



TECHNICAL BRIEF

# Connecting the Dell™ PowerEdge™ M-Series Blades to a Cisco SAN Fabric

*Utilizing the Dell 8/4Gbps FC SAN Module*

Dell leverages standards-based technologies to provide PowerEdge M1000e customers industry-leading simplicity for connecting server blades to the Cisco core Storage Area Network (SAN). Customers can quickly and easily connect entire blade enclosures to the Cisco core SAN while maintaining independent server blade connections.

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## STANDARDS-BASED TECHNOLOGY

The best and easiest method to connect a Dell PowerEdge M1000e Blade Enclosure to a Cisco Fibre Channel fabric is to use industry-standard N\_Port ID Virtualization (NPIV) technology. NPIV is mature, widely accepted, broadly available, and proven Fibre Channel (FC) SAN standards-based technology that simplifies SAN connectivity. By transforming how servers and SANs communicate with each other, NPIV eliminates traditional FC SAN switch constraints, such as interoperability, domain counts, and incremental management.

### Standards-Based

- NPIV is defined by the Technical Committee 11 or the InterNational Committee for Information Technology Standards (INCITS).
- INCITS is an American National Standards Institute (ANSI) accredited forum of IT developers.

### Mature

- NPIV was developed by IBM and formally defined by standards in 2002. IBM introduced NPIV on IBM System z9™ to support multiple Linux partitions; Brocade and McDATA introduced NPIV on certain switches in 2005; Cisco SAN switches currently support NPIV.

### Accepted

- NPIV is available today on industry-standard switches and directors from Brocade, Qlogic, McDATA, and Cisco.
- NPIV has been available with Dell blades since early 2007.
- It is utilized in virtual FC Host Bus Adapter (HBA) designs available today from Emulex and QLogic.
- Future virtualization software products will utilize NPIV for virtual machine to SAN connectivity.

### Proven

NPIV is qualified and widely supported by Dell and EMC. EMC E-Labs Enterprise Support Matrix\* documents the Dell 8/4Gbps FC SAN Module connecting to devices including:

- Cisco MDS 9120 Multilayer Fabric Switch
- Cisco MDS 9124 Multilayer Fabric Switch
- Cisco MDS 9140 Multilayer Fabric Switch
- Cisco MDS 9216 Multilayer Fabric Switch
- Cisco MDS 9216A Multilayer Fabric Switch
- Cisco MDS 9216i Multilayer Fabric Switch
- Cisco MDS 9506 Multilayer Director
- Cisco MDS 9509 Multilayer Director
- Cisco MDS 9513 Multilayer Director

\* Latest updates and configuration details can be obtained from:  
[www.emc.com/interoperability/index.jsp](http://www.emc.com/interoperability/index.jsp)

## INDUSTRY-LEADING SIMPLICITY

Dell understands the challenges of complexity in today's data centers and is committed to simplifying blade-to-SAN deployments. That is why Dell makes choices simple, offering a robust solution for Cisco SAN fabrics with the Dell 8/4Gbps FC SAN Module ("FC SAN Module"), providing the following benefits:

- Rise above the challenges of SAN interoperability with industry-standard NPIV technology
- Deploy M-Series blade servers into existing SANs without adding switch domains
- Pay as you grow with port upgrade options from 12 to 24 ports
- Protect your investment with flexibility to evolve from 2 to 4 to 8 Gbps Fibre Channel
- Eliminate the need for incremental SAN management, while enjoying the benefits of automatic port failover/failback and default port mapping

## Connecting PowerEdge M-Series Blades to Cisco Fabrics

The Dell 8/4Gbps FC SAN Module transparently connects each server blade (each with a unique FC connection and SAN ID) to a Cisco SAN through an NPIV-enabled Cisco core SAN port. The FC SAN Module then orchestrates I/O between each server blade and associated SAN storage, maintaining independent server to storage mappings.

Based on NPIV, the FC SAN Module can route more servers (both physical server blades and virtual machines) over fewer physical connection components (optical cables and transceivers), which translates into customer benefits such as:

- Reduced complexity: less cable and component clutter
- Lower costs: fewer expensive components
- Increased availability: eliminates potential points of failure

Because the FC SAN Module functions as an NPIV-based port aggregator, it does not communicate as a vendor- or brand-specific FC SAN switch requiring a traditional "switch-to-switch" interoperability mode of operation. This allows for connectivity to any NPIV-enabled SAN.

