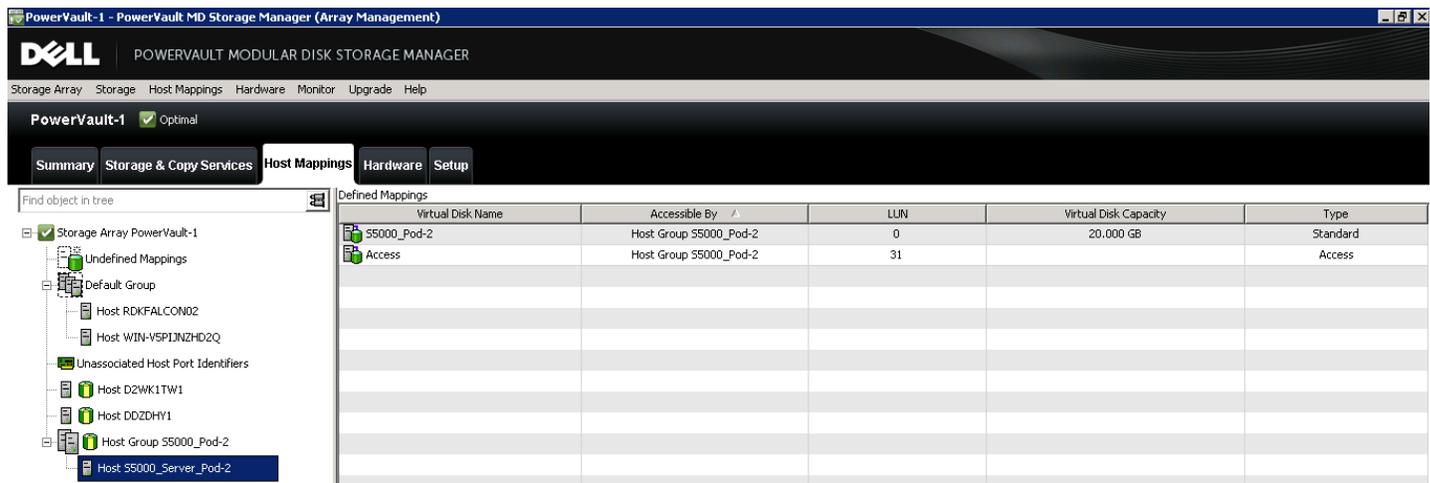


Figure 7: Viewing host mapping information using 'Dell PowerVault Modular Disk Storage Manager' application

You have completed looking at the settings for the PowerVault storage array. Close the **'PowerVault Modular Disk Storage Manager'** by clicking **'Storage Array->Exit'** on the top menu and then again **'Edit->Exit'** on the top menu.

C.) Understanding the LAN network

- Looking at **Figure 1** you can see there is a Dell S4810 switch in the network. This is only there to demonstrate LAN connectivity. You do not need to do any configuration on this S4810. The only configuration on the S4810 is an interface in VLAN 6. VLAN 6 has an IP address of **6.0.0.1/24**. The PowerEdge blade server has an IP address of **6.0.0.2/24** on the virtual LAN NIC. Once you configure the Dell MXL switch and S5000s in the following sections, we will test the LAN network by pinging this IP address on the LAN while writing to the PowerVault storage array via FCoE.

D.) Configuring the Dell MXL switch as a FSB/FCoE transit switch

- In this section you will configure the MXL switch as a FIP-snooping Bridge (FSB) or FCoE transit switch.

Double click the putty icon on the desktop. Select **'Session'** on the left-side menu and select **'Pod 2 – Dell MXL'** from the saved sessions and click the **'Load'** button. Click the **'Open'** button. Use the correct credentials to login.

