

# Deploying ESXi 6.0 with Dell PS and SC Series Storage on Separate iSCSI Networks

Dell Storage Engineering October 2016

A Dell Deployment and Configuration Guide

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# Acknowledgements

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# 1 Introduction

Dell<sup>™</sup> Storage PS Series and SC Series systems both support storage area networks (SANs) over the iSCSI protocol. This document provides best practices for deploying VMware vSphere<sup>®</sup> host servers that connect to an existing:

- PS Series storage target using a dedicated iSCSI network
- SC Series storage target using two additional dedicated iSCSI networks.

### 1.1 Scope

The scope of this paper focuses on:

- Dedicated switches for iSCSI storage traffic
- Non-DCB (Data Center Bridging) enabled iSCSI SAN
- Standard TCP/IP implementations utilizing standard network interface cards (NICs)
- Standard TCP/IP implementations utilizing network interface cards with iSCSI Offload Engine
- vSphere Software iSCSI Adapter for PS Series iSCSI connectivity
- vSphere Dependent Hardware iSCSI adapters for SC Series iSCSI connectivity
- Virtual LAN (VLAN) untagged solution
- IPv4 only for PS Series and SC Series

The scope of this paper does **not** include:

- DCB or sharing the same SAN infrastructure for multiple traffic types
- NIC partitioning (NPAR)
- VLAN tagging at the switch, initiator, or target
- SC Series storage systems using Fibre Channel over Ethernet (FCoE) SAN connectivity
- Non-MPIO (Multipath Input/Output) implementation

### 1.2 Audience

This paper is intended for storage administrators, network administrators, SAN system designers, storage consultants, or anyone tasked with configuring a SAN infrastructure for VMware ESXi hosts using PS Series and SC Series storage. It is assumed that readers have experience in designing and/or administering a shared storage solution. There are assumptions made in terms of familiarity with all current Ethernet standards as defined by the Institute of Electrical and Electronic Engineers (IEEE) as well as TCP/IP standards defined by the Internet Engineering Task Force (IETF) and FC standards defined by the T11 committee and the International Committee for Information Technology Standards (INCITS).

# 1.3 Terminology

The following terms are used throughout this document:

**Converged network adapter (CNA):** A network adapter that supports convergence of simultaneous communication of both traditional Ethernet and TCP/IP protocols as well as storage networking protocols, such as internet SCSI (iSCSI) or Fibre Channel over Ethernet (FCoE), using the same physical network interface port.

**Data Center Bridging (DCB):** A set of enhancements made to the IEEE 802.1 bridge specifications for supporting multiple protocols and applications in the same data center switching fabric. It is made up of several IEEE standards including Enhanced Transmission Selection (ETS), Priority-based Flow Control (PFC), Data Center Bridging Exchange (DCBX), and application Type-Length-Value (TLV). For more information read *Data Center Bridging: Standards, Behavioral Requirements, and Configuration Guidelines with Dell EqualLogic iSCSI SANs*.

EqualLogic Multipathing Extension Module (MEM) for VMware vSphere: The PS Series multipath I/O (MPIO) module for ESXi.

**Fault domain (FD):** A set of hardware components that share a single point of failure. For controller-level redundancy, fault domains are created for SC Series storage to maintain connectivity in the event of a controller failure. In a dual-switch topology, each switch acts as a fault domain with a separate subnet and VLAN. Failure of any component in an FD will not impact the other FD.

**iSCSI offload engine (iSOE):** Technology that can free processor cores and memory resources to increase I/Os per second (IOPS) and reduce processor utilization.

**Link aggregation group (LAG):** A group of Ethernet switch ports configured to act as a single highbandwidth connection to another switch. Unlike a stack, each individual switch must still be administered separately and function independently.

Local area network (LAN): A network carrying traditional IP-based client communications.

**Logical unit (LUN):** A number identifying a logical device, usually a volume that is presented by an iSCSI or Fibre Channel storage controller.

**Multipath I/O (MPIO):** A host-based software layer that manages multiple paths for load balancing and redundancy in a storage environment.

**Native VLAN and default VLAN:** The default VLAN for a packet that is not tagged with a specific VLAN or has a VLAN ID of 0 or 1. When a VLAN is not specifically configured, the switch default VLAN will be utilized as the native VLAN.

**Network interface card (NIC):** A network interface card or network interface controller is an expansion board inserted into the computer/server so that the computer/server can connect to a network. Most NICs are designed for a particular type of network (typically Ethernet) protocol (typically TCP/IP) and media.

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**NIC partitioning (NPAR):** A technology used by Broadcom and QLogic which enables traffic on a network interface card (NIC) to be split into multiple partitions. NPAR is similar to QoS on the network layer and is usually implemented with 10GbE.

**Storage area network (SAN):** A Fibre Channel, Ethernet, or other specialized network infrastructure specifically designed to carry block-based traffic between one or more servers to one or more storage and storage inter-process communications systems.

**Virtual LAN (VLAN):** A method of virtualizing a LAN to make it appear as an isolated physical network. VLANs can reduce the size of and isolate broadcast domains. VLANs still share resources from the same physical switch and do not provide any additional QoS services such as minimum bandwidth, quality of a transmission, or guaranteed delivery.

VLAN tag: IEEE 802.1Q: The networking standard that supports VLANs on an Ethernet network. This standard defines a system of tagging for Ethernet frames and the accompanying procedures to be used by bridges and switches in handling such frames. Portions of the network that are VLAN-aware (IEEE 802.1Q conformant) can include VLAN tags. When a frame enters the VLAN-aware portion of the network, a tag is added to represent the VLAN membership of the frame port or the port/protocol combination. Each frame must be distinguishable as being within exactly one VLAN. A frame in the VLAN-aware portion of the network that does not contain a VLAN tag is assumed to be flowing on the native (or default) VLAN.

# 2 Storage product overview

The following sections provide an overview of the Dell Storage products and technologies presented in this paper.

# 2.1 Dell Storage PS Series arrays

PS Series arrays provide an enterprise storage solution that delivers the benefits of consolidated networked storage in an affordable and easy to use self-managing iSCSI SAN, regardless of scale. Built on an advanced, peer storage architecture, PS Series storage simplifies the deployment and administration of consolidated storage environments, enabling perpetual self-optimization with automated load balancing across PS Series members in a pool. This provides efficient enterprise scalability for both performance and capacity without forklift upgrades. PS Series storage provides a powerful, intelligent and simplified management interface.

# 2.2 Dell Storage SC Series arrays

SC Series storage is the Dell enterprise storage solution featuring multi-protocol support and self-optimizing, tiering capabilities. SC Series storage can be configured with all flash, as a hybrid system, or with only traditional spinning disks and features automatic migration of data to the most cost-effective storage tier. Efficient thin provisioning and storage virtualization enable disk capacity usage only when data is actually written, enabling a pay-as-you-grow architecture. This self-optimizing system can reduce overhead cost and free up the administrator for other important tasks.

# 3 PS and SC Series with separate iSCSI SANs

vSphere hosts can be connected to both PS and SC Series arrays through separate, dedicated iSCSI SAN infrastructures. In most cases, the need for this configuration would arise when implementing 10Gb iSCSI SC Series storage to an existing 1Gb iSCSI PS Series storage environment. However, the same configuration can be used for an all 10Gb iSCSI environment as well. The reason for isolating the PS Series and SC Series iSCSI SAN infrastructures is due to the differences in connectivity best practices for each platform. Figure 1 depicts the proper configuration of this environment.

**Note**: Implementing both PS and SC Series storage on vSphere where the iSCSI SAN infrastructure is shared is covered in the Dell TechCenter paper: <u>Best Practices for Sharing an iSCSI SAN Infrastructure with</u> <u>Dell PS Series and Dell SC Series Storage using VMware ESXi Hosts</u>.

## 3.1 Topology

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Figure 1 depicts the best practices for connecting a vSphere host to both PS Series and SC Series iSCSI storage using isolated 1Gb and 10Gb iSCSI SAN infrastructures. This environment has two 1Gb NICs and two 10Gb NICs on the host, each is connected to the respective 1Gb PS Series and 10Gb SC Series storage platforms. Additionally, the network switch design and storage port connectivity is shown.

