

# Dell EMC Networking Fibre Channel Deployment with S4148U-ON in F\_port Mode

Connecting server Fibre Channel HBAs to Fibre Channel storage using two S4148U-ON leaf switches running OS10 Enterprise Edition

Dell EMC Networking Infrastructure Solutions  
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## Revisions

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# 1 Introduction

Our vision at Dell EMC is to be the essential infrastructure company in the data center for today's applications and for the cloud-native world we are entering. To attain that vision, the Dell EMC portfolio focuses on making every component of data center infrastructure (servers, storage, and networking) compelling by making the value of the integrated solution greater than the sum of the parts.

In a leaf-spine data center environment, two Dell EMC Networking S4148U-ON switches running OS10 Enterprise Edition (OS10EE) may be used as a leaf pair with Ethernet ports connected to spine switches for production TCP/IP traffic. The same leaf pair may also be used in F\_port mode for direct connections to server Fibre Channel (FC) host bus adapters (HBAs) and FC storage.

This guide covers configuration of the FC portion of the network. This includes configuration of two S4148U-ON switches, PowerEdge server FC HBAs, VMware ESXi hosts, and a Unity 500F storage array. The goal of this guide is to enable a network administrator or deployment services engineer to deploy a pair of S4148U-ONs in an FC environment using the hardware and software described.



**Note:** For servers using converged network adapters (CNAs) instead of FC HBAs, see [FCoE-to-Fibre Channel Deployment with S4148U-ON in F\\_port Mode](#).

## 1.1 Typographical conventions

The CLI and GUI examples in this document use the following conventions:

Monospace Text	CLI examples
<u>Underlined Monospace Text</u>	CLI examples that wrap the page. This text is entered as a single command.
<i>Italic Monospace Text</i>	Variables in CLI examples
<b>Bold Monospace Text</b>	Commands entered at the CLI prompt
<b>Bold text</b>	GUI fields and information entered in the GUI

## 1.2 Attachments

This .pdf includes switch configuration file attachments. To access attachments in Adobe Acrobat Reader, click the  icon in the left pane halfway down the page, then click the  icon.

## 2 Hardware overview

This section briefly describes the primary hardware used to validate this deployment. A complete listing of hardware validated for this guide is provided in Appendix A.

### 2.1 Dell EMC Networking S4148U-ON

The S4148U-ON enables converging LAN and SAN traffic in a single 1-RU, multilayer switch. It includes twenty-four 10GbE ports, two 40GbE ports, four 10/25/40/50/100GbE or FC8/16/32 ports, and twenty-four 10GbE or FC8/16 ports. Two S4148U-ONs are used as leaf switches in this guide for Fibre Channel connectivity to the SAN and Ethernet connectivity to the leaf-spine network.



Figure 1 Dell EMC Networking S4148U-ON

### 2.2 Dell EMC Networking S3048-ON

The S3048-ON is a 1-RU switch with forty-eight 1GbE BASE-T ports and four 10GbE SFP+ ports. In this guide, one S3048-ON switch is used per rack for out-of-band (OOB) management traffic.



Figure 2 Dell EMC Networking S3048-ON

### 2.3 Dell EMC PowerEdge R640 server

The PowerEdge R640 is a 1-RU, two-socket server platform with support for up to 56 processor cores, 3TB memory, and up to twelve SAS/SATA HDD/SSD drives or eight NVMe drives. Two R640 servers are used in the deployment in this guide.



Figure 3 Dell EMC PowerEdge R640

## 2.4 Dell EMC Unity 500F storage array

The Unity 500F storage platform delivers all-flash storage with up to 8PB raw capacity. It has concurrent support for NAS, iSCSI, and FC protocols. The Disk Processing Enclosure (DPE) has a 2-RU form factor, redundant Storage Processors (SPs), and supports up to twenty-five 2.5" drives. Additional 2-RU Disk Array Enclosures (DAEs) may be added providing twenty-five additional drives each.



Figure 4 Dell EMC Unity 500F front view



Figure 5 Dell EMC Unity 500F rear view



### 3 Topology overview

Each S4148U-ON provides universal ports that may be configured as either FC or Ethernet. The mix of FC and Ethernet ports allows the switches to simultaneously connect directly to an FC SAN for storage traffic and act as leaves in a leaf-spine network for production TCP/IP traffic.

**Note:** FC SAN traffic does not traverse the leaf-spine network, or the VLT interconnect (VLTi). FC traffic is contained within the rack.

A combined FC SAN and leaf-spine topology is shown in the diagram below.

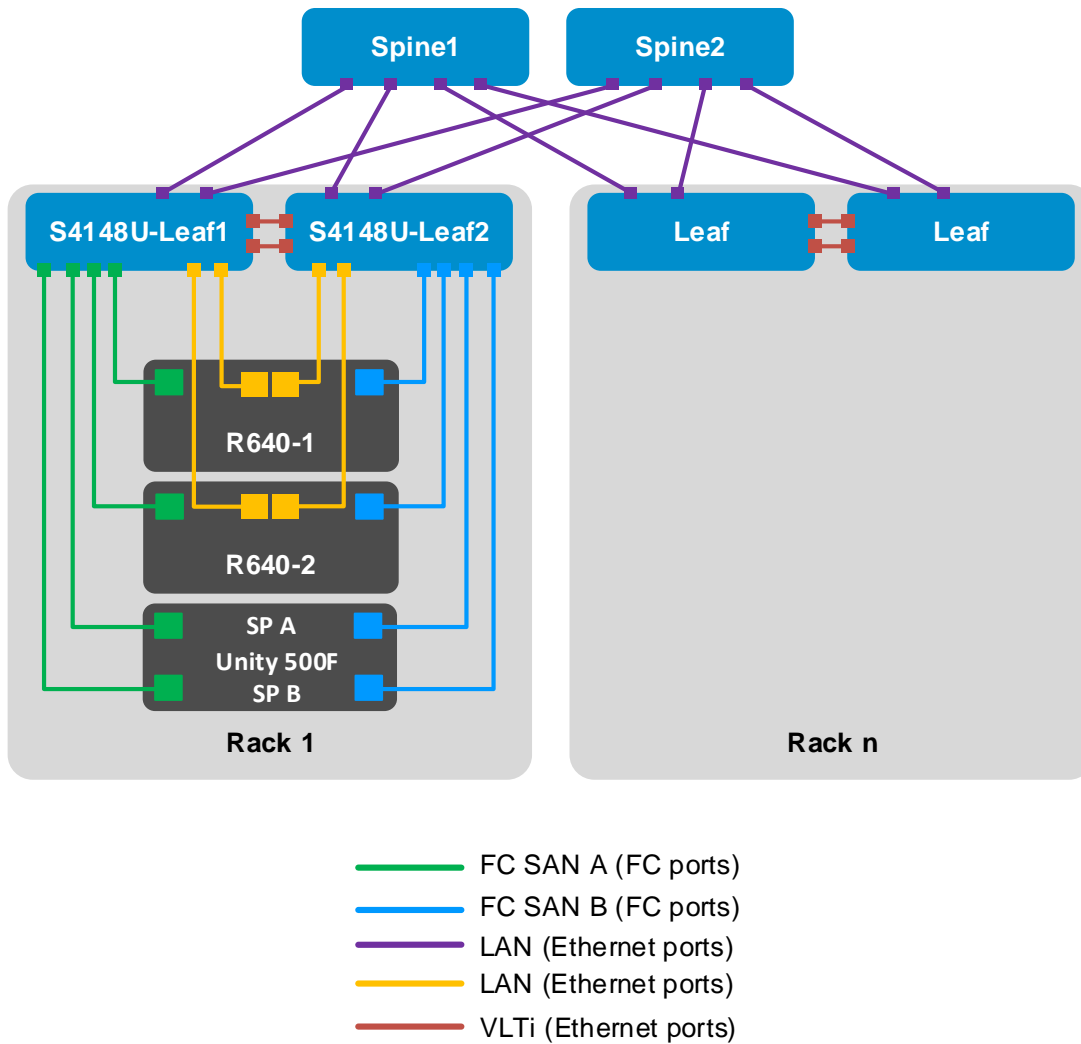


Figure 6 Combined FC SAN and leaf-spine topology

**Note:** Using a leaf-spine network in the data center is considered a best practice. This document covers configuration of the FC SAN portion of the topology above. For the leaf-spine Ethernet portion, refer to [Dell EMC Networking Layer 3 Leaf-Spine Deployment and Best Practices with OS10EE](#).