2. Configure the MXL switch as a FSB switch passing the converged LAN/SAN traffic up to the S5000 with the commands below. The text in red are the commands you need to input. The text in brackets are comments. Note, you can enter part of the command and then hit the **'Tab'** key on the keyboard for autocomplete.
- a.) Configure the hostname
- **enable** [Enable password is 'force10']
 - **terminal monitor** [Display messages on the monitor]
 - **config**
 - **hostname MXL_A2_2** [Sets the hostname of the switch]
 - **feature fip-snooping** [Enable the FIP snooping feature]
- b.) Create port-channel connecting to S5000 and configure DCBx settings. You'll notice the connectivity from the MXL switch to the S5000 is via a Port Channel. Below we use a 40 GbE port (fo 0/ 33) on the Dell MXL switch in 4 x 10GbE mode and configure the ports in a port channel to connect up to the S5000. The 40 GbE port has already been set to 4 x 10 GbE mode.
- **interface range tengigabitethernet 0/33 – 36**
 - **port-channel-protocol lacp** [Create LACP port channel]
 - **port-channel 1 mode active** [Create port channel 1]
 - **exit**
 - **protocol lldp** [Go under interface LLDP settings]
 - **no advertise dcbx-tlv ets-reco** [For manual type settings, ETS recommended configuration TLV's will not be advertised but instead set via negotiations]
 - **dcbx port-role auto-upstream** [Set DCBx port role to receive a peer configuration. The configuration source is elected from auto-upstream ports.]
 - **no shut**
 - **exit**
- c.) Configure port-channel connecting to S5000 to get its DCB settings from the S5000
- **interface port-channel 1**
 - **portmode hybrid** [Allow port to both carry tagged and untagged traffic]
 - **switchport**
 - **fip-snooping port-mode fcf** [Configure the port for bridge-to-FCF links]
 - **exit**
- d.) Configure port connecting to server CNA to push DCB settings from S5000 down to CAN
- **interface tengigabitethernet 0/9**
 - **no switchport** [Need to remove layer 2 mode to make it a hybrid port first]

- **portmode hybrid** [Allow port to both carry tagged and untagged traffic]
- **switchport** [Put port in layer 2 mode – you will later tag this port to the LAN and FCoE VLAN]
- **protocol lldp** [Go under interface LLDP settings]
- **dcbx port-role auto-downstream** [Set DCBx port role to accept the internally propagated DCB configuration from a configuration source]
- **no shut**
- **exit**

e.) Finish LAN configuration

- **interface vlan 6** [Create LAN VLAN]
- **tagged tengigabitethernet 0/9** [Tag interface going to server with LAN VLAN]
- **tagged port-channel 1** [Tag port channel going up to S5000 switch with LAN VLAN]
- **exit**

f.) Finish FCoE configuration by putting respective interfaces in FCoE VLAN and enabling FIP-snooping on the FCoE VLAN]

- **interface vlan 1006** [Create VLAN for FCoE]
- **tagged tengigabitethernet 0/9** [Tag interface going to server with FCoE VLAN]
- **tagged port-channel 1** [Tag port channel going up to S5000 switch with FCoE VLAN]
- **fip-snooping fc-map 0efc06** [Enable an FC-MAP value since we are not using the default FC-MAP on S5000]
- **fip-snooping enable** [Enable FIP snooping on FCoE VLAN 1006]
- **end**

Do not use the 'write mem' command. We do not want to save this config!

E.) Configuring the Dell S5000 switch connecting to the PowerVault storage array

1. In this section you will configure the S5000 switch connecting to the PowerVault FC storage array. Note, there is not much configuration needed on this switch as it simply has the FC storage connected and ISL links to the other S5000 switch which is connecting to the MXL switch. This S5000 switch just needs the respective FC ports and Fabric Services enabled. As mentioned prior, we could have connected the FC storage directly to the other S5000 switch as there are plenty of FC ports available, however, the purpose of this lab is also to demonstrate ISL links and the creation of a small FC SAN fabric via S5000 switches.

Double click the putty icon on the desktop. Select **'Session'** on the left-side menu and select **'Pod 2 – Dell S5000 2'** from the saved sessions and click the **'Load'** button. Click the **'Open'** button. Use the correct credentials to login.

2. Configure the S5000 switch connecting to the PowerVault FC storage array in Full Fabric mode.
 - a.) Configure the hostname
 - **enable** [Enable password is 'force10']
 - **config**
 - **hostname S5000_2_2** [Sets the hostname of the switch]
 - b.) Enable Fibre Channel capability and Full Fabric mode
 - **feature fc**
 - **fc switch-mode fabric-services**
 - c.) Enable FC ports connecting to PowerVault FC storage array and FC ports connecting to other S5000 switch via ISL links.
 - **interface range fi 0/0 - 7** [Select the range of FC ports to configure]
 - **no shut** [Enable FC ports]

Do not use the 'write mem' command. We do not want to save this config!

F.) Configuring the Dell S5000 switch connecting to the MXL blade switch

1. In this section you will configure the S5000 switch connecting to the MXL switch. The S5000 switch is a FCoE Forwarder (FCF), providing bridging between FCoE and FC. The converged traffic comes up from the MXL switch and the S5000 sends the LAN traffic up to the S4810 and de-encapsulates the FC from FCoE and switches it via the FC ports. The S5000 is also providing the fabric services such as Fabric Login Server, Name Server, Zoning, and ISL links.