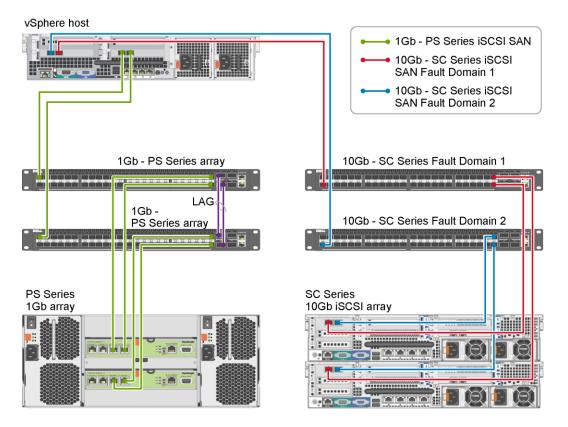


Figure 1 Isolated iSCSI SANs for both 1Gb PS Series and 10Gb SC Series storage

## 3.2 PS Series specific settings

The use cases defined in this paper consist of PS Series storage connected to vSphere hosts utilizing an isolated iSCSI SAN infrastructure. It is expected that the Ethernet network supporting the iSCSI SAN, as well as the vSphere hosts accessing the PS Series storage, are configured using best practice recommendations as defined in the documents, <u>VMware ESXi 5.1, 5.5, or 6.0 Host Configuration Guide</u> and <u>Dell PS Series</u> <u>Configuration Guide</u>.

The PS Series Virtual Storage Manager (VSM), Multipath Extension Module (MEM), and iSCSI port binding best practice settings for PS Series storage are applicable on this isolated iSCSI SAN infrastructure.

Each PS Series volume is presented as a unique target with LUN 0. The PS Series volumes that are accessible to the host are listed in the iSCSI initiator properties. When a volume is connected, the iSCSI initiator establishes the initial iSCSI session and then the PS Series MPIO plugin determines if additional sessions are necessary for redundancy.

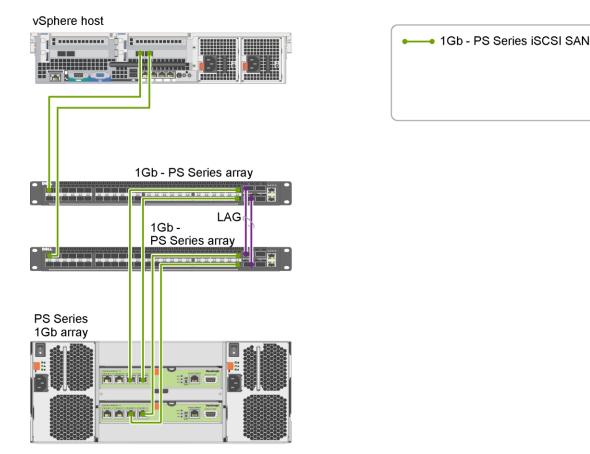


Figure 2 vSphere host connectivity showing only isolated 1Gb PS Series storage SAN

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### 3.2.1 PS Series: Host physical connectivity and IP assignment

Connecting hosts to PS Series storage utilizes a fairly simplistic iSCSI SAN infrastructure design. This design creates an easy implementation process – one of the goals of PS Series storage. The iSCSI SAN infrastructure design includes a single VLAN, a single IP subnet, and two network switches connected together to allow traffic to pass from one to the other. Supported switches can be found in the <u>Dell Storage</u> <u>Compatibility Matrix</u>.

**Note:** The preferred method of connecting the network switches is to use a stacking connection if available. If stacking is not available, an Inter Switch Link (ISL) using multiple connections and Link Aggregation Protocol (LAG) would be the secondary recommendation.

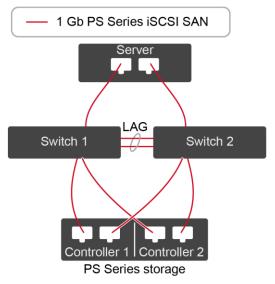


Figure 3 Connecting the host to PS Series storage

## 3.3 SC Series specific settings

A typical SC Series iSCSI implementation involves two separate, dedicated Ethernet iSCSI SAN fabrics, two iSCSI fault domains with an independent IP subnets, and two redundant network switches. Since connectivity to the PS Series storage is on its own separate, isolated iSCSI SAN infrastructure, the typical SC Series implementation will be used for this paper.

Each SC Series array has both front-end and back-end ports. The front-end ports present unique target LUN IDs. Every initiator (host) IP has a connection to each port that it can access. Redundant connections are made by creating multiple sessions with each of the virtual iSCSI ports of the SC Series storage system. For example, one initiator port and two target ports in each fault domain means there will be four connections (two for each fault domain).

Note that the host port on one fault domain cannot access the target port on the other fault domain. This creates a redundant iSCSI SAN infrastructure.

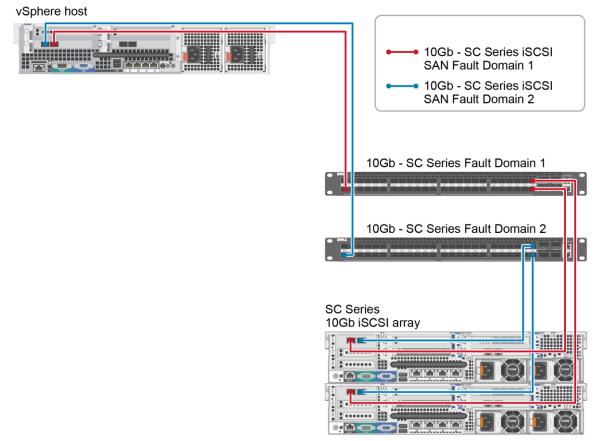


Figure 4 vSphere host connectivity showing only isolated 10Gb SC Series storage SAN

### 3.3.1 SC Series: Host physical connectivity and IP assignment

Depending on the OS-specific implementation, different methods are used to connect the arrays and assign IP addresses. For this environment, two SC Series Fault Domains are used for fault tolerance. As is recommended, the iSCSI Fault Domains are isolated through the use of two switches; each using a different IP subnet. It is important to ensure all host ports assigned and addressed for each Fault Domain connect to the same switch as the SC Series ports assigned and addressed for the same Fault Domain.

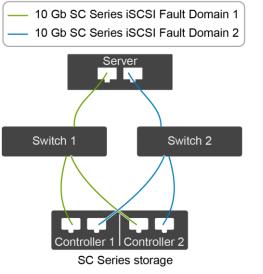


Figure 5 Connecting the host to SC Series ports

# 4 Enable ESXi 6.0 host access to PS Series iSCSI storage

To enable an ESXi 6.0 host to access PS Series storage when implemented in a vCenter environment, the PS Series Multipath Extension Module (MEM) is recommended. However, if the vSphere licensing in use is less than standard (vSphere 5.x or previous requires Enterprise), MEM is not supported. Although portions of the host configuration can be configured using the MEM setup processes described in section 4.2, manual configuration is described in sections 4.3 and 4.4.

## 4.1 Install PS Series Multipath Extension Module (MEM) for VMware

Configure VMware vSphere servers using the best practices defined in the <u>Dell PS Series Configuration</u> <u>Guide</u>, including the installation of MEM on the vSphere host servers.

For more information on MEM, see <u>Configuring and Installing the PS Series Multipathing Extension Module</u> for VMware vSphere and PS Series SANs.

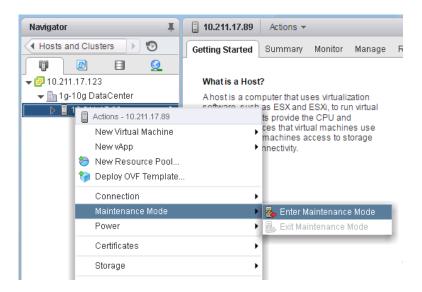
**Note**: When working with vSphere 6.0 or newer, configure additional security access as described in chapter 3 of <u>ESXi Versions 5.1, 5.5, or 6.0 Host Configuration Guide</u> before installing MEM. Additional information can be found in this <u>VMware KB article</u>.

Prerequisites for installing and configuring MEM on a vSphere host are:

- Do NOT configure iSCSI networking prior to installing/configuring MEM for either the PS Series or SC Series iSCSI SAN infrastructures.
- Do not enable the Software iSCSI Adapter
- Put the vSphere host into maintenance mode to install MEM.
- Reboot of the vSphere host is recommended. A reboot is not required for installation, however, enabling configuration of MEM through the vCLI does require a reboot.

MEM can be installed using the VMware Update Manager (VUM) or using one of the following command line tools: vSphere CLI, vMA (virtual Management Appliance), or the vSphere ESXi console. This paper provides the steps required to install and configure MEM using the vSphere CLI utility.

1. From the **Hosts and Clusters** view, right-click the vSphere host and select **Maintenance Mode** and click **Enter Maintenance Mode**. Click **OK** to confirm.



2. Open the vSphere CLI, navigate to the location of the downloaded MEM installation files and execute the following command and options:

setup.pl --install --server=server IP address --reboot (reboot is optional, but
recommended)

3. Enter the username and password for the server (the username and password can be included as options with the setup.pl script).