### 3.1 FC SAN topology detail

Each S4148U-ON switch is placed in F\_port mode and acts as an FC switch. This enables direct connections to N\_port devices such as FC storage and server FC HBAs without the need for additional dedicated FC switches.

The FC SAN topology used in this guide is shown in Figure 7.

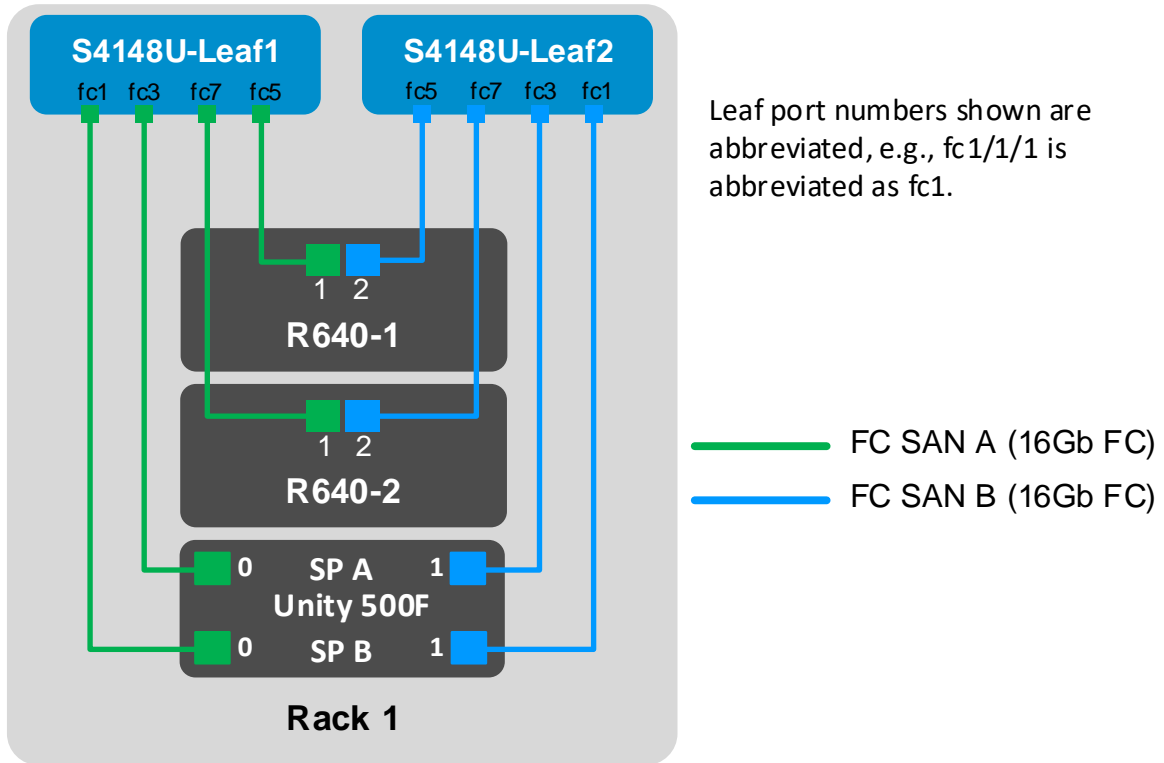


Figure 7 FC SAN topology

Each PowerEdge R640 server in this deployment contains one QLogic QLE2662 FC HBA with two 16Gb FC ports. Each HBA port is connected to an FC port on one S4148U-ON as shown.

The Unity 500F storage array contains redundant storage processors, SP A and SP B. 16Gb FC ports from the Unity SPs are directly connected to FC ports on the S4148U-ON switches as shown.

## 3.2 OOB management network

The out-of-band (OOB) management network is an isolated network for management traffic only. It is used by administrators to remotely configure and manage servers, switches, and storage devices. Production traffic initiated by the network end users does not traverse the management network.

An S3048-ON switch is installed at the top of each rack for OOB management connections as shown.

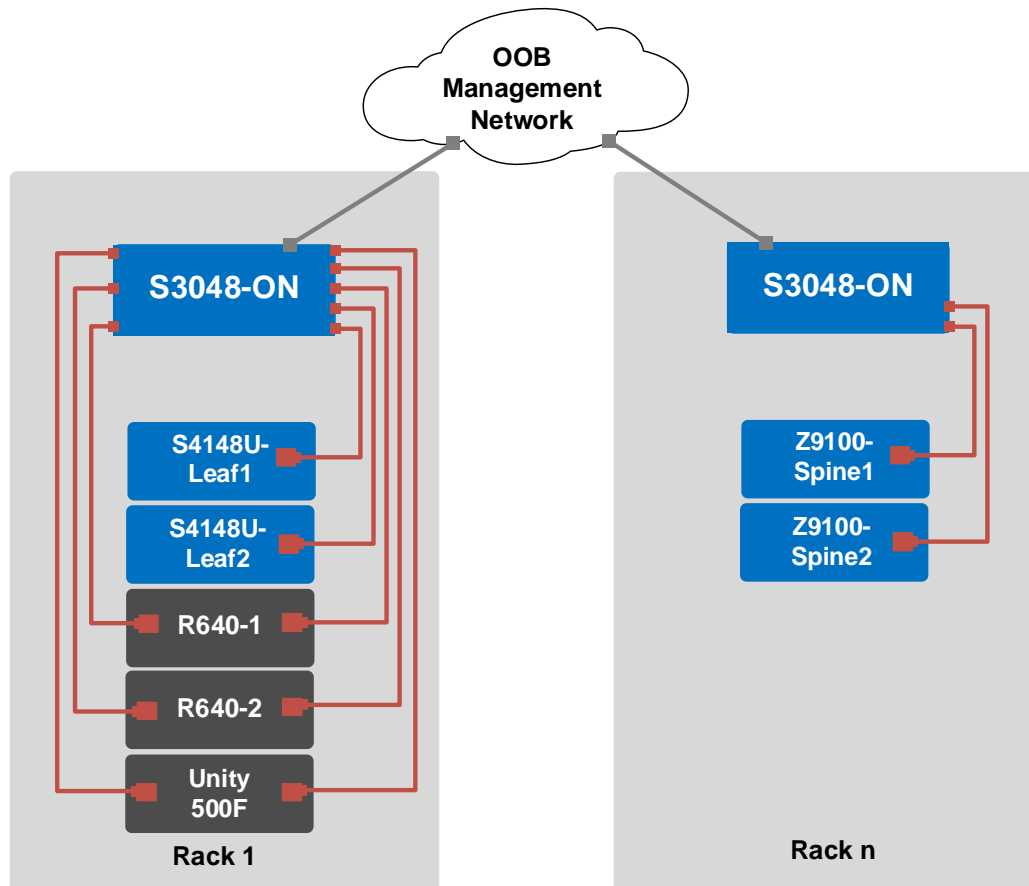


Figure 8 OOB management network connections

Four 10GbE SFP+ ports are available on each S3048-ON switch for use as uplinks to the OOB management network core. Downstream connections to servers, switches, and storage devices are 1GbE BASE-T.

The dedicated OOB management port of each leaf and spine switch is used for these connections. Each PowerEdge R640 server has two connections to the S3048-ON: the server's iDRAC port and a 1GbE NIC that is used for ESXi host management.

**Note:** For this deployment example, each server's ESXi management connection is made using one of the two QLogic 57800 1GbE BASE-T ports on the rNDC.

The Unity 500F storage array has two dedicated management ports: one for SP A and one for SP B. Both are connected to the S3048-ON.

## 4 Preparation

**Note:** Exact iDRAC steps in this section may vary depending on hardware, software and browser versions used. See the PowerEdge server documentation for steps to connect to the iDRAC.

### 4.1 Reset server FC HBAs to factory defaults

**Note:** Resetting to defaults is only necessary if installed FC HBAs have been modified from their factory default settings.

1. Connect to the server's iDRAC in a web browser and launch the virtual console.
2. In the virtual console, from the **Next Boot** menu, select **BIOS Setup**.
3. Reboot the server.
4. From the **System Setup Main Menu**, select **Device Settings**.
5. From the **Device Settings** page, select the first FC adapter port.
6. From the **Main Configuration Page**, click the **Default** button followed by **Yes** to load the default settings. Click **OK**.
7. Click **Finish**.
8. Click **Yes** to save changes. Click **OK**.
9. Repeat steps 5-8 for the second FC adapter port.
10. Repeat steps 1-9 for remaining servers.