Additionally, since the FC SAN Module does not communicate as a switch, it eliminates practical switch domain limitations such as domain counts which typically range from 30-60 domains per fabric. This enables increased scalability of blade enclosures filled with physical and virtual servers. Dell enterprise customers can deploy with confidence, increasing numbers of PowerEdge M1000e blade enclosures to Cisco core SANs without traditional limits.

Finally, the FC SAN Module eliminates incremental management domains & tools normally required by fabric switches. Instead FC connections are managed like FC HBA connections from Cisco Core SAN management.

See the appendix for detailed instructions.

## Considerations

While the FC SAN Module provides excellent I/O connectivity for Dell server blades to Cisco core SANs and has shown to be compatible with Cisco VSAN, Dynamic Port VSAN (DVPM), and Inter-VSAN Routing (IVR) features of MDS switches. Cisco feature and function considerations, include:

- Cisco SAN OS 3.1 or later must be running on the Cisco switch to which the FC SAN Module is connected.
- Port Grouping on the Dell FC SAN Module must be enabled in order to take full advantage of Cisco VSAN features (supports up to 8 VSANs per module).

- Cisco Port Channeling is not supported between the Dell FC SAN Module and Cisco SAN switches.
- To update the software on the FC SAN Module, contact your Dell representative.

## SUMMARY

With the 8/4Gbps FC SAN Module, Dell delivers a simple, yet effective, bladed solution for PowerEdge M1000e customers who want to connect Dell server blades to Cisco core SANs.

Designed to reduce complexity and cost while increasing availability—the FC SAN Module is the optimal solution for connecting Dell blade servers to SANs. The extremely flexible FC SAN Module is designed for enterprise customers actively consolidating and optimizing data center resources. It enables:

- Scaling of server blade FC connections through a port upgrade license option
- Flexible use of licensed ports *when and where needed*
- Unrestricted blade enclosure deployments utilizing NPIV

## APPENDIX: CONNECTION PROCEDURE

Before you can connect the Dell 8/4Gbps FC SAN Module, NPIV must be enabled on the Cisco MDS switch and the VSAN must be configured for NPIV. To check and see whether NPIV is enabled on the Cisco switch:

- Log in to the Cisco MDS switch and run the “show run” command.
- From the Device Manager, check the Feature Control list.

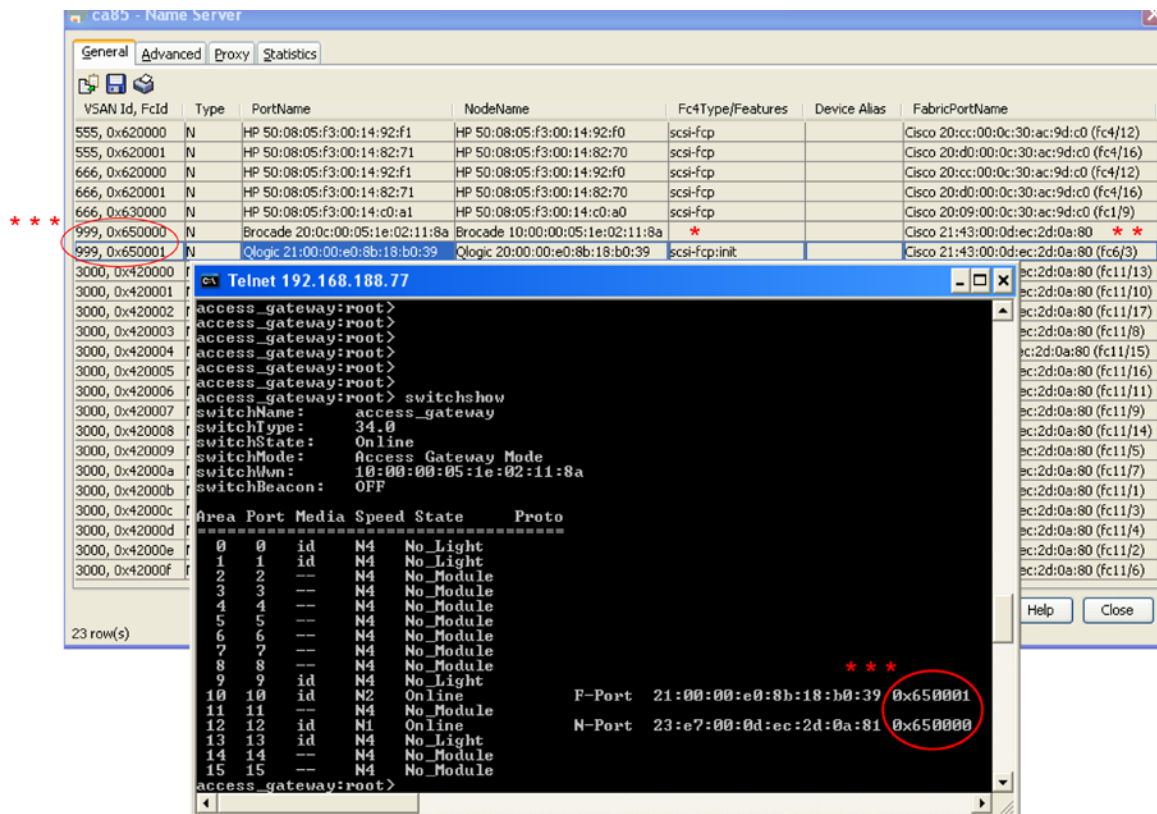
There are two ways to enable NPIV on the Cisco MDS. In this example, “VSAN 999” is the NPIV VSAN.