Double click the putty icon on the desktop. Select '**Session**' on the left-side menu and select '**Pod 2 – Dell S5000 1**' from the saved sessions and click the '**Load**' button. Click the '**Open**' button. Use the correct credentials to login.

2. Configure the S5000 switch connecting to the to the MXL switch in Full Fabric mode.
 - a.) Configure the hostname
 - **enable** [Enable password is 'force10']
 - **config**

- **hostname S5000_1_2** [Sets the hostname of the switch]
- b.) Configure the switch for LAN traffic. You'll notice the connectivity from the MXL switch to the S5000 is via a Port Channel. Below we use 4 x 10 GbE ports to create a port channel connecting to the MXL switch. One 10 GbE interface is used to connect up to the S4810 for the LAN connectivity.
- **interface range te 0/12 - 15** [Ports connected to MXL switch]
 - **port-channel-protocol lacp** [Create a LACP port channel]
 - **port-channel 1 mode active** [Create port channel 1 with LACP mode active]
 - **no shut**
 - **exit**

 - **interface po 1** [Go under the port channel just created]
 - **portmode hybrid** [Allows port to both carry tagged and untagged traffic]
 - **switchport** [Puts port in layer 2 mode – port will be part of the LAN VLAN and FCoE VLAN]
 - **no shut**
 - **exit**

 - **interface te 0/16** [Go under the interface connecting to the S4810 LAN switch]
 - **switchport** [Put port in layer 2 mode – you will later tag this port to the LAN VLAN]
 - **no shut**
 - **exit**

 - **interface vlan 6** [Create LAN VLAN]
 - **tagged te 0/16** [Tag port going to S4810 to LAN VLAN]
 - **tagged po 1** [Tag port channel going down to MXL switch to LAN VLAN]
 - **exit**
- c.) Enable Fibre Channel capability and Full Fabric mode
- **feature fc**
 - **fc switch-mode fabric-services**
- d.) Create DCB MAP and configure priority-based flow control (PFC) and enhanced transmission selection (ETS) settings for LAN and SAN traffic.

Priorities or Class of Service (CoS) are mapped to priority groups using the '**priority-pgid**' command. In this example, priorities 0, 1, 2, 4, 5, 6, and 7 are mapped to priority group 0. Priority 3 is mapped to

priority-group 1

- **dcb-map SAN_DCB_MAP**
- **priority-group 0 bandwidth 60 pfc off** [60% bandwidth for LAN traffic with PFC off]
- **priority-group 1 bandwidth 40 pfc on** [40% bandwidth for SAN traffic with PFC on]
- **priority-pgid 0 0 0 1 0 0 0 0** [Map FCoE priority 3 to priority group 1]
- **exit**

e.) Create a FCoE VLAN and edit the default FCoE MAP. Apply the DCB MAP to the respective interfaces. The FCoE MAP is used to map FCoE traffic to the respective VLAN/interfaces. The FCoE MAP is applied to the '**Port-channel 1**' interface connecting to the MXL switch. By default the default FCoE MAP is also applied to all FC interfaces and does not need to be manually applied. Note, on S5000, FCoE is always mapped to priority 3.

- **interface vlan 1006** [Create VLAN for FCoE]
- **exit**
- **fcoe-map default_full_fabric** [Edit the default FCoE MAP]
- **fabric-id 1006 vlan 1006** [Link the FCoE MAP to the FCoE VLAN]

The fc-map is used as the first 24-bits of the Fabric Provided MAC Address (FPMA) that gets assigned to the CNA port. The second 24-bits (FC-ID) comes from the FC switch providing the fabric services. In this case the Dell S5000 switch is providing the fabric services so also provides the other 24-bits or FC-ID.

- **fc-map 0efc06** [Designate the FC-MAP used by the S5000 switch]
- **exit**
- **interface range fi 0/0 - 3** [Select FC ports connecting to other S5000]
- **no shut**
- **exit**
- **interface range te 0/12 – 15** [Select port channel members connecting to MXL switch]
- **dcb-map SAN_DCB_MAP** [Apply DCB MAP]
- **exit**
- **interface po 1** [Select port channel connecting to MXL switch]
- **fcoe-map default_full_fabric** [Apply FCoE MAP]
- **exit**

- f.) Create and apply the zoning configuration. By default on S5000 Enodes cannot communicate with each other until zoning is configured. You can use the '**show fc ns fabric**' command to see all Enodes and respective WWPNs logged into the fabric. This information can then be used for zoning purposes. Below we create a zone containing the WWPNs of the Broadcom CNA on the server, and the WWPNs of the four FC ports being connected to on the PowerVault FC storage.