### 4.2 Determine FC HBA port WWPNs

The PowerEdge R640 server's FC HBA World Wide Port Names (WWPNs) are used for FC zone configuration. WWPNs may be determined using the iDRAC as follows:

1. Connect to the first server's iDRAC in a web browser and log in.
2. Select **System > Network Devices**.
3. Under **Network Devices**, click on the FC HBA. In this example, it is **FC Slot 2**. The FC ports are displayed as shown in Figure 9:

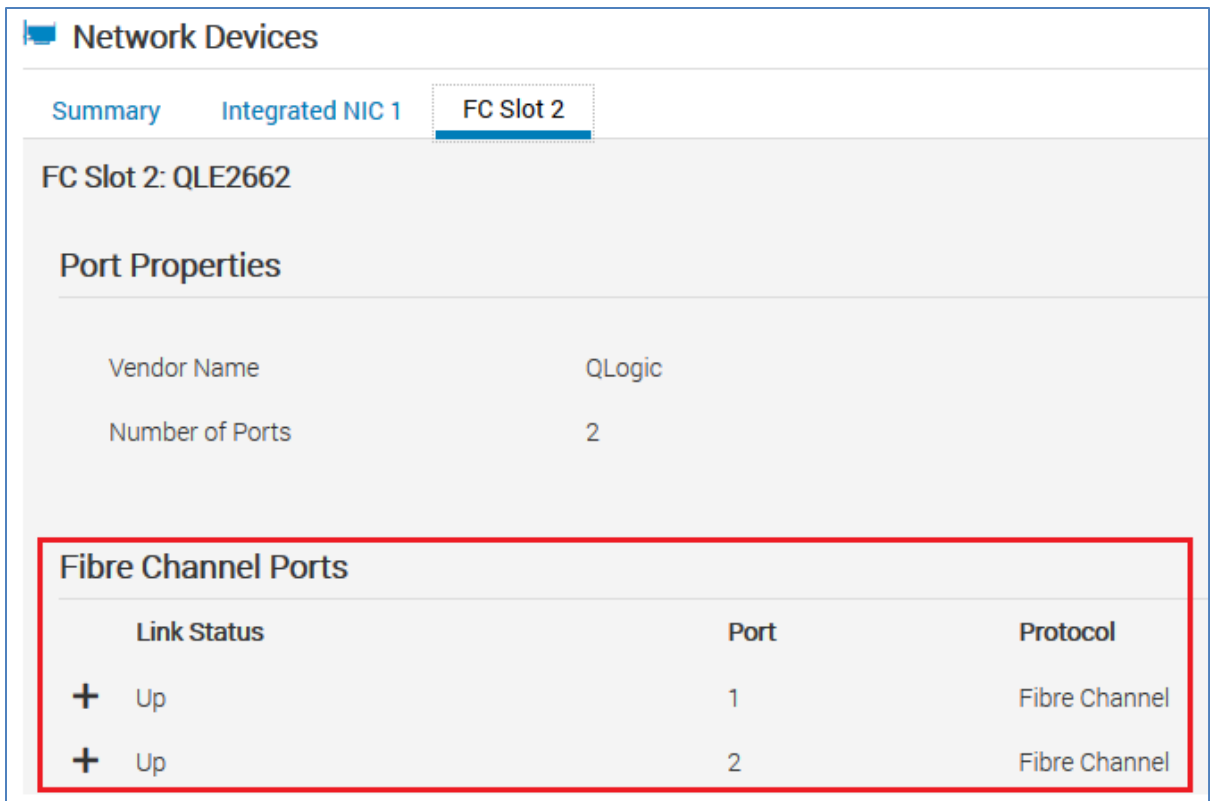


Figure 9 FC ports listed in iDRAC

4. Under **Fibre Channel Ports**, click the **+** icon next to the first port to expand the details as shown:

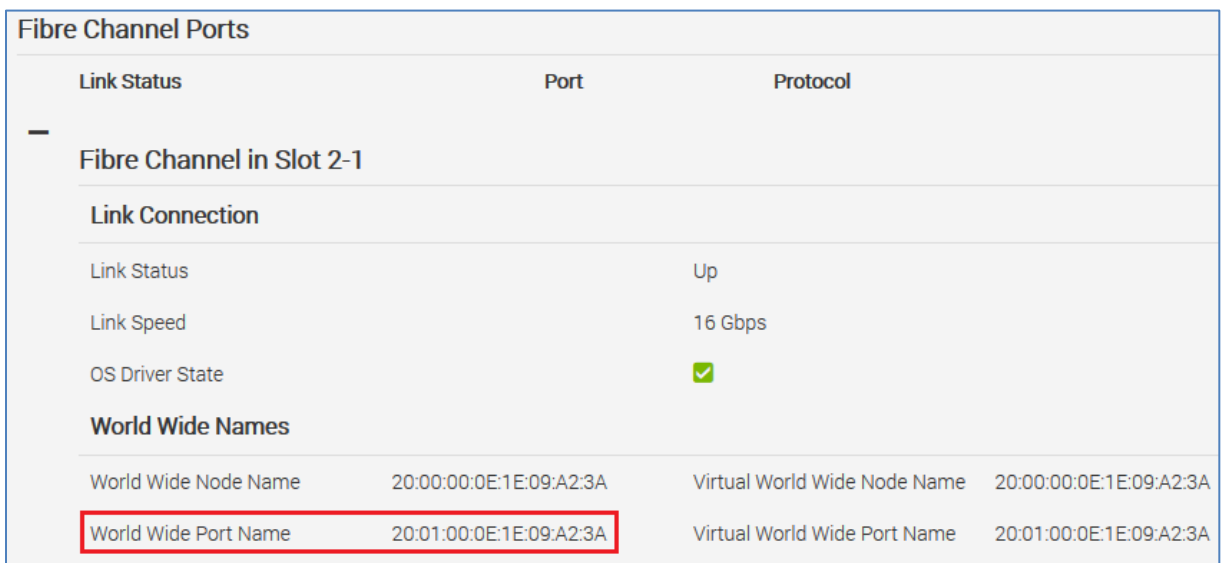


Figure 10 WWPN for FC HBA port 1

5. Record the **World Wide Port Name**, outlined in red in Figure 10. A convenient method is to copy and paste it into a text file. The WWPN is used in the S4148U-ON switch FC zone configuration.

6. Repeat steps 4 and 5 for FC port 2.
7. Repeat steps 1-6 for remaining servers.


The FC WWPNS used in this deployment example are shown in Table 1. The Switch column has been added for reference per the cable connections in the SAN topology diagram (Figure 7).

**Table 1** Server HBA FC port WWPNS

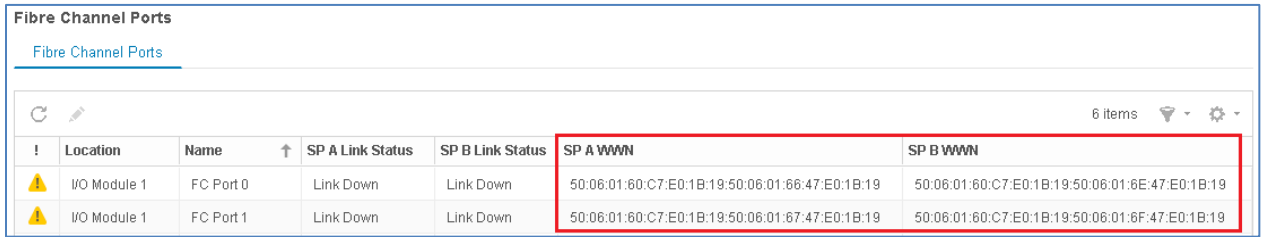
<b>Server</b>	<b>Port</b>	<b>Switch</b>	<b>WWPN</b>
R640-1	1	S4148U-Leaf1	20:01:00:0E:1E:09:A2:3A
R640-1	2	S4148U-Leaf2	20:01:00:0E:1E:09:A2:3B
R640-2	1	S4148U-Leaf1	20:01:00:0E:1E:09:B8:F6
R640-2	2	S4148U-Leaf2	20:01:00:0E:1E:09:B8:F7

## 4.3 Determine Unity 500F storage array FC WWPNs

The WWPNs of FC adapters in storage arrays are also used for FC zone configuration. WWPNs on Unity storage arrays are determined as follows:

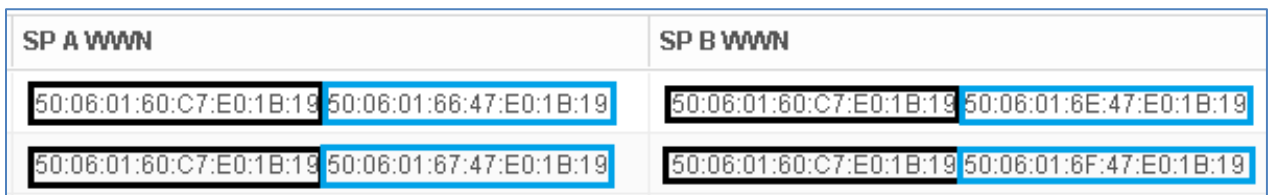
1. Connect to the Unisphere GUI in a web browser and log in. Click the **Settings** icon  near the top right corner of the page.
2. In the left pane of the **Settings** window, select **Access > Fibre Channel**.