### Enable NPIV on the MDS and Configure the VSAN for NPIV

1. From the Command-Line Interface (CLI) on the Cisco MDS switch, use `npiv enable`.

Or from the Device Manager, go to **Admin -> Feature Control**. Find NPIV, and then in the **Action** column for NPIV, select **enable** and click **Apply**. You will soon see the status for NPIV as enabled.

2. Connect the external port (N\_Port) on the FC SAN Module to port 3 on slot 6 on the MDS switch. The view from the MDS name Server and the FC SAN Module is shown below.



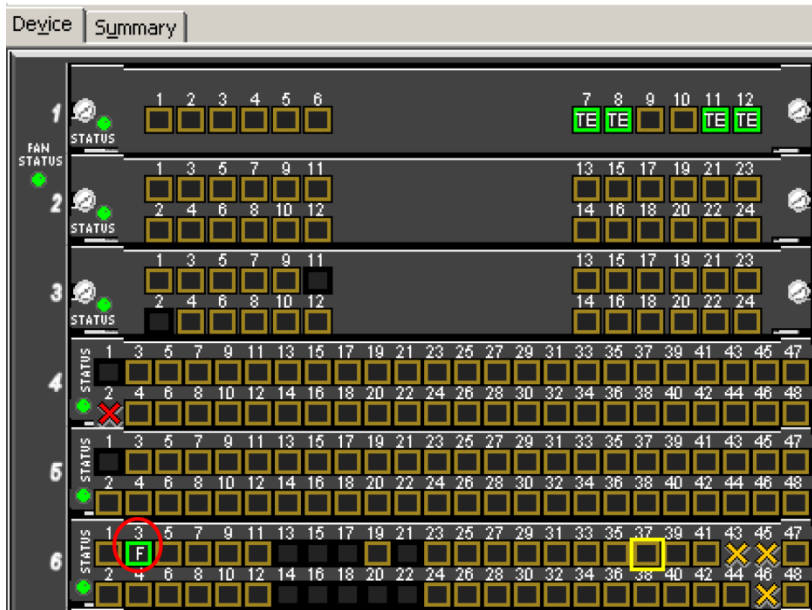
\* The external port (N\_Port) on the FC SAN Module does not present a name like the other devices listed in the column.

\*\* The external port (N\_Port) on the FC SAN Module does not have a port location (fc6/3) like the other devices.

\* \* \* The FCIDs in VSAN 999 including both server (F-Port, 0x650001) and the FC SAN Module (N-Port, 0x650000) matches what is being reported by the Dell FC SAN Module.

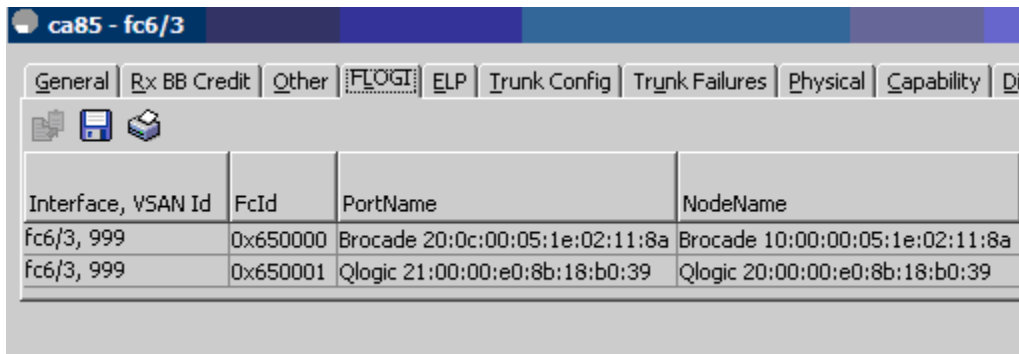


The connection from the MDS switch to the FC SAN Module is shown below.