**Note**: When working with vSphere 6.0 or newer, configure additional security access as described in chapter 3 of <u>ESXi Versions 5.1, 5.5, or 6.0 Host Configuration Guide</u> before installing MEM. Additional information can be found in this <u>VMware KB article</u>.

```
C:\EqualLogic-ESX-Multipathing-Module>setup.pl --install --server=10.211.17.89 -

bundle=dell-eql-mem-esx6-1.3.0.410095.zip --reboot

You must provide the username and password for the server.

Clean install of Dell EqualLogic Multipathing Extension Module.

Bundle being installed dell-eql-mem-esx6-1.3.0.410095.zip

Copying dell-eql-mem-esx6-1.3.0.410095.zip

to Idatastore11/dell-eql-mem-esx6-1.3.

.0.410095.zip

The install operation may take several minutes. Please do not interrupt it.

Check to see if the install succeeded

Install succeeded

Clean install was successful.

Rebooting host.
```

4. When the vSphere host is back online, confirm the installation of MEM by executing the following command:

```
setup.pl --server server IP address --query
C:\EqualLogic-ESX-Multipathing-Module>setup.pl --server 10.211.17.89 --query
You must provide the username and password for the server.
Found Dell EqualLogic Multipathing Extension bundle installed: 1.3.0-407867
Default PSP for EqualLogic devices is DELL_PSP_EQL_ROUTED.
No UMkernel ports bound for use by iSCSI multipathing.
```

C:\EqualLogic-ESX-Multipathing-Module>\_

Note: MEM is only supported when using VMware ESXi Enterprise or Enterprise Plus licensing.

## 4.2 Configure MEM to access PS Series volumes

Configuring MEM to access PS Series volumes is an automated process that prompts for specific information. With the complete information provided, all relevant settings are made on the vSphere host where MEM is being configured.

1. Configuration of MEM is performed using the vCLI by executing the following command:

setup.pl --configure --server=server IP address

**Note**: Specific settings for your environment may differ from those used in this example. MEM configuration settings that must be used to adhere to best practices are noted.

- 2. Enter the username and password for the server
- 3. Select the new vSwitch type: Press Enter to accept the default
- 4. Enter the new vSwitch name: vSwitch-1G-PS-iSCSI
- 5. Identify the vmnics dedicated to PS Series iSCSI storage traffic: vmnic0 vmnic1
- 6. Enter the IP address for the vmknic using vmnic0: 10.30.10.89
- 7. Enter the IP address for the vmknic using vmnic1: 10.30.10.90
- 8. Enter the Netmask for all vmknics: 255.255.255.0
- 9. Enter the MTU to be used: 9000
- 10. Enter the desired VMKernel Portgroup prefix: 1g-PS-iSCSI
- 11. Enter the VLanID to be used: 0
- 12. Specify SW iSCSI or HW iSCSI: SW (required for this configuration)
- 13. Software iSCSI initiator, if not enabled, do you wish to enable it: **yes** (required if asked)
- 14. Enter PS Group IP address for target discovery: 10.30.10.130
- 15. Configure CHAP if desired: press enter
- 16. Apply Dell Equallogic best practice settings to the iSCSI adapters: yes
- 17. Confirm information provided and proceed: yes

C:\EqualLogic-ESX-Multipathing-Module>setup.pl --configure --server=10.211.17.89着 You must provide the username and password for the server. Do you wish to use a standard vSwitch or a vNetwork Distributed Switch (vSwitch/ vDS) [vSwitch]: Found existing switches vSwitch0. vSwitch Name [vSwitchISCSI]: vSwitch-1G-PS-iSCSI Which nics do you wish to use for iSCSI traffic? [vmnic0 vmnic1 vmnic2 vmnic4 vm nic5 vmnic6 vmnic7]: vmnic0 vmnic1 IP address for vmknic using nic vmnic0: 10.30.10.89 IP address for vmknic using nic vmnic1: 10.30.10.90 Netmask for all vmknics [255.255.255.0]: What MTU do you wish to use for iSCSI vSwitches and vmknics? Before increasing the MTU, verify the setting is supported by your NICs and network switches. [150-0]: 9000 What prefix should be used when creating VMKernel Portgroups? [iSCSI]: 1g-PS-iSC What VLanId do you wish to use for Portgroup for vSwitch to be configured [0]: Do you wish to use SW iSCSI or HW iSCSI? (sw/hw) [SW]: The SW iSCSI initiator is not enabled, do you wish to enable it? [yes]: What PS Group IP address would you like to add as a Send Target discovery addres s <optional)?: 10.30.10.130 What CHAP user would you like to use to connect to volumes on this group (option a1)?: Would you like to apply Dell EqualLogic best practice settings to the iSCSI adapters? See the Installation and User Guide for more information on the settings that will be applied. [yes]:
Configuring iSCSI networking with following settings:

Using a standard vSwitch 'vSwitch-1G-PS-iSCSI'
Using NICs 'vmnic0,vmnic1'
Using IP addresses '10.30.10.89,10.30.10.90'
Using netmask '255.255.255.0'
Using prefix '1g-PS-iSCSI' for UMKernel Portgroups
Using SW iSCSI initiator
Enabling SW iSCSI initiator
Adding PS Series Group IP '10.30.10.130' to Send Targets discovery list. The following command line can be used to perform this configuration: C:\EqualLogic=ESX-Multipathing-Module\setup.pl --configure --server=10.211.17.89 --vswitch=vSwitch-IG-PS-iSCSI --mtu=9000 --nics=vmnic0,vmnic1 --ips=10.30.10.89 ,10.30.10.90 --vlanid=0 --netmask=255.255.255.0 --wnkernel=1g-PS-iSCSI --nohwisc si --enableswiscsi --groupip=10.30.10.130 --bestpractices Do you wish to proceed with configuration? [yes]: \_

18. Reboot the server (not required, but recommended).

**Note:** Install and configure MEM on all hosts connecting to PS Series storage prior to creating VMs, or alternatively, install and configure one host at a time by evacuating all VMs to other hosts in the cluster.

19. Exit Maintenance Mode on the vSphere host.

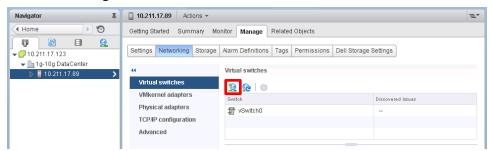
After successfully installing and configuring MEM on all vSphere hosts connecting to PS Series storage, create needed volumes and configure access to them on the PS Group using either PS Group Manager or Dell Storage Manager. A rescan of the Software iSCSI Adapter may be required.

**Note**: MEM is only supported when using VMware ESXi Standard or above (Enterprise or above for vSphere 5.x or previous) licensing.

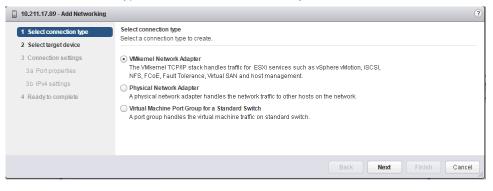
# 4.3 Manually configure networking to access PS Series volumes (Optional – No MEM)

In environments where MEM is not supported, networking must be configured manually to connect the ESXi host to the 1Gb PS Series iSCSI storage. The configuration consists of a single vSwitch with all (in this case, two) vmnics dedicated to 1Gb iSCSI traffic as uplinks. Additionally, a VMkernel (VMK) port is created and linked to each vmnic used. For the purposes of this paper, the addresses assigned to the two vmk ports used to connect to the 1Gb iSCSI PS Series storage are: 10.30.10.89 and 10.30.10.90.

5. From the Hosts and Clusters view, select Manage, Networking, Virtual switches, and click the Add host networking icon.