The **Fibre Channel Ports** page is displayed as shown in Figure 11. A zoomed-in view of the area inside the red box is shown in Figure 12.



!	Location	Name	↑	SP A Link Status	SP B Link Status	SP A WWN	SP B WWN
⚠	I/O Module 1	FC Port 0		Link Down	Link Down	50:06:01:60:C7:E0:1B:19 50:06:01:66:47:E0:1B:19	50:06:01:60:C7:E0:1B:19 50:06:01:6E:47:E0:1B:19
⚠	I/O Module 1	FC Port 1		Link Down	Link Down	50:06:01:60:C7:E0:1B:19 50:06:01:67:47:E0:1B:19	50:06:01:60:C7:E0:1B:19 50:06:01:6F:47:E0:1B:19

Figure 11 Unisphere Fibre Channel Ports page



SP A WWN	SP B WWN
50:06:01:60:C7:E0:1B:19 50:06:01:66:47:E0:1B:19	50:06:01:60:C7:E0:1B:19 50:06:01:6E:47:E0:1B:19
50:06:01:60:C7:E0:1B:19 50:06:01:67:47:E0:1B:19	50:06:01:60:C7:E0:1B:19 50:06:01:6F:47:E0:1B:19

Figure 12 Zoomed-in view of SP A and SP B WWPNs on Fibre Channel Ports page

3. Two WWPNs are listed for each port. The World Wide Node Name (WWNN), outlined in black, identifies this Unity storage array (the node). It is not used in zone configuration. The WWPNs, outlined in blue, identify the individual ports and are used for FC zoning. Record the WWPNs as shown in Table 2. The Switch column has been added based on the physical cable connections shown in Figure 7.

Table 2 Storage array FC adapter WWPNs

Service processor	Port	Switch	WWPN
SP A	0	S4148U-Leaf1	50:06:01:66:47:E0:1B:19
SP A	1	S4148U-Leaf2	50:06:01:67:47:E0:1B:19
SP B	0	S4148U-Leaf1	50:06:01:6E:47:E0:1B:19
SP B	1	S4148U-Leaf2	50:06:01:6F:47:E0:1B:19

## 4.4 VMware preparation

### 4.4.1 VMware ESXi download and installation

Install VMware ESXi 6.5 U1 or later on each PowerEdge server. Dell EMC recommends using the latest Dell EMC customized ESXi .iso image available on [support.dell.com](http://support.dell.com). The correct drivers for the PowerEdge server hardware are built into this image. This image is used to install ESXi via CD/DVD, a USB flash drive, or by mounting the .iso image through the PowerEdge server's iDRAC interface.

Each ESXi host has one 1GbE BASE-T interface connected to the OOB management network for communication with the vCenter Server.

### 4.4.2 Install and configure VMware vCenter Server 6.5 U1

For information on the installation and configuration of vCenter Server, refer to [vSphere Installation and Setup](#). In this deployment, the vCenter Server communicates with ESXi hosts via the OOB management network, and it may be located on any host accessible over this network.

### 4.4.3 Add ESXi hosts to vCenter Server

The vSphere Web Client is a service running on vCenter Server. In the vSphere Web Client, a data center object named **Datacenter** is created for this deployment, and the two ESXi hosts are added to it.

A cluster named **Rack1** is created and added to the datacenter object, and the two R640 hosts are added to the cluster. When complete, the vSphere Web Client **Hosts and Clusters** tab in the **Navigator** pane appears as shown in Figure 13.

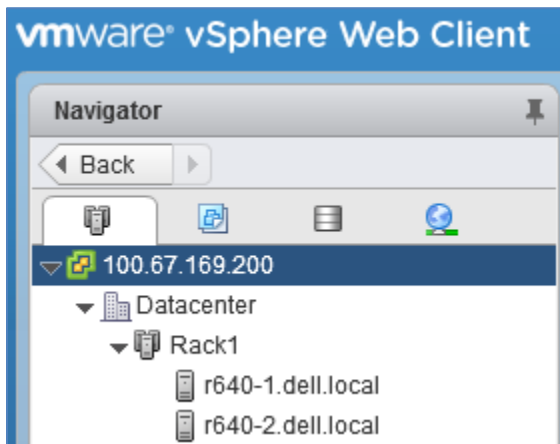


Figure 13 Datacenter and cluster created with ESXi hosts



## 5 S4148U-ON switch configuration

This section covers steps to configure the S4148U-ON leaf switches running OS10EE.

### 5.1 Prepare switches

#### 5.1.1 Factory default configuration

The configuration commands in the sections that follow begin with S4148U-ON switches at their factory default settings. Dell EMC Networking switches running OS10EE can be reset to their default configuration as follows:

```
OS10# delete startup-configuration  
Proceed to delete startup-configuration [confirm yes/no(default)]:y
```

```
OS10# reload  
System configuration has been modified. Save? [yes/no]:n  
Proceed to reboot the system? [confirm yes/no]:y
```

The switch reboots to its factory default configuration. Repeat on the second S4148U-ON switch.

**Note:** OS10EE at its default settings has Telnet disabled, SSH enabled, and the OOB management interface configured to get its IP address via DHCP. The default username and password are both `admin`. Dell EMC recommends changing the admin password to a complex password during the first login.

#### 5.1.2 Set switch port profile

A switch port profile determines the enabled front-panel ports and supported breakout modes on Ethernet and unified ports. Changing the profile removes the existing switch configuration, so the switch port profile is configured first. Switch port profile-3 is used in this deployment to enable four 100GbE ports on each S4148U-ON for the leaf-spine portion of the topology. This profile also provides twelve 16Gb FC ports for storage connections.

**Note:** See [OS10 Enterprise Edition User Guide Release 10.4.0E\(R3\)](#) for switch-port profile options and details.

To change the switch-port profile from its current setting:

```
OS10# configure terminal  
OS10(config)# switch-port-profile 1/1 profile-3  
Warning: Switch port profile will be applied only after a save and reload.  
All management port configurations will be retained but all other  
configurations will be wiped out after the reload.  
OS10(config)# exit  
OS10# write memory  
OS10# reload
```

Proceed to reboot the system? [confirm yes/no]:y

## 5.2 Configure switches

After the switch port profile is set on both S4148U-ONs, the commands in the tables that follow are run to complete the FC configuration on both switches. The port numbers used correspond to the topology diagram shown in Figure 7.

**Note:** The commands in the tables below should be entered in the order shown. Switch running-configuration files are provided as attachments named **S4148U-Leaf1.txt** and **S4148U-Leaf2.txt**.

Configure the hostname, OOB management IP address, and OOB management default gateway.

S4148U-Leaf1	S4148U-Leaf2
<pre>configure terminal  hostname S4148U-Leaf1  interface mgmt 1/1/1 no ip address dhcp ip address 100.67.169.31/24 no shutdown management route 0.0.0.0/0 100.67.169.254</pre>	<pre>configure terminal  hostname S4148U-Leaf2  interface mgmt 1/1/1 no ip address dhcp ip address 100.67.169.30/24 no shutdown management route 0.0.0.0/0 100.67.169.254</pre>

The `feature fc domain-id domain-id` command puts the switch in F\_port mode. FC aliases are configured for the server and storage adapter WWPNs from Table 1 and Table 2. Using aliases is optional, but makes the configuration more user-friendly.