3. After bringing up the Cisco Device Manager (DM), port 6/3 (circled in red above) is the port in VSAN 999 configured for NPIV and connected to the FC SAN Module. The port is an F\_Port.

Right-click the port and select **Configure**, and then click the **FLOGI** tab as shown below.



The first port listed is the external port (N\_Port) on the Dell 8/4Gbps FC SAN Module. Its VSAN ID is 999, and is followed by a list of the server adapters connected to the FC SAN Module. If FlexAddress is enabled, the adapter WWNs shown will be the ones assigned from FlexAddress.

4. Now disable the port on MDS switch and look at the view from the FC SAN Module.

```
access_gateway:root> switchshow
switchName:    access_gateway
switchType:    34.0
switchState:   Online
switchMode:    Access Gateway Mode
switchWwn:     10:00:00:05:1e:02:11:8a
switchBeacon:  OFF

Area Port Media Speed State      Proto
=====
 0  0  id  N4  No_Light
 1  1  id  N4  No_Light
 2  2  --  N4  No_Module
 3  3  --  N4  No_Module
 4  4  --  N4  No_Module
 5  5  --  N4  No_Module
 6  6  --  N4  No_Module
 7  7  --  N4  No_Module
 8  8  --  N4  No_Module
 9  9  id  N4  No_Light
10 10  id  N4  In_Sync
11 11  --  N4  No_Module          Disabled <N-Port Offline for F-Port>
12 12  id  N4  No_Light
13 13  id  N4  No_Light
14 14  --  N4  No_Module
15 15  --  N4  No_Module
access_gateway:root>
```

5. Re-enabling the port on the MDS switch to see the port state changes from the FC SAN Module, as shown below.

```
access_gateway:root> switchshow
switchName:    access_gateway
switchType:    34.0
switchState:   Online
switchMode:    Access Gateway Mode
switchWwn:     10:00:00:05:1e:02:11:8a
switchBeacon:  OFF

Area Port Media Speed State      Proto
=====
 0  0  id  N4  No_Light
 1  1  id  N4  No_Light
 2  2  --  N4  No_Module
 3  3  --  N4  No_Module
 4  4  --  N4  No_Module
 5  5  --  N4  No_Module
 6  6  --  N4  No_Module
 7  7  --  N4  No_Module
 8  8  --  N4  No_Module
 9  9  id  N4  No_Light
10 10  id  N4  In_Sync
11 11  --  N4  No_Module          Disabled <N-Port Offline for F-Port>
12 12  id  N1  OnLine          N-Port  23:e7:00:0d:ec:2d:0a:81 0x650000
13 13  id  N4  No_Light
14 14  --  N4  No_Module
15 15  --  N4  No_Module
access_gateway:root> switchshow
switchName:    access_gateway
switchType:    34.0
switchState:   Online
switchMode:    Access Gateway Mode
```

The external port (N\_Port) comes online.

```

Area Port Media Speed State      Proto
=====
 0  0  id  N4  No_Light
 1  1  id  N4  No_Light
 2  2  --  N4  No_Module
 3  3  --  N4  No_Module
 4  4  --  N4  No_Module
 5  5  --  N4  No_Module
 6  6  --  N4  No_Module
 7  7  --  N4  No_Module
 8  8  --  N4  No_Module
 9  9  id  N4  No_Light
10 10  id  N4  No_Sync
11 11  --  N4  No_Module
12 12  id  N1  Online      N-Port  23:e7:00:0d:ec:2d:0a:81 0x650000
13 13  id  N4  No_Light
14 14  --  N4  No_Module
15 15  --  N4  No_Module