Note, when zoning configuration is applied on one S5000 in the FC fabric, the zoning configuration is updated on all other S5000s so they all have the same zoning applied.

- **fc zone S5000_Pod-2** [Create a zone]
- **member 20:01:c8:1f:66:72:b2:8c** [WWPN of Broadcom CNA port on server]
- **member 20:24:90:b1:1c:04:a4:84** [WWPN of FC port on PowerVault FC storage controller]
- **member 20:44:90:b1:1c:04:a4:84** [WWPN of FC port on PowerVault FC storage controller]
- **member 20:25:90:b1:1c:04:a4:84** [WWPN of FC port on PowerVault FC storage controller]
- **member 20:45:90:b1:1c:04:a4:84** [WWPN of FC port on PowerVault FC storage controller]
- **exit**

- **fc zoneset S5000_Storage_Pod-2** [Create zoneset]
- **member S5000_Pod-2** [Add zone to zoneset]
- **exit**

- **fcoe-map default_full_fabric** [Edit default FCoE MAP]
- **fc-fabric** [Enter FC-Fabric configuration]
- **active-zoneset S5000_Storage_Pod-2** [Activate zoneset]
- **end**

Do not use the 'write mem' command. We do not want to save this config!

G.) Confirm the Dell S5000 switches and MXL switch is configured correctly

1. Use the following commands on the Dell S5000 switch to confirm successful configuration/operation.

- a.) To see all FCoE end-node (ENodes), use the '**show fip-snooping enode**' command.

- **show fip-snooping enode**

You will see the below, which shows the CNA port is logged into the fabric.

```
S5000_1_2#show fip-snooping enode
Enode MAC          Enode Interface    FCF MAC           VLAN             FC-ID
-----
c8:1f:66:72:b2:8c  Po 1              5c:f9:dd:ef:36:88  1006            02:35:00
S5000_1_2#
```

Figure 8: 'show fip-snooping enode' output

b.) To see currently active FCoE VN_Port sessions, use the 'show fip-snooping sessions' command.

- **show fip-snooping sessions**

```
S5000_1_2#show fip-snooping sessions
Enode MAC          Enode Intf         FCF MAC           FCF Intf         VLAN    FCoE MAC          FC-ID    Port WWPN          Port WWNN
-----
c8:1f:66:72:b2:8c  Po 1              5c:f9:dd:ef:36:88  Fc 0/5          1006    0e:fc:06:02:35:00  02:35:00  20:01:c8:1f:66:72:b2:8c  20:00:c8:1f:66:72:b2:8c
S5000_1_2#
```

Figure 9: 'show fip-snooping sessions' output

c.) To see brief information on the default FCoE-MAP use the 'show fcoe-map brief' command.

- **show fcoe-map brief**

```
S5000_1_2#show fcoe-map brief
Fabric-Name      Fabric-Id          Vlan-Id          FC-MAP          FCF-Priority      Config-State      Oper-State      UP
default_full_fabric  1006              1006             1006            0efc06            128              ACTIVE          UP
S5000_1_2#
```

Figure 10: 'show fcoe-map brief' output

d.) To see more detailed information on the default fcoe-map, use the 'show fcoe-map default_full_fabric' command. Notice below, we see the priority mapped to FCoE by default is '3'.

- **show fcoe-map default_full_fabric**

```

S5000_1_2#show fcoe-map default_full_fabric

Fabric Name          default_full_fabric

Fabric Type          full-fabric
Fabric Id            1006
Vlan Id              1006
Vlan priority        3
FC-MAP               0efc06
FKA-ADV-Period       8
Fcf Priority          128
Config-State         ACTIVE
Oper-State           UP

=====
Switch Config Parameters
=====
R_A_TOV (ms)         10000
R_T_TOV (ms)         100
E_D_TOV (ms)         2000
DomainID             2
DomainID-Locked      OFF
Principal-Pri        254

=====
Switch Zoning Parameters
=====
Default Zone Mode:   Deny
Active Zoneset:      S5000_Storage_Pod-2

=====
Members
Fc 0/0 Fc 0/1 Fc 0/2 Fc 0/3 Fc 0/4 Fc 0/5 Fc 0/6 Fc 0/7 Fc 0/8 Fc 0/9 Fc 0/10 Fc 0/11
Po 1
=====
S5000_1_2#