S4148U-Leaf1	S4148U-Leaf2
<pre>feature fc domain-id 100  fc alias r640-1p1 member wwn 20:01:00:0E:1E:09:A2:3A fc alias r640-2p1 member wwn 20:01:00:0E:1E:09:B8:F6 fc alias SpB-0 member wwn 50:06:01:6E:47:E0:1B:19 fc alias SpA-0 member wwn 50:06:01:66:47:E0:1B:19</pre>	<pre>feature fc domain-id 100  fc alias r640-1p2 member wwn 20:01:00:0E:1E:09:A2:3B fc alias r640-2p2 member wwn 20:01:00:0E:1E:09:B8:F7 fc alias SpB-1 member wwn 50:06:01:6F:47:E0:1B:19 fc alias SpA-1 member wwn 50:06:01:67:47:E0:1B:19</pre>

Server and storage adapter WWPNs, or their aliases, are combined into zones to allow communication between devices in the same zone. Dell EMC recommends single-initiator zoning. In other words, no more than one server HBA port per zone. For high availability, each server HBA port should be zoned to at least one port from SP A and one port from SP B.

In this deployment, one zone is created for each server HBA port. The zone contains the server port and the two storage processor ports connected to the same S4148U-ON.

S4148U-Leaf1	S4148U-Leaf2
<pre>fc zone r640-1p1zone member alias-name r640-1p1 member alias-name SpB-0 member alias-name SpA-0  fc zone r640-2p1zone member alias-name r640-2p1 member alias-name SpB-0 member alias-name SpA-0</pre>	<pre>fc zone r640-1p2zone member alias-name r640-1p2 member alias-name SpB-1 member alias-name SpA-1  fc zone r640-2p2zone member alias-name r640-2p2 member alias-name SpB-1 member alias-name SpA-1</pre>

A zone set is a collection of zones. A zone set named zoneset1 is created on each switch, and the zones are added to it.

**Note:** Multiple zone sets may be configured on a switch, but only one zone set can be active at any time.

S4148U-Leaf1	S4148U-Leaf2
<pre>fc zoneset zoneset1 member r640-1p1zone member r640-2p1zone exit</pre>	<pre>fc zoneset zoneset1 member r640-1p2zone member r640-2p2zone exit</pre>

Create the FCoE VLAN, vfabric, FCoE map, and activate the zone set. In this deployment, the FCoE VLAN is set to 1002, the vfabric ID is set to 100 (valid range is 1-255), and the fcmmap is set to 0xEFC64 (valid range is 0xEFC00-0xEFCFF).

**Note:** The FCoE VLAN and FCoE map are used internally by the switch to forward FC traffic, even if FCoE is not used by nodes connected to the switch.

S4148U-Leaf1	S4148U-Leaf2
<pre>interface vlan 1002  vfabric 100 vlan 1002 fcoe fcmmap 0xEFC64 zoneset activate zoneset1</pre>	<pre>interface vlan 1002  vfabric 100 vlan 1002 fcoe fcmmap 0xEFC64 zoneset activate zoneset1</pre>

**Note:** If changes are subsequently made to aliases, zones, or zone sets, the zone set must be reactivated for the changes to take effect. This is done with the following command sequence:

```
S4148U-Leaf1# configure terminal
S4148U-Leaf1(config)# vfabric vfabric_number
S4148U-Leaf1(conf-vfabric-100)# zoneset activate zoneset_name
```

Put enough unified ports in 16Gb FC mode for connections to the FC storage array. In this deployment example, four FC ports per S4148U-ON switch are used. In switch port profile-3, unified port groups 1 and 2 (entered as 1/1/1 and 1/1/2) provide two 16Gb FC interfaces each.

**Note:** For more information on mapping ports to switch profiles and port groups, see [OS10 Enterprise Edition User Guide Release 10.4.0E\(R3\)](#), p.83-85.

Add the server and storage Fibre Channel interfaces to vfabric 100.

Finally, exit configuration mode and save the configuration with the `end` and `write memory` commands.

S4148U-Leaf1	S4148U-Leaf2
<pre>port-group 1/1/1 mode fc 16g-2x  port-group 1/1/2 mode fc 16g-2x  interface fibrechannel 1/1/1 description "To SPB" no shutdown vfabric 100  interface fibrechannel 1/1/3 description "To SPA" no shutdown vfabric 100  interface fibrechannel 1/1/5 description "To Server 1" no shutdown vfabric 100  interface fibrechannel 1/1/7 description "To Server 2" no shutdown vfabric 100  end write memory</pre>	<pre>port-group 1/1/1 mode fc 16g-2x  port-group 1/1/2 mode fc 16g-2x  interface fibrechannel 1/1/1 description "To SPB" no shutdown vfabric 100  interface fibrechannel 1/1/3 description "To SPA" no shutdown vfabric 100  interface fibrechannel 1/1/5 description "To Server 1" no shutdown vfabric 100  interface fibrechannel 1/1/7 description "To Server 2" no shutdown vfabric 100  end write memory</pre>

## 6 S4148U-ON validation

After connected devices are configured, many commands are available to validate the network configuration. This section provides a list of the most common commands and their output for this topology.

**Note:** The commands and output shown below are for S4148U-Leaf1. The output for S4148U-Leaf2 is similar. For additional commands and output related to the leaf-spine portion of the topology, such as VLT, BGP, etc., see [Dell EMC Networking Layer 3 Leaf-Spine Deployment and Best Practices with OS10EE](#).

### 6.1 show interface status

The `show interface status | grep up` command is used to verify required interfaces are up, and links are established at their appropriate speeds.

```
S4148U-Leaf1# show interface status | grep up
Port          Description      Status   Speed   Duplex   Mode Vlan Tagged-Vlans
Fc 1/1/1      To SPB           up       16G     auto     -
Fc 1/1/3      To SPA           up       16G     auto     -
Fc 1/1/5      To Server 1     up       16G     auto     -
Fc 1/1/7      To Server 2     up       16G     auto     -
```

### 6.2 show fc switch

The `show fc switch` command verifies the switch is in F\_Port mode for FC traffic.

```
S4148U-Leaf1# show fc switch
Switch Mode : FPORT
Switch WWN   : 10:00:e4:f0:04:6b:04:42
```

### 6.3 show fc ns switch

The `show fc ns switch` command shows all device ports logged into the fabric. In this deployment, four ports are logged in to each switch: two storage ports and two server ports.

```
S4148U-Leaf1# show fc ns switch

Total number of devices = 4

Switch Name          10:00:e4:f0:04:6b:04:42
Domain Id            100
Switch Port          fibrechannel1/1/1
FC-Id                64:04:00
Port Name            50:06:01:6e:47:e0:1b:19
Node Name            50:06:01:60:c7:e0:1b:19
Class of Service     8
Symbolic Port Name   UNITY::::SPB10::FC:::::
```

```

Symbolic Node Name      UNITY::::SPA::FC::::::
Port Type               N_PORT
Registered with NameServer Yes
Registered for SCN      Yes

Switch Name             10:00:e4:f0:04:6b:04:42
Domain Id               100
Switch Port             fibrechannel1/1/3
FC-Id                   64:0c:00
Port Name               50:06:01:66:47:e0:1b:19
Node Name               50:06:01:60:c7:e0:1b:19
Class of Service        8
Symbolic Port Name      UNITY::::SPA10::FC::::::
Symbolic Node Name      UNITY::::SPA::FC::::::
Port Type               N_PORT
Registered with NameServer Yes
Registered for SCN      Yes

Switch Name             10:00:e4:f0:04:6b:04:42
Domain Id               100
Switch Port             fibrechannel1/1/5
FC-Id                   64:14:00
Port Name               20:01:00:0e:1e:09:a2:3a
Node Name               20:00:00:0e:1e:09:a2:3a
Class of Service        8
Symbolic Port Name
Symbolic Node Name      QLE2662 FW:v8.05.63 DVR:v2.1.57.0
Port Type               N_PORT
Registered with NameServer Yes
Registered for SCN      Yes

Switch Name             10:00:e4:f0:04:6b:04:42
Domain Id               100
Switch Port             fibrechannel1/1/7
FC-Id                   64:1c:00
Port Name               20:01:00:0e:1e:09:b8:f6
Node Name               20:00:00:0e:1e:09:b8:f6
Class of Service        8
Symbolic Port Name
Symbolic Node Name      QLE2662 FW:v8.05.63 DVR:v2.1.57.0
Port Type               N_PORT
Registered with NameServer Yes
Registered for SCN      Yes