6. Select Connection Type: VMKernel Network Adapter and click Next



7. Select target device: New standard switch and click Next

1	10.211.17.89 - Add Networking	9
~	21	Select target device Select a target device for the new connection.
	2 Select target device 3 Create a Standard Switch	Select an existing standard switch
	4 Connection settings	VSwitch-1G-PS-ISCSI Browse
	4a Port properties	New standard switch
	4b IPv4 settings	
	5 Ready to complete	
		Back Next Finish Cancel

8. Create a Standard Switch: click the Add Adapter icon

10.211.17.89 - Add Networking		0	
<ul> <li>1 Select connection type</li> <li>2 Select target device</li> </ul>	Create a Standard Switch Assign free physical network adapters to the new switch.		
3 Create a Standard Switch	Assigned adapters:		
4 Connection settings 4a Port properties 4b IPv4 settings 5 Ready to complete	Active adapters Standby adapters		
5 Ready to complete	Unused adapters	Select a physical network adapter from the list to view its details.	
		Back Next Finish Cancel	

9. Add Physical Adapters to the Switch: Select appropriate adapters (**vmnic0**, **vmnic1**) from list and click **OK** 

Add Physical Adapters to the Switch			
Failover order group: Active adapters Network Adapters:	•		
🚾 vmnic0 🚾 vmnic1 赋 vmnic2			
	ct a single network adapter from st to view its details.		
mnic7	OK Cancel		

### 10. Click Next.

🔋 10.211.17.89 - Add Networking			
<ul> <li>1 Select connection type</li> <li>2 Select target device</li> </ul> Create a Standard Switch <ul> <li>Assign free physical network adapters to the new switch.</li> </ul>			
3 Create a Standard Switch	Assigned adapters:		
4 Connection settings	+ X 🕆 🖡		
4a Port properties	Active adapters		
4b IPv4 settings	对 (New) vmnic0		
5 Ready to complete	对 (New) vmnic1	Select a physical network adapter from the list to view its	
	Standby adapters	details.	
	Unused adapters		
		Back Next Finish Cancel	

**Default** (or appropriate)

- 11. Port properties (for the first vmk port), make the following selections:
  - Network label: 1g-PS-iSCSI0 (descriptive name)
  - VLAN ID:
  - IP Settings: Default (IPv4)
  - TCP/IP stack: Default
  - Available services: No other selections

#### 12. Click Next.

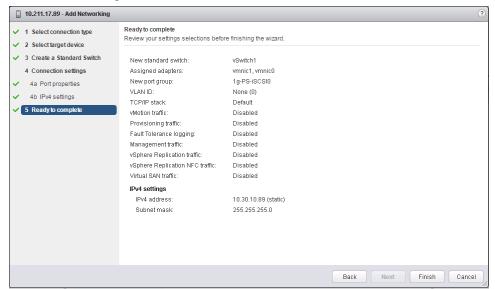
10.211.17.89 - Add Networking		
<ul> <li>1 Select connection type</li> <li>2 Select target device</li> </ul>	Port properties Specify VMkernel port settings.	
<ul> <li>3 Create a Standard Switch</li> <li>4 Connection settings</li> <li>4a Port properties</li> <li>4b IPv4 settings</li> <li>5 Ready to complete</li> </ul>	VMkemel port settings Network label: VLAN ID: IP settings: TCP/IP stack: Available services Enable services:	Ig-PS-ISCSI0         None (0)         IPv4         Default         Whotion traffic         Provisioning traffic         Fault Tolerance logging         Management traffic         Vsphere Replication traffic         vSphere Replication NFC traffic         Virtual SAN traffic
		Back Next Finish Cancel

- 13. IPv4 settings:
  - Use static IPv4 settings (your environment may differ)
  - IPv4 address:
- **10.30.10.89** (used for this example) **255.255.255.0** (used for this example)
- Subnet mask:Default gateway for IPv4:
- Leave default
- DNS server addresses: Leave default

#### 14. Click Next.

10.211.17.89 - Add Networking				?
<ul> <li>1 Select connection type</li> <li>2 Select target device</li> </ul>	IPv4 settings Specify VMkernel IPv4 settings.			
<ul> <li>2 Selectarget device</li> <li>3 Create a Standard Switch</li> <li>4 Connection settings</li> <li>4a Port properties</li> <li>4b IPW settings</li> <li>5 Ready to complete</li> </ul>	<ul> <li>Obtain IPv4 settings automatically</li> <li>Use static IPv4 settings</li> <li>IPv4 address:</li> <li>Subnet mask:</li> <li>Default gateway for IPv4:</li> <li>DNS server addresses:</li> </ul>	10 . 30 . 10 . 89 255 . 255 . 255 . 0 10.211.17.126 10.211.18.4		
			Back Next	Finish Cancel

15. Confirm the settings and click Finish.



16. To add the second vmk port to vSwitch 1, select vSwitch1 and click the Add host networking icon.

Navigator I	🔒 10.211.17.89 Actions 🔻	±*
Home 🕨 🕲	Getting Started Summary Monitor Manage Related Objects	
		ell Storage Settings

17. Select an existing standard switch. If not listed already, click browse to select the proper standard switch. Click **Next**.

10.211.17.89 - Add Networking	0			
<ul> <li>1 Select connection type</li> <li>2 Select target device</li> </ul>	Select a target device for the new connection.			
3 Connection settings 3a Port properties	Select an existing standard switch     vSwitch1     Browse			
3b IPv4 settings 4 Ready to complete	O New standard switch			
	Back Next Finish Cancel			

- 18. Port properties:
  - Network label: **1g-PS-iSCSI1** (descriptive name)
  - VLAN ID: Default (or appropriate)
  - IP Settings: Default (IPv4)
  - TCP/IP stack: Default
  - Available services: No other selections

#### 19. Click Next.

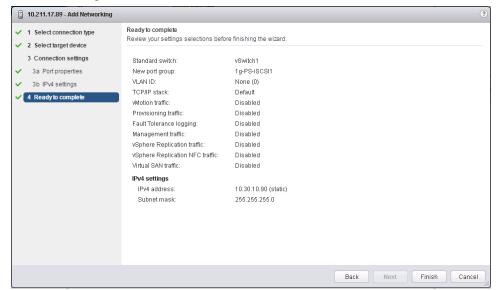
10.211.17.89 - Add Networking		
<ul> <li>10.211.17.89 - Add Networking</li> <li>1 Select connection type</li> <li>2 Select target device</li> <li>3 Connection settings</li> <li>3a Port properties</li> <li>3b IPv4 settings</li> <li>4 Ready to complete</li> </ul>	Port properties Specify VMkernel port settings. VMkernel port settings Network label: VLAN ID: IP settings: TCP/IP stack: Available services Enable services:	1g-PS-ISCSI1 None (0) ▼ IPv4 ▼ Default ▼ ●
		Provisioning traffic Fault Tolerance logging Vanagement traffic Vsphere Replication traffic Vsphere Replication NFC traffic Virtual SAN traffic
		Back Next Finish Cancel

- 20. IPv4 settings:
  - Use static IPv4 settings (your environment may differ)
  - IPv4 address:
  - Subnet mask:
- 10.30.10.90 (used for this example)
- Default gateway for IPv4:
- DNS server addresses:
- 255.255.255.0 (used for this example) Default
- Default

21. Click Next.

10.211.17.89 - Add Networking				?
1 Select connection type     2 Select target device     3 Connection settings     3a Port properties     3b IPv4 settings     4 Ready to complete	IPv4 settings Specify VMkernel IPv4 settings. Obtain IPv4 settings automatical Use static IPv4 settings IPv4 address: Subnet mask: Default gateway for IPv4: DNS server addresses:	ly 10 . 30 . 10 . 90 255 . 255 . 255 . 0 10.211.17.126 10.211.18.4		
			Back Next Finish Car	cel

22. Confirm settings and click Finish.



23. Select the newly created vSwitch (vSwitch1) and click the Edit icon.

Navigator I	☐ 10.211.17.89 Actions ▼		=*
Home 🕨 🔊	Getting Started Summary Mo	nitor Manage Related Objects	
Image: Constraint of the second se	Settings Networking Storage	Alarm Definitions Tags Permissions Dell Storage Virtual switches 2 2 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	Discovered Issues
	TCP/IP configuration Advanced	1 vSwitch1	
		Standard switch: vSwitch1 (1g-PS-iSC SI0)	Ċ
		1g-PS-ISCSI0             VLAN ID:             VMkernel Ports (1)             vmk1 : 10.30.10.89             •             1g-PS-ISCSI1             •             VLAN ID:             VMkernel Ports (1)             vmk2 : 10.30.10.90             •             VMkernel Ports (1)             vmk2 : 10.30.10.90             •             P	Physical Adapters     Im vmnic0 1000 Full     Im vmnic1 1000 Full

24. On the Properties tab, change the MTU to 9000 and click OK.

T vSwitch1 - Edit Settings			(?)
Properties Security Traffic shaping Teaming and failover	Number of ports: MTU (Bytes):	Elastic 9000	
			OK Cancel

25. Select the vmk (**vmk1/vmk2**) port and click the **edit** icon (steps 21-22 must be performed for each vmk port used for 1Gb PS Series iSCSI).

Navigator I	☐ 10.211.17.89 Actions ▼		Ξ.
Home 🕨 🔊	Getting Started Summary Mo	nitor Manage Related Objects	
Image: Constraint of the state of	Settings Networking Storage	Aarm Definitions     Tags     Permissions     Dell Stor       Virtual switches <ul> <li></li></ul>	age Settings
	Physical adapters	1 vSwitch0	-
	TCP/IP configuration Advanced	1 vSwitch1	
	Auvanceu		
		Standard switch: vSwitch1 (vmk1)	
		×	G
		1g-P8-ISCSI0           VLAN ID:           VMkemel Ports (1)           vmkt: 10.30.10.89           1g-P8-ISCSI1           VLAN ID:           VMkernel Ports (1)           vmk2: 10.30.10.90	Physical Adapters     Image: Second Sec

26. In the NIC settings, change the MTU to 9000 and click OK.

NIC settings	MTU: 90001 😴	
IPv4 settings IPv6 settings		
Analyze impact	0	K Cancel

- 27. Repeat steps 21-22 for vmk2.
- 28. Select the portgroup (1g-PS-iSCSI0) and click the Edit icon (repeat steps 24-25 for 1g-PS-iSCSI1).