```

The port on the FC SAN Module is back online.

```

access_gateway:root> switchshow
switchName:      access_gateway
switchType:      34.0
switchState:     Online
switchMode:      Access Gateway Mode
switchWwn:       10:00:00:05:1e:02:11:8a
switchBeacon:    OFF

Area Port Media Speed State      Proto
=====
 0  0  id  N4  No_Light
 1  1  id  N4  No_Light
 2  2  --  N4  No_Module
 3  3  --  N4  No_Module
 4  4  --  N4  No_Module
 5  5  --  N4  No_Module
 6  6  --  N4  No_Module
 7  7  --  N4  No_Module
 8  8  --  N4  No_Module
 9  9  id  N4  No_Light
10 10  id  N2  Online      F-Port  21:00:00:e0:8b:18:b0:39 0x650001
11 11  --  N4  No_Module
12 12  id  N1  Online      N-Port  23:e7:00:0d:ec:2d:0a:81 0x650000
13 13  id  N4  No_Light
14 14  --  N4  No_Module
15 15  --  N4  No_Module
access_gateway:root>

```

Note that the PIDs listed (0x650000, 0x650001) are the same on both the FC SAN Module and the MDS VSAN configured for NPIV.



## VSANs and FC SAN Module

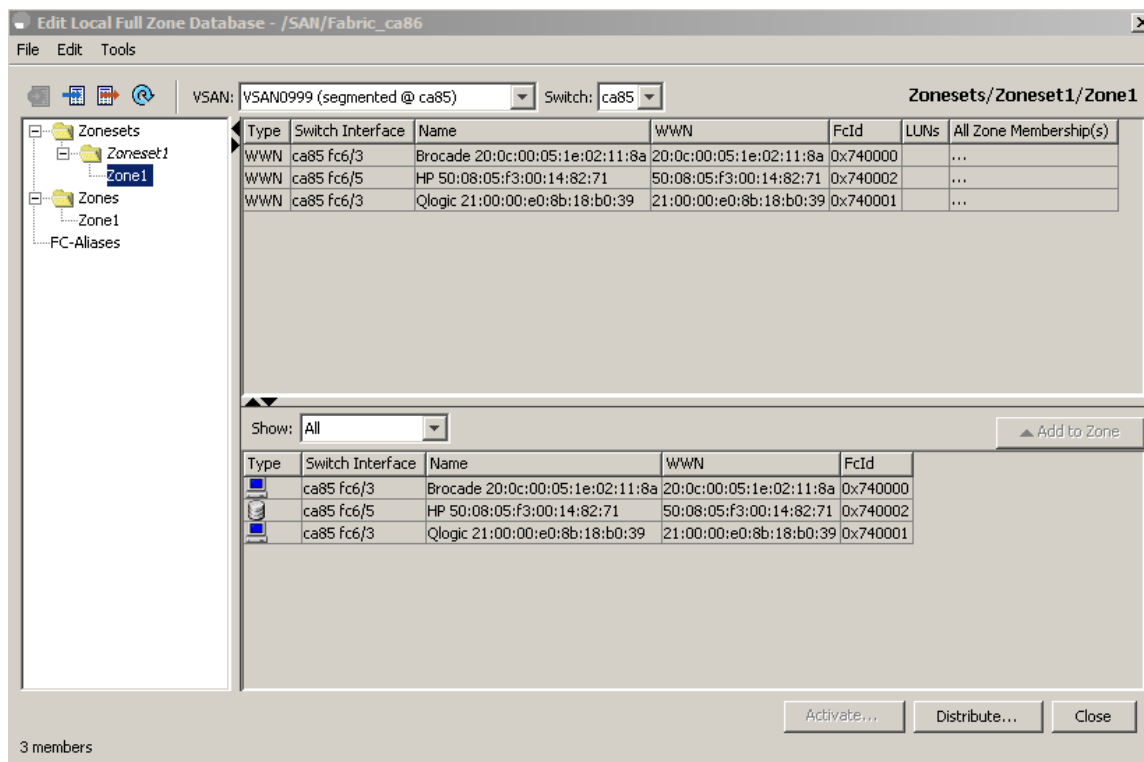
When VSAN 999 was created, the mode was “default,” which is the Cisco native VSAN mode. The following VSAN modes can connect to the external port (N\_Port) on the FC SAN Module:

- Default
- Interop-1 (Standards-based interoperability)
- Interop-2 (PID 0)
- Interop-3 (PID 1)
- Interop-4 (McDATA native mode)

The first four methods listed above can easily be configured via the Cisco Device Manager, for interop-4 configuration. See the *Cisco MDS Switch-to-Switch Interoperability Configuration Guide*.

## MDS Zoning with FC SAN Module

The Windows 2003 hosts began formatting a 407 GB volume in NPIV VSAN 999. The first zone configuration created during the formatting consisted of the QLogic HBA, the storage array, and the external port (N\_Port) from the FC SAN Module as shown below in the Cisco Fabric Manager.