```

**Note:** For condensed output, use the `show fc ns switch brief` command.

## 6.4 show fc zoneset active

The **show fc zoneset active** command shows the zones and zone members in the active zone set. Members logged into the fabric are shown with an asterisk (\*).

```
S4148U-Leaf1# show fc zoneset active

vFabric id: 100
Active Zoneset: zoneset1
ZoneName                ZoneMember
=====
r640-1plzone            *20:01:00:0e:1e:09:a2:3a
                        *50:06:01:66:47:e0:1b:19
                        *50:06:01:6e:47:e0:1b:19

r640-2plzone            *20:01:00:0e:1e:09:b8:f6
                        *50:06:01:66:47:e0:1b:19
                        *50:06:01:6e:47:e0:1b:19
```

## 6.5 show vfabric

The **show vfabric** command output provides a variety of information including the default zone mode, the active zone set, and interfaces that are members of the vfabric.

```
S4148U-Leaf1# show vfabric
Fabric Name
Fabric Type          FPORT
Fabric Id            100
Vlan Id              1002
FC-MAP               0xEFC64
Vlan priority        3
FCF Priority          128
FKA-Adv-Period       Enabled,8
Config-State         ACTIVE
Oper-State           UP
=====
Switch Config Parameters
=====
Domain ID            100
=====
Switch Zoning Parameters
=====
Default Zone Mode:   Deny
Active ZoneSet:      zoneset1
=====
Members
fibrechannel1/1/1
```

```
fibrechannell1/1/3
fibrechannell1/1/5
fibrechannell1/1/7
=====
```

**Note:** By default, the Default Zone Mode is set to Deny. This setting denies access between FC nodes except those in the same zone of the active zone set. To allow access between FC nodes in the absence of an active zone set, change the Default Zone Mode to Allow with the following command sequence:

```
S4148U-Leaf1# configure terminal
S4148U-Leaf1(config)# vfabric vfabric_number
S4148U-Leaf1(conf-vfabric-100)# zone default-zone permit
```

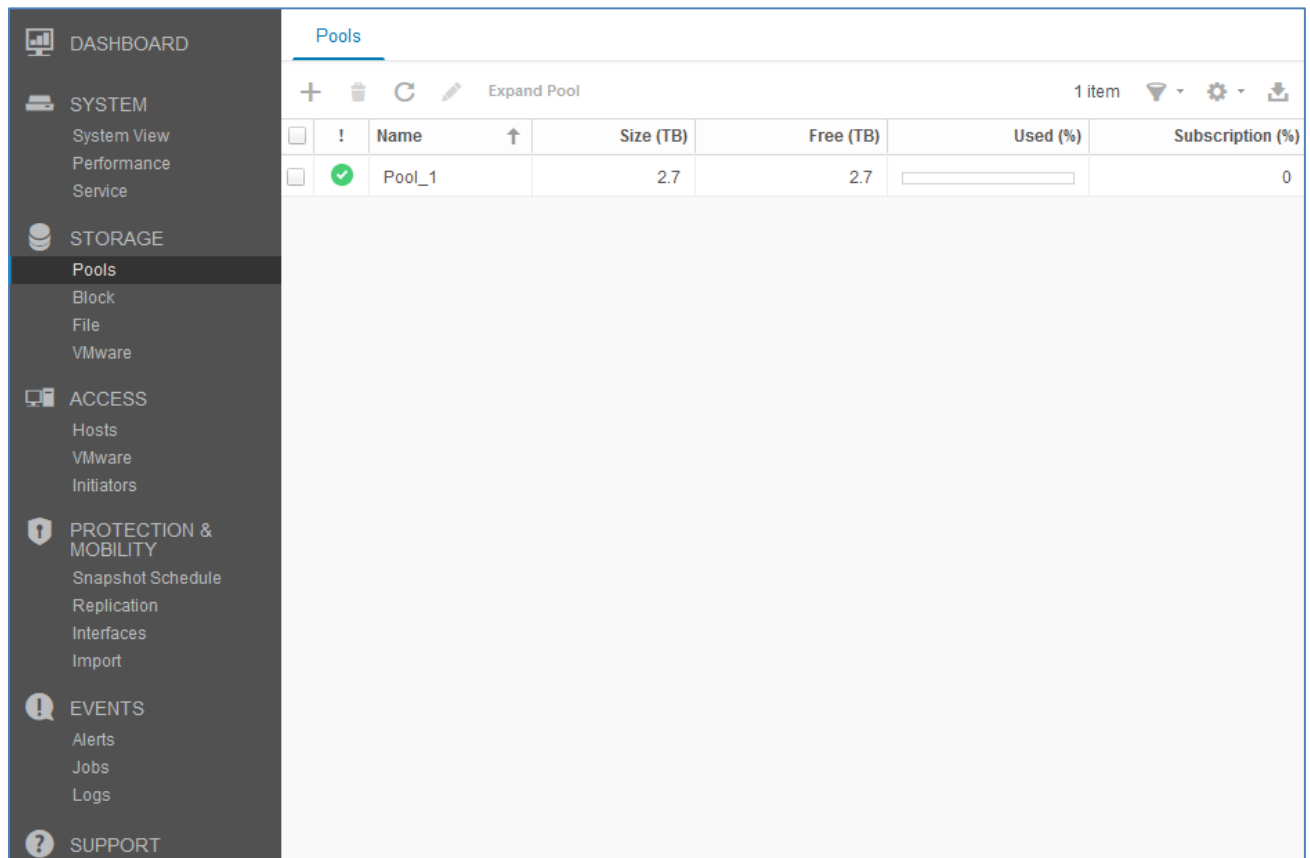


## 7 Configure Unity FC storage

This section covers configuration of a Dell EMC Unity 500F storage array. Refer to the storage system documentation for other FC storage devices.

### 7.1 Create a storage pool

1. Connect to the Unisphere GUI in a web browser and log in.
2. In the left pane under **STORAGE**, select **Pools**.
3. Click the **+** icon. In the **Create Pool** dialog box, provide a **Name** and click **Next**.
4. Select appropriate storage tiers and RAID configuration for the pool. Click **Next**.
5. Under **Select Amount of Storage**, select the number of drives section. The total number of drives and the total capacity will be displayed next to **Totals**. Click **Next**.
6. The **Capability Profile Name** section is optional. Click **Next**.
7. Review selections on the **Summary** page and click **Finish** to create the pool. Once the **Overall status** shows 100%, click **Close**.
8. The pool is displayed on the **STORAGE > Pools** page as shown in Figure 14.



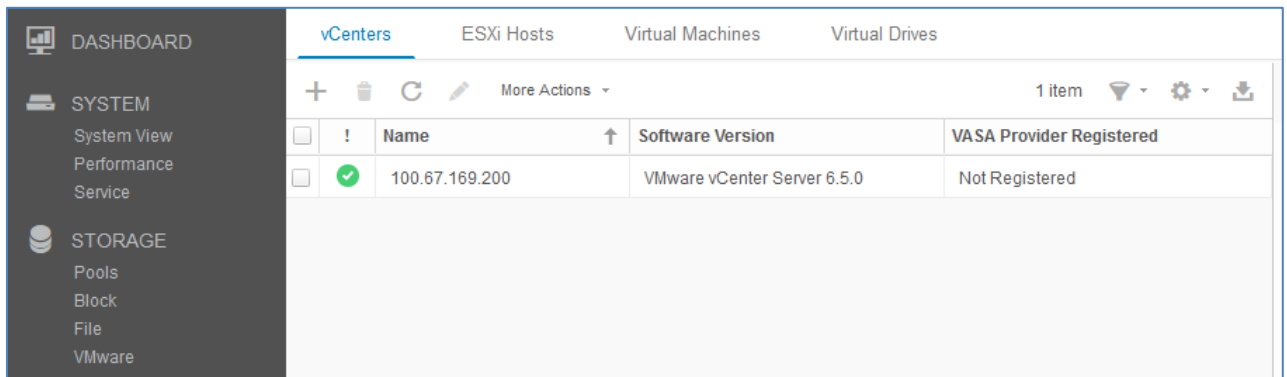
The screenshot shows the 'Pools' page in the Unisphere GUI. The left sidebar contains a navigation menu with categories: DASHBOARD, SYSTEM, STORAGE, ACCESS, PROTECTION & MOBILITY, EVENTS, and SUPPORT. The 'STORAGE' section is expanded to show 'Pools'. The main content area displays a table with the following data:

	!	Name	↑	Size (TB)	Free (TB)	Used (%)	Subscription (%)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pool_1		2.7	2.7	<input type="text"/>	0

Figure 14 Storage pool created

## 7.2 Add ESXi hosts

1. In the Unisphere left pane under **ACCESS**, select **VMware**.
2. On the **vCenters** tab, click the **+** icon to open the **Add vCenter** dialog box.
3. Enter the **Network Name or Address** of the vCenter server. Enter the vCenter **User Name** and **Password** and click **Find**.
4. A list of discovered ESXi hosts is displayed. Select the applicable hosts and click **Next**.
5. A VMware API for Storage Awareness (**VASA**) **Provider** is not used in this example. Click **Next**.
6. On the **Summary** page, review the ESXi Hosts to be added. Click **Finish**.
7. When the **Overall status** shows **100% Completed**, click **Close**.
8. The vCenter server is displayed as shown in Figure 15.