Navigator I	☐ 10.211.17.89 Actions ▼		=
Home 🕨 🔊	Getting Started Summary Mo	nitor Manage Related Objects	
✓      ✓	Setting Started Summary with     Settings Networking Storage		Storage Settings Discovered Issues
	Advanced		
		= Standard switch: vSwitch1 (1g-PS-iSC SI0)	
		×	G
		¶             19-PS-ISCSI0               €             19-PS-ISCSI0                 VLAN ID:               VMkernel Ports (1)             vmk1 : 10.30.10.89               □                 VMkernel Ports (1)             vmk1 : 10.30.10.89               □               □                 VLAN ID:             VLAN ID:             VAlkernel Ports (1)             vmk2 : 10.30.10.90               □	Physical Adapters     Merroricol 1000 Full     Merroricol 1000 Full     Merroricol 1000 Full

29. On the **Teaming and failover** tab, check the **Override** box and use the arrow buttons to move **vmnic1** to the **Unused adapters** section and click **OK**.

👷 1g-PS-iSCSI0 - Edit Settings					?
Properties Security Traffic shaping Teaming and failover	Load balancing: Network failure detection: Notify switches: Failback:	Override Override Override Override Override	Route based on originating Link status only Yes Yes	virtual port v	
	Failover order  C Override  C Override C Override C Override C Override C Override C Override C Override C Override C Override C Override C Override C Override C Override C O	Co	e tion r <b>is</b> itus nfigured speed, Duplex	Intel(R) Ethernet Controller X540-AT2 vmnic1 PCI 0000:01:00.1 bgbe Connected Auto negotiate	•
	Select active and standby a	Ne	ual speed, Duplex tworks g a failover, standby adapters :	1000 Mb, Full Duplex 0.0.0.1-255.255.255.254 activate in the order specified above.	•
				ОК	Cancel

**Note**: Overriding the adapter failover so that each vmnic is active for only one vmk portgroup (and the other adapter is set to unused) directs iSCSI traffic over specific vmnic adapters for each vmk portgroup. This is required to bind the vmk portgroups to the iSCSI Software Adapter (explained in section 4.4).

30. Repeat steps 24-25 for portgroup 1g-PS-iSCSI1 and move vmnic0 to the Unused adapters section.

🙎 1g-PS-iSCSI1 - Edit Settings					?
Properties Security Traffic shaping Teaming and failover	Load balancing: Network failure detection: Notify switches: Failback: Failover order Coverride Coveride Coverride Coverride Co	Cc Ac	ne ition er	virtual port	
	Select active and standby a			activate in the order specified ab	cve.
					OK Cancel

# 4.4 Manually configure iSCSI Software Adapter to access PS Series volumes (Optional – No MEM)

In environments where MEM is not supported, the VMware iSCSI Software Adapter must be configured manually to be bound to the VMkernel ports configured in section 4.3. This configuration results in all 1Gb vmk ports dedicated to the PS Series iSCSI storage being bound to the iSCSI Software Adapter and the PS Series Group IP address entered as the storage target. For the purposes of this paper, the address used as the iSCSI target portal (the PS Series Group address) is 10.30.10.130.

For port binding to work properly, the initiator (host) must be able to reach the target (storage) on the same subnet. iSCSI port binding does not support routing.

1. From the Hosts and Clusters view, select Manage, Storage, Storage Adapters, click the Add (+) button, and click Software iSCSI adapter. (Skip to step 3 if the iSCSI Software Adapter already exists)

Navigator I	☐ 10.211.17.89 Actions ▼					≡∗
Home 🕑 😗	Getting Started Summary Mo	nitor Manage Related Objects				
<ul> <li>Image: Image: Im</li></ul>	Settings Networking Storage	Aarm Definitions Tags Permiss	ons Dell Stora	ige Settings		
▶ ■ 10.211.17.89	44	Storage Adapters				
	Storage Adapters	+ 🕫 🛛 🖉 🕼 -		(	Q Filter	•
	Storage Devices	, Software iSCSI adapter	Туре	Status	Identifier	-
	Host Cache Configuration	Software FCoE adapter	Block SCSI	Unknown		
	Protocol Endpoints	🚱 vmhba38	Block SCSI	Unknown		
		😵 vmhba34	Block SCSI	Unknown		
		🚱 vmhba37	Block SCSI	Unknown		
		🚱 vmhba35	Block SCSI	Unknown		
		🚱 vmhba36	Block SCSI	Unknown		::
		QLogic 57810 10 Gigabit Etherne	t Adapter			
		🚱 vmhba32	iSCSI	Unbound	bnx2i-001018d6afa0(i	jqi
		🚱 vmhba33	iSCSI	Unbound	bnx2i-001018d6afa2(	iqi
						<b>v</b>

2. Click OK to confirm adding the Software iSCSI Adapter.

10.211.	17.89 - Add Software iSCSI Adapter
1	A new software iSCSI adapter will be added to the list. After it has been added, select the adapter and use the Adapter Details section to complete the configuration.
	OK

3. From the Hosts and Clusters view, select Manage, Storage, Storage Adapters, the iSCSI Software Adapter (vmhba39), Network Port Binding in Adapter Details, and click the Add (+) icon.

Navigator I	☐ 10.211.17.89 Actions ▼			=*
Home 🕨 🔊	Getting Started Summary Mo	nitor Manage Related Objects		
Image: Constraint of the second se	Settings Networking Storage	Alarm Definitions Tags Permission	ons Dell Storage Settings	a Filter
	Storage Devices	🕂 🔂 🚊 🔯 🍙 -	Type Status	Identifier
	Host Cache Configuration	wmhba35	Block SCSI Unknown	
	Protocol Endpoints	Vmhba37	Block SCSI Unknown	
		🚱 vmhba38	Block SCSI Unknown	1
		🔄 vmhba34	Block SCSI Unknown	1
		QLogic 57810 10 Gigabit Ethernet	Adapter	
		🚱 vmhba32	iSCSI Unbound	bnx2i-001018d6afa0(iqi
		🚱 vmhba33	iSCSI Unbound	bnx2i-001018d6afa2(iqi
		iSCSI Software Adapter		
		🚱 vmhba39	iSCSI Online	iqn.1998-01.com.vmwa
		4 ::		۳ ۲
			=	
		Adapter Details		
		Properties Devices Paths	Targets Network Port E	Binding Advanced Options
		+ × 0		
			nel Ad Port Group Policy	Path Status Physica
		No VMkernel network ada	oters are bound to this iSC	SI host bus adapter.

#### 4. Select both **1g-PS-iSCSI0** and **1g-PS-iSCSI1** from the list and click **OK**.

10.211.17.89 - Bind vmhba39 with VMkerne	l Adapter		? X
VMkernel network adapter			
Only VMkernel adapters compatible with the is	SCSI port binding requirements and a	available physical network adapters are listed.	
Port Group	VMkernel Adapter	Physical Network Adapter	*
🔲 🧕 Management Network (vSwitch0)	🐖 vmk0	对 vmnic3 (1 Gbit/s, Full)	
🗹 🧕 1g-PS-iSCSI0 (vSwitch1)	🛒 vmk1	对 vmnic0 (1 Gbit/s, Full)	
🗹 🤶 1g-PS-iSCSI1 (vSwitch1)	🗾 vmk2	对 vmnic1 (1 Gbit/s, Full)	
-		对 vmnic4	
		飅 vmnic5	*
	No items selected	I	
		ОК	Cancel

5. Select the Targets, click Dynamic Discovery, and click Add.

Navigator I	<b>10.211.17.89</b> Actions -				≡*	
( Home ) 🕲	Getting Started Summary Mo	nitor Manage Related Objects				
Image: Constraint of the second se	Settings Networking Storage	Alarm Definitions Tags Permissio	ons Dell Stora	age Settings		
10.211.17.89		Storage Adapters				
	Storage Adapters	🕂 🔂 💄 🛛 🖉 🔓 -		(	Q Filter 🔹	
	Storage Devices	Adapter	Type	Status	Identifier 🔺	
	Host Cache Configuration	🚱 vmhba38	Block SCSI	Unknown		
	Protocol Endpoints	🔄 vmhba34	Block SCSI	Unknown		
		QLogic 57810 10 Gigabit Ethernet				
		🚱 vmhba32	ISCSI	Unbound	bnx2i-001018d6afa0(iqi	
		🚱 vmhba33	iSCSI	Unbound	bnx2i-001018d6afa2(iqi	
		iSCSI Software Adapter				
		🔥 🚱 vmhba39	ISCSI	Online	iqn.1998-01.com.vmwa	
		•			Þ	
		Due to recent configuration changes, a rescan of this storage adapter is recommended.				
		Adapter Details				
		Properties Devices Paths	Targets Ne	twork Port Bin	ding Advanced Options	
		Dynamic Discovery Static Dis			Faction Advanced	
		Add	Remov	e Autnent	tication Advanced	
		iSCSI server				
			This list is er	npty.		