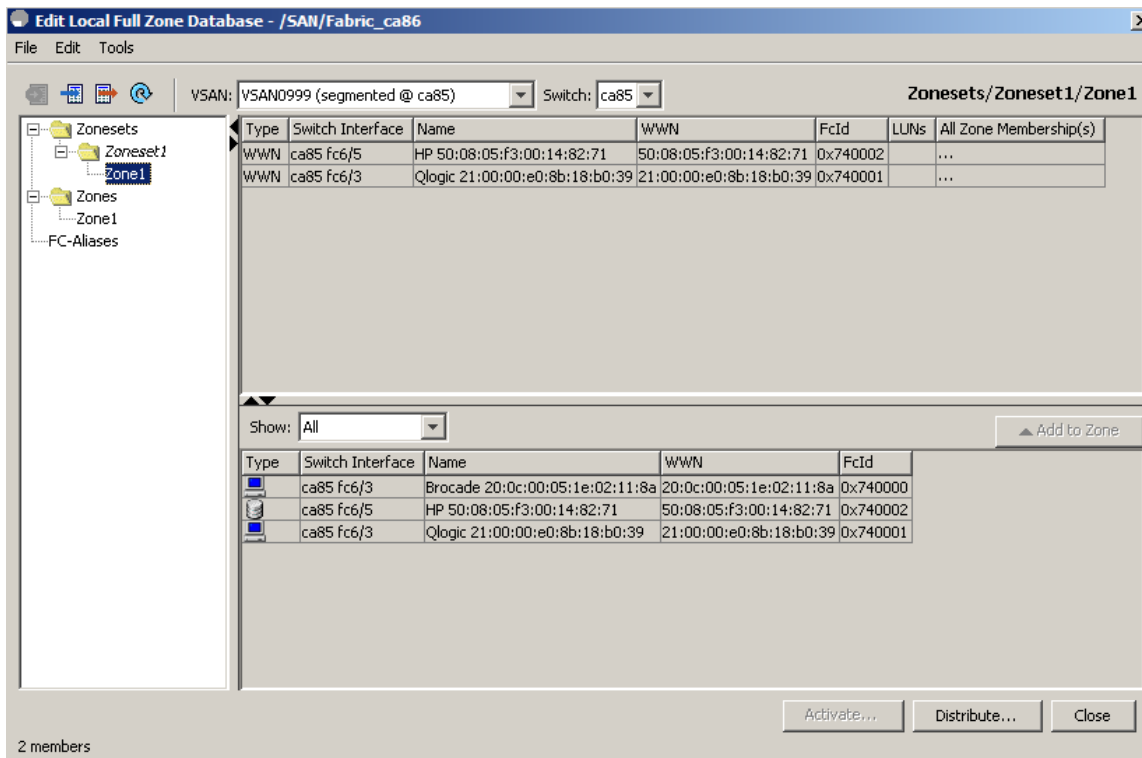


From the command line, you can also see all (three) devices are now active in VSAN 999:

```
ca85# sh zones active vsan 999
zoneset name Zoneset1 vsan 999
zone name Zone1 vsan 999
  * fcid 0x740002 [pwwn 50:08:05:f3:00:14:82:71] (HP Array)
  * fcid 0x740001 [pwwn 21:00:00:e0:8b:18:b0:39] (Qlogic HBA)
  * fcid 0x740000 [pwwn 20:0c:00:05:1e:02:11:8a] (external N_Port on the FC SAN Module)

zone name $default_zone$ vsan 999 (VSAN set to permit)
```

Again, while the volume is being formatted, the external FC SAN Module port (N\_Port) is removed from the configuration and the zone set reactivated. The format is not affected by the removal of the N\_Port. Furthermore, if FlexAddress is used, the zone will persist.



From the command line, you can see that the QLogic HBA, the HP array on the active zone set, and the N\_Port are displayed as shown below:

```
ca85# sh zones active vsan 999
zoneset name Zoneset1 vsan 999
zone name Zone1 vsan 999
  * fcid 0x740002 [pwwn 50:08:05:f3:00:14:82:71] (HP array)
  * fcid 0x740001 [pwwn 21:00:00:e0:8b:18:b0:39] (QLogic HBA)
zone name $default_zone$ vsan 999
  * fcid 0x740000 (N_Port on the Dell 8/4Gbps FC SAN Module not in Zone1)
```

The \$default\_zone\$ means that the VSAN has been set to “permit” versus “deny,” which means that the devices can see one another.

The asterisk (\*) tells you that the device is logged into the fabric.