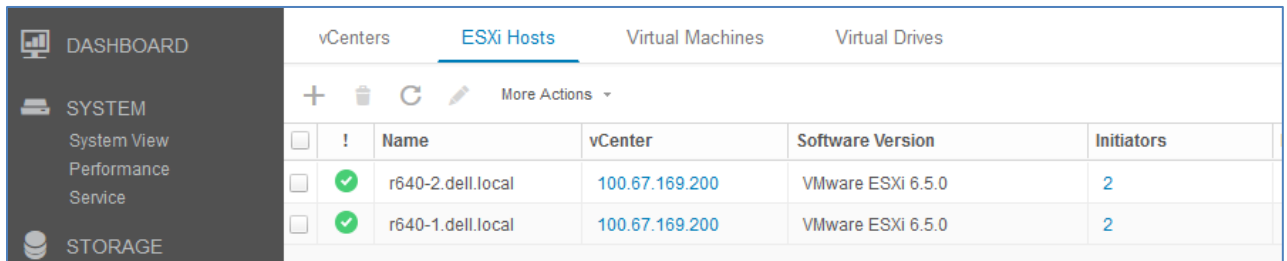


The screenshot shows the Unisphere interface with the 'vCenters' tab selected. The left sidebar contains 'DASHBOARD', 'SYSTEM' (System View, Performance, Service), and 'STORAGE' (Pools, Block, File, VMware). The main area displays a table with one row for a discovered vCenter server.

		Name	Software Version	VASA Provider Registered
<input type="checkbox"/>	!	100.67.169.200	VMware vCenter Server 6.5.0	Not Registered

Figure 15 vCenter server added to Unisphere

9. The list of added ESXi hosts is displayed on the **ESXi Hosts** tab, as shown in Figure 16.



The screenshot shows the Unisphere interface with the 'ESXi Hosts' tab selected. The left sidebar is the same as in Figure 15. The main area displays a table with two rows for discovered ESXi hosts.

		Name	vCenter	Software Version	Initiators
<input type="checkbox"/>	!	r640-2.dell.local	100.67.169.200	VMware ESXi 6.5.0	2
<input type="checkbox"/>	✓	r640-1.dell.local	100.67.169.200	VMware ESXi 6.5.0	2

Figure 16 ESXi Hosts added to Unisphere

**Note:** Additional hosts may be added as needed on the **ESXi Hosts** tab. Click the **+** icon, enter the credentials for the vCenter Server or ESXi host, and follow the prompts.

## 7.3 Create LUNs and configure host access

1. In the Unisphere left pane under **STORAGE**, select **Block**.
2. On the **LUNs** tab, click the **+** icon to open the **Create LUNs** dialog box.
3. On the **Configure LUN(s)** page, select the **Number of LUNs**. Provide a **Name** and select the **Storage Pool**. Modify the **Size** as required and click **Next**.
4. On the **Access** page, click the **+** icon and select host(s) to be granted access to the LUN. Click **OK > Next**.


5. On the **Snapshot** page, leave settings at their defaults and click **Next**.
6. On the **Replication** page, leave settings at their defaults and click **Next**.
7. On the **Summary** page, review the details and click **Finish** to create the LUN.
8. On the **Results** page, click **Close** when **Overall status** shows **100% Completed**.

The newly created LUN is now visible on the **LUNs** tab as shown in Figure 17. In this example, a LUN named FC-80GB that is 80GB in size has been created.

		LUNs		Consistency Groups		iSCSI Interfaces	
				More Actions ▾		1 item	
<input type="checkbox"/>	!	Name ↓	Size (GB)	Allocated (%)	Pool	Thin Clone Base	
<input type="checkbox"/>	✓	FC-80GB	80.0	<input type="text"/>	Pool_1	-	

Figure 17 LUN Created


Create additional LUNs and grant access (map) to hosts as needed.

**Note:** To modify host access at any time, check the box next to the LUN to select it. Click the  icon, and select the **Host Access** tab.

## 8 Configure storage on ESXi hosts

In this section, the example LUN created on the storage array is used to create a datastore on an ESXi host. The datastore is used to create a virtual disk on a virtual machine (VM) residing on the ESXi host. This process may be repeated as needed for additional LUNs, hosts, and VMs.

### 8.1 Rescan storage

1. In the vSphere Web Client, go to **Home > Hosts and Clusters**.
2. In the **Navigator** pane, select an ESXi host with LUN access configured on the FC storage array.
3. In the center pane, select **Configure > Storage Adapters**.
4. Select host's first FC adapter, vmhba4 in this example, and click the  icon to rescan storage.
5. The LUN on the storage array mapped to this host appears under **Adapter Details** on the **Devices** tab as shown in Figure 18.

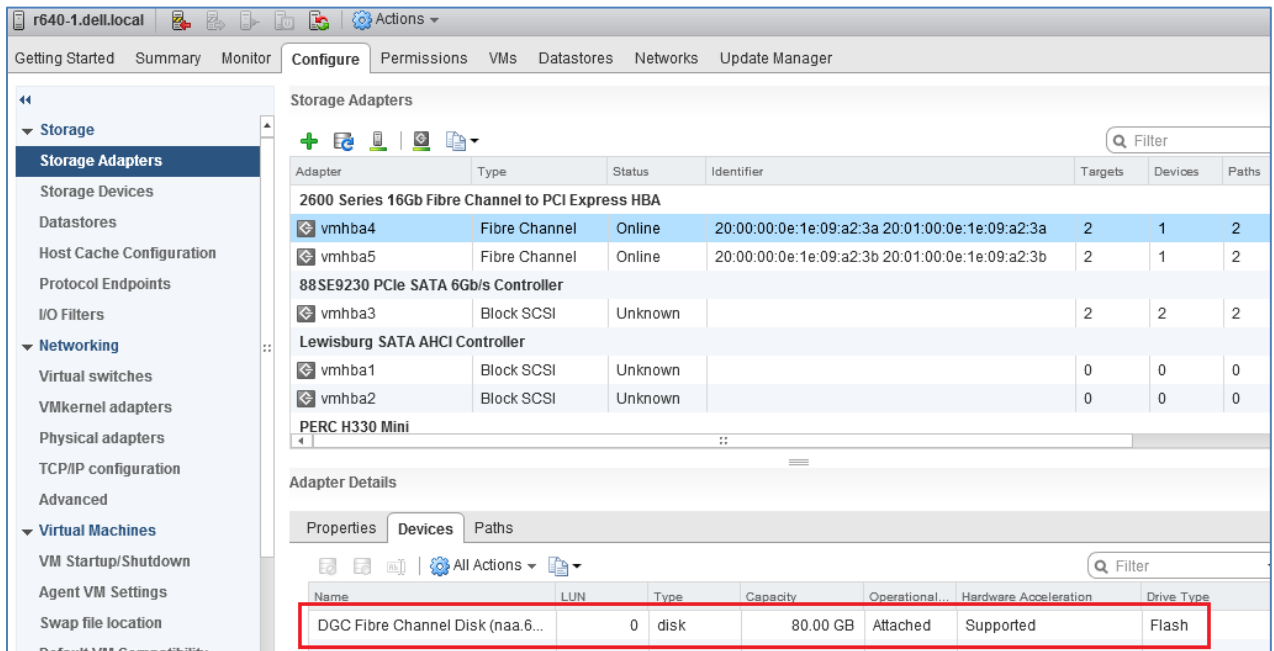


Figure 18 LUN visible to ESXi host

6. Repeat for host's second adapter, vmhba5 in this example. The LUN information on the **Adapter Details > Devices** tab is identical to the first adapter.
7. Select the first storage adapter, e.g., vmhba4, then select the **Adapter Details > Paths** tab as shown in Figure 19. The target, LUN number (e.g., LUN 0) and path status are shown. The target field includes the two active storage WWPNs connected to vmhba4. The status field is marked either **Active** or **Active (I/O)** for each path.