6. Enter the PS Series Group IP address (10.30.10.130) and click OK.

vmhba39 - Add 9	Send Target Server	?
iSCSI Server: Port:	10.30.10.130 3260	
Authentication S	-	
		OK Cancel

After successfully configuring networking and the VMware iSCSI Software Adapter on all vSphere hosts connecting to PS Series storage, create volume(s) and configure Access to those volumes on the PS Group using either PS Group Manager or Dell Storage Manager. A rescan of the Software iSCSI Adapter may be required.

# 5 Enable ESXi 6.0 host access to SC Series iSCSI storage

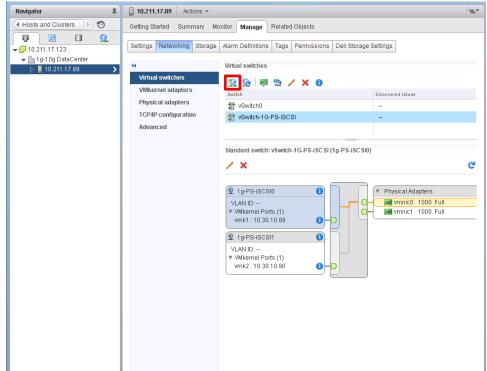
To enable an ESXi 6.0 host to access SC Series storage when implemented in a vCenter environment, the networking and storage access requires manual configuration due to the large number of configuration differences. The steps to configure network and storage access are below.

**Note**: Configure 10g iSCSI networking for the SC Series storage only after the PS adapters have been configured in <u>section 4</u>.

## 5.1 Manually configure networking to access SC Series volumes

Configuring ESXi hosts to access SC Series iSCSI storage using a dual subnets and fault domains by creating a vSwitch with one vmnic and one VMkernel (vmk) port for each dependent hardware iSCSI adapter used.

1. From the Hosts and Clusters view, select **Manage**, **Networking**, **Virtual switches**, and click the **Add host networking** icon.



2. Select VMKernel Network Adapter as the connection type and click Next.

10.211.17.89 - Add Networking	0
1 Select connection type 2 Select target device	Select connection type Select a connection type to create.
3 Connection settings 3a Port properties 3b IPv4 settings 4 Ready to complete	Wilkernel Network Adapter     The VMIkernel TCP/IP stack handles traffic for ESXI services such as vSphere vMotion, ISCSI,     NFS, FCoE, Fault Tolerance, Virtual SAN and host management.     Physical Network Adapter     A physical network adapter handles the network traffic to other hosts on the network.
	<ul> <li>Virtual Machine Port Group for a Standard Switch A port group handles the virtual machine traffic on standard switch.</li> </ul>
	Back Next Finish Cancel

3. Select **New standard switch** for the target device and click **Next**.

10.211.17.89 - Add Networking	0
<ul> <li>1 Select connection type</li> </ul>	Select target device
2 Select target device	Select a target device for the new connection.
3 Create a Standard Switch	Select an existing standard switch
4 Connection settings	vSwitch-16-PS-ISCSI Browse
4 a Port properties	New standard switch     ■
4 b IPv4 settings	
5 Ready to complete	
	Back Next Finish Cancel

4. Create a Standard Switch: Add Adapter (green plus sign)

10.211.17.89 - Add Networking		3
<ul> <li>1 Select connection type</li> <li>2 Select target device</li> </ul>	Create a Standard Switch Assign free physical network adapters	to the new switch.
3 Create a Standard Switch	Assigned adapters:	
4 Connection settings 4a Port properties 4b IPv4 settings 5 Ready to complete	Active adapters Standby adapters Unused adapters	Select a physical network adapter from the list to view its details.
		Back Next Finish Cancel _

5. In the Add Physical Adapters to the Switch dialog, select the appropriate adapter and click OK.

Add Physical Adapters	to the Switch	×
Failover order group: Network Adapters:	Active adapters   Active adapters   All Properties CDP LLDP	
i vmnic4 vmnic5 vmnic6 i vmnic7	Adapter Broadcom Corporation QLogic 57810 10 Gigabit Ethernet Adapter Name vmnic6	
	Location PCI 0000:04:00.0 Detuce how the	•
	OK Car	ncel

### 6. Click Next.

10.211.17.89 - Add Networking					?
<ul> <li>1 Select connection type</li> <li>2 Select target device</li> </ul>	Create a Standard Switch Assign free physical network a	dapters to the	new switch.		
3 Create a Standard Switch	Assigned adapters:	A	Properties CDP LLDP		
4 Connection settings	+ 🗙 🕆 🦊	A	dapter	Broadcom Corporation QLogic 57810 10	
4a Port properties	Active adapters			Gigabit Ethernet Adapter	
4b IPv4 settings	对 (New) vmnic6		ame	vmnic6	
5 Ready to complete	Standby adapters	-	ocation	PCI 0000:04:00.0	
	Unused adapters		river	bnx2x	
		s	tatus		18
			Status	Connected	
			Configured speed, Duplex	10000 Mb, Full Duplex	
			Actual speed, Duplex	10000 Mb, Full Duplex	
			Networks	No networks	
		N	etwork I/O Control		
			Status	Allowed	
		D	irectPath I/O		
			Status	Not supported	
			The physical NIC does not	support DirectPath I/O.	
		5	R.IOV		•
				Back Next Finish C	ancel

7. Port properties:

-

- 10g-SC-iSCSI0/10g-SC-iSCSI1 (descriptive name)
- VLAN ID: **Default** (or appropriate)
- IP Settings:

- Network label:

Default (IPv4)

- TCP/IP stack: Default
- Available services: No other selections

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### 8. Click Next.

10.211.17.89 - Add Networking			?
<ul> <li>1 Select connection type</li> <li>2 Select target device</li> </ul>	Port properties Specify VMkernel port settings.		
<ul> <li>2 Selectarget device</li> <li>3 Create a Standard Switch</li> <li>4 Connection settings</li> <li>4a Port properties</li> <li>4b IPv4 settings</li> <li>5 Ready to complete</li> </ul>	VMkernel port settings Network label: VLAN ID: IP settings: TCP/IP stack: Available services Enable services:	10g-SC-ISCSI0         None (0)         IPv4         Oefault         •	
		Back Next Finish Cance	

- 9. IPv4 settings:
  - Use static IPv4 settings (your environment may differ)
  - IPv4 address:
  - Subnet mask:
- 255.255.255.0 (used for this example)

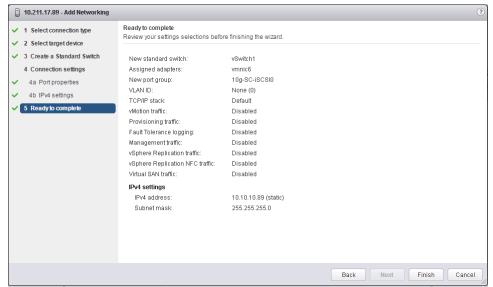
10.10.10.89/10.20.10.89 (used for this example)

- Default gateway for IPv4:DNS server addresses:
- Leave default Leave default

10. Click Next.

10.211.17.89 - Add Networking				٢
10.211.17.89 - Add Networking     1 Select connection type     2 Select target device     3 Create a Standard Switch     4 Connection settings     4a Port properties     4b IPv4 settings     5 Ready to complete	IPv4 settings Specify VMkernel IPv4 settings. ○ Obtain IPv4 settings automaticall ③ Use static IPv4 settings IPv4 address: Subnet mask: Default gateway for IPv4: DNS server addresses:	10 . 10 . 10 . 89 255 . 255 . 255 . 0 10.211.17.126 10.211.18.4		
			Back Next	Finish Cancel