```

Figure 11: 'show fcoe-map default_full_fabric' output

- e.) To see the active zoneset and respective zones use the '**show fc zoneset active**' command.
- **show fc zoneset active**

```

S5000_1_2#show fc zoneset active

Active Zoneset: S5000_Storage_Pod-2

ZoneName                ZoneMember
=====
S5000_Pod-2
                        *20:01:c8:1f:66:72:b2:8c
                        *20:45:90:b1:1c:04:a4:84
                        *20:44:90:b1:1c:04:a4:84
                        *20:25:90:b1:1c:04:a4:84
                        *20:24:90:b1:1c:04:a4:84
S5000_1_2#

```

Figure 12: 'show fc zoneset active' output

- f.) To see all device logged into the nameserver through this S5000 only, use the 'show fc ns switch' command

```

S5000_1_2#show fc ns switch

Total number of devices = 1

Switch Name             10:00:5c:f9:dd:ef:36:80
Domain Id               2
Switch Port             Po 1
FC-Id                   02:35:00
Port Name                20:01:c8:1f:66:72:b2:8c
Node Name                20:00:c8:1f:66:72:b2:8c
Class of Service        8
Symbolic Port Name      Broadcom Port1 pWWN 20:01:c8:1f:66:72:b2:8c
Symbolic Node Name      Broadcom BCM57810 FCoE 7.4.6.0 7.4.33.0 WIN-NBWA07RIW6I
Port Type                N_Port
S5000_1_2#

```

Figure 13: 'show fc ns switch' output

- g.) To see all device logged into the nameserver through all S5000s in the fabric, use the 'show fc ns fabric' command

- h.) Pull up the terminal for the second S5000 switch connecting directly to the PowerVault storage array. If you have been logged-out of the switch due to in-activity, please log back in. Use the **'show fc zoneset active'** and **'show fc ns fabric'** commands to confirm you see the same results as on other S5000 switch.
- i.) Pull up the terminal for the MXL switch connecting directly to the PowerEdge M620 blade server. If you, have been logged-out of the switch due to in-activity, please log back in. Use the **'show fip-snooping enode'** command; you should also be able to see from the MXL switch that the Enode is logged into the fabric.

```
MXL_A2_2#show fip-snooping enode
Enode MAC          Enode Interface    FCF MAC           VLAN             FC-ID
-----
c8:1f:66:72:b2:8c  Te 0/9             5c:f9:dd:ef:36:88  1006             02:35:00
MXL_A2_2#
```

Figure 14: 'show fip-snooping enode' output

H.) Test LAN/SAN connectivity from the Windows 2008 server

1. Double click the **'Computer'** icon on the desktop. Note the **'S5000_Pod-2'** disk drive now available. This is the remote storage on the PowerVault storage array. Leave this window visible.
2. Double click the **'Command Prompt'** icon on the desktop and enter **'ping -t 6.0.0.1'**. You are sending a continuous ping to the IP address on VLAN 6 on the S4810 on your LAN network. Leave the command prompt window visible.
3. Double click the **'Test Files'** folder on the desktop. Select all five test files with the mouse and drag them over to the **'S5000_Pod-2'** disk.

You have now successfully configured a converged network via FCoE with the Dell S5000 switch in Full Fabric mode and the MXL switch as FSB. You have also confirmed this configuration by sending both LAN and SAN traffic from the Dell PowerEdge blade server to the Dell PowerVault storage array.

4. Double click the **'S5000_Pod-2'** disk icon and delete all five files you just copied over. Close the command prompt window. Close any other open windows in the **'Remote Desktop'** session before closing the **'Remote Desktop'** session. **Do not simply close the 'Remote Desktop' connection without closing all the windows you opened in the session.**

I.) Remove all configuration from the the Dell S5000s and the Dell MXL switch.

1. On both Dell S5000 switches and the MXL switch enter the '**reload**' command. If you have been logged-out of any switch due to in-activity, please log back in and reload the switch.

- **reload**

On all three switches, when prompted to save the configuration, type 'no**' and hit enter. When prompted to confirm reload, type '**yes**' and hit enter.** Close the putty console connection to all three switches.

Close all browser windows.

Congratulations! You have successfully configured a converged LAN/SAN network using FCoE with the Dell S5000 switch in Full Fabric mode and the Dell MXL blade switch as a FSB.