11. Confirm settings and click Finish.



12. Select the newly created vSwitch (vSwitch1/vSwitch2) and click the Edit icon.

Navigator I	□ 10.211.17.89 Actions -	±.
Hosts and Clusters	Getting Started Summary Monitor Manage Related Objects	
Hosts and Clusters ▶ ♥ Image: Cluster	Getting Started Summary Monitor Manage Related Objects         Settings Networking Storage Alarm Definitions Tags Permissions Dell Storage Settings         Virtual switches         Virtual switches         Physical adapters         TCP.IP configuration         Advanced         Value Storage Settings         Virtual switches         Virtual switches         Volten         Discovered Issues         Volten         Volten	C

13. On the Properties tab, change the MTU to 9000 and click OK.

T vSwitch1 - Edit Settings			?
Properties Security Traffic shaping Teaming and failover	Number of ports: MTU (Bytes):	Elastic	
			OK Cancel

14. Select the vmk (vmk3/vmk4) port and click the edit icon.

Navigator I	☐ 10.211.17.89 Actions -		≡∗
	Getting Started Summary Monito	or Manage Related Objects	
· · · · · · · · · · · · · · · · · · ·	Getting Started Summary Monito Settings Networking Storage Ala Virtual switches VMkernel adapters Physical adapters TCP/IP configuration Advanced	Manage     Related Objects       arm Definitions     Tags     Permissions     Dell Storage S       fitual switches     Image: Second S	

15. In **NIC settings**, change the MTU to **9000** and click **OK**.

🛤 vmk3 - Edit Settings		?
Port properties	MTU:	
NIC settings		
IPv4 settings		
IPv6 settings		
Analyze impact		
		OK Cancel

 Repeat steps <u>1-15</u> above for the additional adapter(s) with appropriate settings – resulting in the following view of VMkernel adapters.

Navigator I	☐ 10.211.17.89 Actions ▼						=*
Hosts and Clusters	Getting Started Summary Mo	nitor Manag	ge Related (	Objects			
<ul> <li>Image: Control of the second s</li></ul>	Settings Networking Storage	Alarm Definit	tions Tags I	Permissions	Dell Storage Settings	]	
10.211.17.89	44	VMkernel ad	lapters				
	Virtual switches	🧕 🚱	<b>•</b> -			Q Filter	•
	VMkernel adapters	Device Network Label			Switch	IP Address	
	Physical adapters	🛒 vmk0	🧕 Manage	ment Netw	1 vSwitch0	10.211.17.89	
	TCP/IP configuration	🗾 vmk1	🧕 1g-PS-is	SCSI0	T vSwitch-1G-PS-iS	C 10.30.10.89	
	Advanced	飅 vmk2	🧕 1g-PS-is	BCSI1	1 vSwitch-1G-PS-iS	C 10.30.10.90	
		📠 vmk3	🧕 10g-SC-	-ISCSI0	1 vSwitch1	10.10.10.89	
		👥 vmk4	🧕 10g-SC-	-iSCSI1	1 vSwitch2	10.20.10.89	
		4					4

# 5.2 Manually configure iSCSI Dependent Hardware Adapter to access SC Series volumes

For SC Series storage, the VMware Dependent Hardware iSCSI adapters must be configured manually. Configuration includes binding the adapter to the proper vmk port and adding the dynamic discovery target IP address.

SC Series storage presents front-end target ports and each volume is presented as a unique LUN. Redundant connections are made by creating multiple sessions with each of the virtual iSCSI target ports on the array.

For the purpose of this discussion, 10.10.10.100 and 10.20.10.100 are used as the SC Series iSCSI SAN target discovery addresses.

1. From the Hosts and Clusters view, select Manage, Storage, Storage Adapters, the first dependent hardware iSCSI adapter (vmhba32/vmhba33), Network Port Binding in Adapter Details, and click the Add (+) button.

Navigator I	☐ 10.211.17.89 Actions -					=*
📢 Home 🕨 🔊	Getting Started Summary Mi	onitor Manage Related Objects				
Image: Constraint of the second se	Settings Networking Storage	Alarm Definitions Tags Permiss	ons Dell Storag	e Settings		
10.211.17.89	Storage Adapters	+ 12 1 1		0	Filter	•
	Storage Devices	Adapter	Туре	<u> </u>	dentifier	-
	Host Cache Configuration	🚱 vmhba35		Unknown		
	Protocol Endpoints	🚱 vmhba37	Block SCSI	Unknown		
		🚱 vmhba38	Block SCSI	Unknown		
		🚱 vmhba34	Block SCSI	Unknown		
		QLogic 57810 10 Gigabit Etherne	t Adapter			
		🚱 vmhba32			bnx2i-001018d6afa	
		🚱 vmhba33	ISCSI	Unbound I	bnx2i-001018d6afa	2(iqi
		iSCSI Software Adapter				
		🚱 vmhba39	ISCSI	Online i	iqn.1998-01.com.vr	nwa
		4 ::				
			_			
		Adapter Details				
		Properties Devices Paths	Targets Netwo	ork Port Bindin	g Advanced Optic	ns
		+ × 0				
			rnel Ad Port Grou			nysica
		No VMkernel network ada	pters are bound t	o this iSCSI hos	st bus adapter.	

2. Select the vmk port from the list (vmk3/vmk4) and click OK.

10.211.17.89 - Bind vmhba32 with VMker	nel Adapter		? X
VMkernel network adapter			
Only VMkernel adapters compatible with th	e iSCSI port binding requirements and a	wailable physical network adapters are listed.	
Port Group	VMkernel Adapter	Physical Network Adapter	
2 10g-SC-ISCSI0 (vSwitch1)	📷 vmk3	🗾 vmnic6 (10 Gbit/s, Full)	
VMKernel port binding			
	No items selected		
		ОК	Cancel

3. Select the Targets, Dynamic Discovery, and click Add.

Navigator I	☐ 10.211.17.89 Actions ▼				≡▼
Home 🕨 🔊	Getting Started Summary Mo	onitor Manage Related Objects			
	_		Type Block SCSI Block SCSI Block SCSI Block SCSI t Adapter ISCSI ISCSI	Status Unknown Unknown Unknown Unknown Unknown Unbound Unbound	Q Filter Identifier bmx2I-001018d6afa0((q) bmx2I-001018d6afa2((q)
		Adapter Details Properties Devices Paths Dynamic Discovery Static Di Add. ISCSI server	scovery		nding Advanced Options

4. Enter IP address for the appropriate SC Series Fault Domain Control Port (10.10.10.100/10.20.10.100) and click OK.

vmhba32 - Add	Send Target Server	?
iSCSI Server: Port:	10.10.100 3260	
Authentication	Settings	
☑ Inherit settir	ngs from parent	
		OK Cancel

5. Repeat steps <u>1-4</u> for additional dependent hardware iSCSI adapters used to connect to SC Series iSCSI storage.

Navigator I	🗐 10.211.17.89 Actions 👻					=*
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	Storage Devices	Adapter	Туре	Status	Identifier	<b>^</b>
	Host Cache Configuration	🚱 vmhba35	Block SCSI	Unknown		
	Protocol Endpoints	🔄 vmhba37	Block SCSI	Unknown		
		🔄 vmhba38	Block SCSI	Unknown		
		🔄 vmhba34	Block SCSI	Unknown		
		QLogic 57810 10 Gigabit Ethern	et Adapter			
		🔥 🚱 vmhba32	ISCSI	Unbound	bnx2i-001018d6a	fa0(iqi
		🔄 vmhba33	ISCSI	Unbound	bnx2i-001018d6a	fa2(iqi
		4 CPI Coffigure Adapter				•
		Due to recent configuration change recommended.	ges, a rescan of	this storage a	adapter is	8
		Properties Devices Paths	Targets Net	work Port Bin	ding Advanced Opt	ions
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		Name	Type	Capacity	Operational	Hardu
			This list is en	npty.		

After all required dependent hardware iSCSI adapters have been configured, create a server object and volume(s) in Dell Storage Manager and map appropriate volumes to the server(s). A rescan of all appropriate hardware dependent iSCSI adapters may be required.

# 6 Configure vSphere host use of PS Series and SC Series storage volumes.

After configuring vSphere host access to PS Series and SC Series storage volumes, the newly presented storage devices can be configured for host use. Configuration for use includes setting (or verifying) the recommended multipath selection and creating a vSphere Datastore.

## 6.1 Confirm multipath for PS Series storage volumes

From the Hosts and Clusters view, select Manage, Storage, Storage Devices, iSCSI disk device presented from the PS Series array (EQLOGIC iSCSI Disk), in Device Details, Properties section, confirm the setting of: DELL\_PSP\_EQL\_ROUTED.

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	Host Cache Configuration	Name	Type Capacity	Operati Hardware	Drive Transport
	Protocol Endpoints	COMPELNT ISCSI Disk ( COMPELNT ISCSI Disk (		Attac Support Attac Support	HDD ISCSI
		COMPELNT ISCSI Disk (		Attac Support	HDD ISCSI
		Local DP Enclosure Svc		Attac Not sup	HDD Parall
		EQLOGIC ISCSI Disk (n	disk 165.00 GB	Attac Support	HDD ISCSI
		Local HL-DT-ST CD-R0	cdr	Attac Not sup	HDD Block
		Local DELL Disk (naa.6	disk 232.38 GB	Attac Not sup	HDD Parall
		Device Details	_		
		Properties Paths	NMP		
		Owner	NMP		-
		Partition Details			
		Partition Format G	PT		
		► Primary Partitions 0			
		► Logical Partitions 0			
		Multipathing Policies		Edit	Multipathing
		Path Selection Policy	DELL_PSP_EQL	_ROUTED	
		Storage Array Type Po	olicy VMVV_SATP_EQL		•

**Note**: PS Series volumes are automatically configured as part of the MEM configuration. If MEM is not available, path selection policy for PS Series volumes must be set to Round Robin to reflect <u>Best Practices</u> for Implementing VMware vSphere in a Dell PS Series Storage Environment.

# 6.2 Configure multipath for SC Series storage volumes

1. From the Hosts and Clusters view, select Manage, Storage, Storage Devices, the iSCSI disk device presented from the SC Series array (COMPELNT iSCSI Disk), and click the Edit Multipathing from the Device Details, Properties section.

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	Storage Devices	Name	Type Capacity	Operati Hardware		1
	Host Cache Configuration	COMPELNT ISCSI Disk (	disk 512.00 B			
	Protocol Endpoints	COMPELNT ISCSI Disk (	disk 350.00 GB			
		COMPELNT ISCSI Disk (	disk 512.00 B	Attac Support	HDD ISCSI	]
		Local DP Enclosure Svc	en	Attac Not sup	HDD Parall	
		EQLOGIC ISCSI Disk (n	disk 165.00 GB	Attac Support		
		Local HL-DT-ST CD-RO	cd	Attac Not sup		
		Local DELL Disk (naa.6	disk 232.38 GB	Attac Not sup	HDD Parall	
		Device Details				
		Properties Paths				
		Owner	NMP			_
		Partition Details				
		Partition Format GF	Τ			
		Primary Partitions 0				
		▶ Logical Partitions 0				
		Multipathing Policies		Edi	t Multipathing	
		▶ Path Selection Policy	Most Recently U	sed (VMware)		
		Storage Array Type Pol	licy VMW_SATP_ALU	JA		

2. From the Path Selection Policy drop-down list, select Round Robin and click OK.

Path selection policy:				
Round Robin (VMware)				-
DELL_PSP_EQL_ROUTE	ED			
Most Recently Used (VMv	vare)			
Round Robin (VMware)				
Fixed (VMware)				
vmhba32:C0:T1:L1	<ul> <li>Active</li> </ul>	iqn.2002-03.com.compellent:5000d3	1	
			ОК	Cancel

3. Perform steps <u>1-2</u> for each volume presented from the SC Series array.

**Note**: Changing the default Path Selection Policy (PSP), setting the Round Robin PSP for all SC Series volumes for a cluster, and additional recommended settings can be accomplished using scripts provided in *Dell Storage SC Series Best Practices with VMware vSphere 5.x-6.x*.

## 6.3 Create vSphere Datastores from PS and SC Series volumes

1. From the Hosts and Clusters view, select Related Objects, Datastores, and click the Create New Datastore button.

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	Name 1	Status	Туре	Datastore Cluster	
	E datastore1	🥑 Normal	VMFS5		

2. Select VMFS as the Type of Datastore to create and click Next.

省 New Datastore	?	•• (
Ame and device selection     Partition configuration     Ready to complete	Type  • WFS Create a VMFS datastore on a disk/LUN. NFS Create an NFS datastore on an NFS share over the network. WOL Create a Virtual Volumes datastore on a storage container connected to a storage provider.	
	Back Next Finish Cance	

3. Enter the new **Datastore name** (descriptive name is recommended), select the volume for the new Datastore, and click **Next**.

省 New Datastore								? H
✓ 1 Type	Datastore name: PS-ISCSI-Datastore01							
2 Name and device selection						0	Filter	•
3 Partition configuration	Name			LUN	Capacity	Hardware Acceler	Drive Type	Snapshot Vol
4 Ready to complete	EQLOGIC ISCSI	Disk (naa.68b7b2acf4284a179)	76c5e	0	165.00 GB	Supported	HDD	
	COMPELNT ISC:	31 Disk (naa.6000d3100101cf00	00000	1	350.00 GB	Supported	HDD	
	AA.							2 items
					Back	Next	Finish	Cancel
					Bath	Next	Plinsi	

4. A	Accept the defaults	on the Partition	n configuration	page and click Next.
------	---------------------	------------------	-----------------	----------------------

🖆 New Datastore				(?)
✓ 1 Type	Partition Layout	Datastore Details		
<ul> <li>2 Name and device selection</li> </ul>		Partition Configuration	Use all available partitions	•
✓ 3 Partition configuration		Datastore Size	165.00 🛓 GB	
4 Ready to complete				
	PS-iSCSI-Datastore01			
	Capacity: 165.00 GE			
	Free Space: 165.00 GE	3		
			Back Next Finish (	Cancel
			Daux Next Finish	Cancel

5. Confirm the entered and selected options and click **Finish**.

省 New Datastore		(° ))
<ul> <li>1 Type</li> </ul>	General:	
<ul> <li>2 Name and device selection</li> </ul>	Name	PS-ISCSI-Datastore-01
✓ 3 Partition configuration	Туре	VMFS
4 Ready to complete	Datastore size	165.00 GB
	Device and Format	ing:
	Disk/LUN	EQLOGIC iSCSI Disk (naa.68b7b2acf4284a179776c5e23a054054)
	Partition Format	GPT
	VMFS Version	VMFS 5
		Back Next Finish Cancel

6. Repeat steps <u>1-5</u> for each additional PS Series and SC Series volume presented to the host. For this example, the resulting Datastore list is shown here.

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	Name 1	Status	Туре	Datastore Cluster	
	🗐 datastore1	📀 Normal	VMFS5		
	PS-ISCSI-Datastore-01	📀 Normal	VMFS5		
	SC-ISCSI-Datastore01	Normal	VMFS5		

# A Technical Support and resources

Dell.com/support is focused on meeting customer needs with proven services and support.

<u>Dell TechCenter</u> is an online technical community where IT professionals have access to numerous resources for Dell software, hardware and services.

<u>Storage Solutions Technical Documents</u> on Dell TechCenter provide expertise that helps to ensure customer success on Dell Storage platforms.

# A.1 Referenced or recommended documentation

Dell publications:

- Best Practices for Implementing VMware vSphere in a Dell PS Series Storage Environment
   <u>http://en.community.dell.com/techcenter/extras/m/white\_papers/20434601</u>
- Dell Storage SC Series Best Practices with VMware vSphere 5.x-6.x http://en.community.dell.com/techcenter/extras/m/white\_papers/20441056
- VMware ESXi 5.1, 5.5 or 6.0 Host Configuration Guide http://en.community.dell.com/dell-groups/dtcmedia/m/mediagallery/20094619
- Dell Storage Compatibly Matrix
   <u>http://en.community.dell.com/dell-groups/dtcmedia/m/mediagallery/20438558</u>
- Configuring and Installing the PS Series Multipathing Extension Module for VMware vSphere and PS Series SANs <u>http://en.community.dell.com/dell-groups/dtcmedia/m/mediagallery/19991633/</u>
- Best Practices for Sharing an iSCSI SAN Infrastructure with Dell PS Series and Dell SC Series Storage using VMware <a href="http://en.community.dell.com/techcenter/extras/m/white\_papers/20441671">http://en.community.dell.com/techcenter/extras/m/white\_papers/20441671</a>
- Dell PS Series Configuration Guide
   <u>http://en.community.dell.com/dell-groups/dtcmedia/m/mediagallery/19852516</u>
- Dell SC series storage technical content library (whitepapers, videos, best practices, etc.) <u>http://en.community.dell.com/techcenter/storage/w/wiki/5018.compellent-technical-content</u>

VMware publications:

- VMware Knowledge Base Article (2038869): Considerations for using software iSCSI port binding in ESX/ESXi <u>https://kb.vmware.com/selfservice/microsites/search.do?language=en\_US&cmd=displayKC&externall</u> <u>d=2038869</u>
- VMware Knowledge Base Article (2108416): Thumbprint error when running ESXCLI command as a vCLI command https://kb.vmware.com/selfservice/microsites/search.do?language=en\_US&cmd=displayKC&externall d=2108416

VMware Knowledge Base for all VMware products:

VMware Knowledge Base
 <u>http://kb.vmware.com/selfservice/microsites/microsite.do</u>