Adapter Details			
Properties   Devices <b>Paths</b>			
Enable		Disable	
Runtime Name	Target	LUN	Status
vmhba4:C0:T0:L0	50:06:01:60:c7:e0:1b:19 50:06:01:6e:47:e0:1b:19	0	◆ Active (I/O)
vmhba4:C0:T1:L0	50:06:01:60:c7:e0:1b:19 50:06:01:66:47:e0:1b:19	0	◆ Active

Figure 19 Adapter Details - Paths tab

The **Paths** tab includes similar information for the host's second storage adapter.

## 8.2 Create a datastore

In this section, a datastore that uses the Unity LUN is created on the ESXi host.

To create the datastore:

1. In the vSphere Web Client, go to **Home > Hosts and Clusters**.
2. In the **Navigator** pane, right-click on the ESXi host and select **Storage > New Datastore**.
3. In the **New Datastore** window, leave the **Type** set to **VMFS** and click **Next**.
4. The **Name and device selection** page appears as shown in Figure 20. In this example, the 80GB LUN mapped to this host appears in the list of devices.

New Datastore

1 Type

2 **Name and device selection**

3 VMFS version

4 Partition configuration

5 Ready to complete

**Name and device selection**  
Select a name and a disk/LUN for provisioning the datastore.

Datastore name:

Filter

Name	LUN	Capacity	Hardware Accel...	Drive Type	Sector format
Local ATA Disk (t10.ATA_____DELLBOSS_VD_____...)	0	111.73 GB	Not supported	HDD	512e
DGC Fibre Channel Over Ethernet Disk (naa.60060...)	0	80.00 GB	Supported	Flash	512n

Figure 20 Name and device selection page

5. Provide a **Datastore name**, e.g., **Unity 80GB LUN**, select the LUN in the list, and click **Next**.
6. Select the **VMFS version**. For this guide, it is left at its default setting, **VMFS 5**. Click **Next**.
7. Leave the **Partition configuration** at its default settings and click **Next > Finish** to create the datastore.

The datastore is now accessible by selecting the host in the **Navigator** pane. Select the **Configure** tab > **Storage > Datastores** as shown in Figure 21.

Name	Status	Type	Datastore Cluster	Capacity	Free
host1localdatastore	Normal	VMFS 6		104.25 GB	84.85 GB
Unity 80GB LUN	Normal	VMFS 5		79.75 GB	78.8 GB

Figure 21 Datastore configured


The datastore is also accessible by going to **Home > Storage**. It is listed under the **Datacenter** object in the **Navigator** pane.

## 8.3 Create a virtual disk

**Note:** Virtual machine guest operating system deployment steps are not included in this document. For instructions, see the [VMware vSphere 6.5 Documentation](#). Guest operating systems can be any supported by ESXi 6.5. VMs should be deployed before proceeding with this section.

In this example, the ESXi host with the datastore configured in the previous section contains a VM named **VM1** that is running a Windows Server guest OS.

To create a virtual disk on VM1 using the datastore:

1. Go to **Home > Hosts and Clusters**.
2. In the **Navigator** pane, right click on **VM1** and select **Edit Settings**.
3. Next to **New Device**, select **New Hard Disk** and click **Add**.
4. Click the  icon next to **New Hard Disk** to view the configuration options.
5. Next to **Location**, select **Browse**. Select the previously configured datastore, e.g., Unity 80GB LUN, and click **OK**. The screen looks similar to Figure 22.

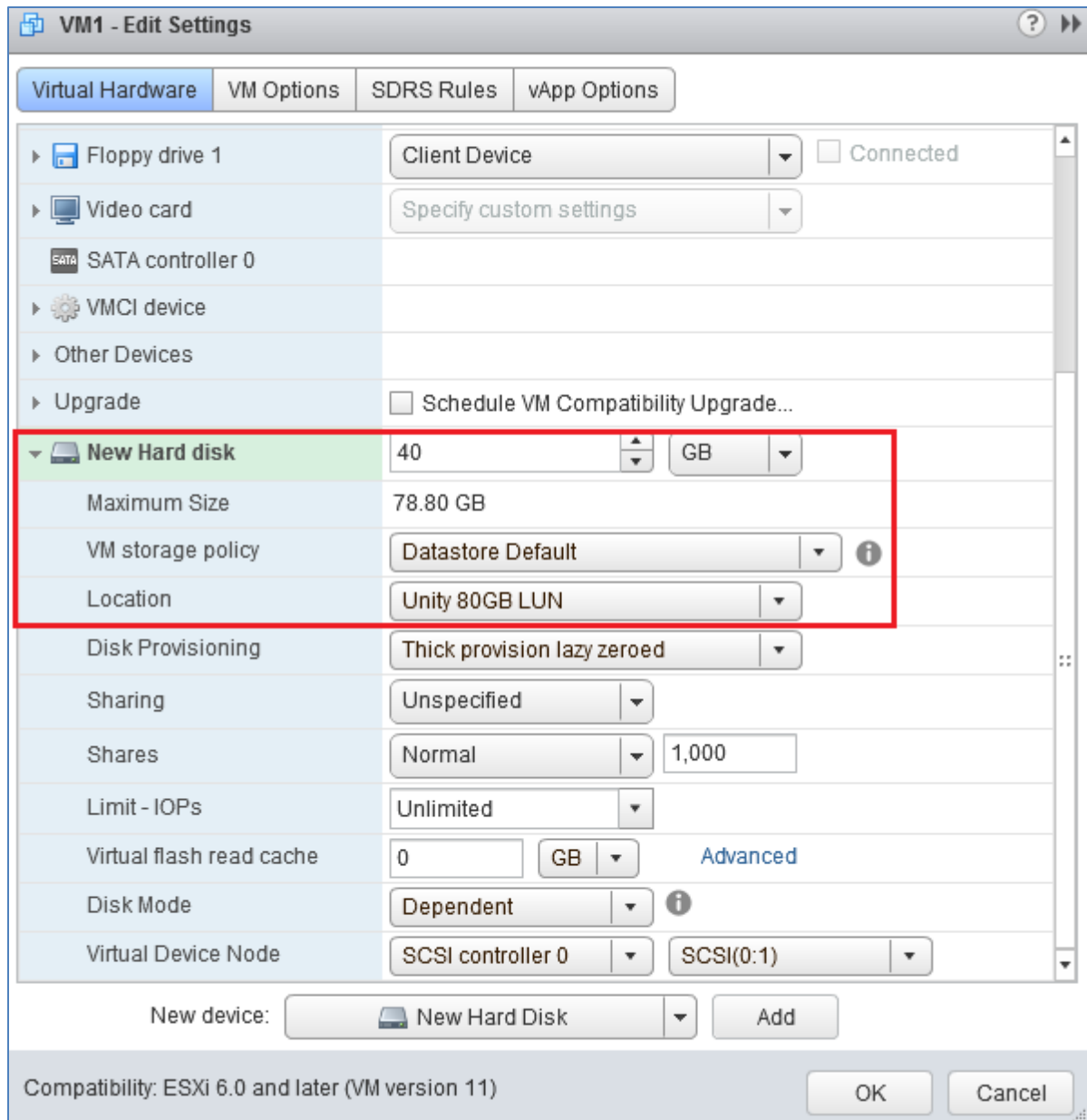


Figure 22 New hard disk configuration options

6. Next to **New Hard disk**, set the size in GB less than or equal to the **Maximum size** shown on the line below. The size is set to **40 GB** in this example.
7. Click **OK** to close the **Edit Settings** window and create the virtual disk.

## 8.4 Configure the virtual disk

**Note:** The following example is applicable for VMs running Windows Server 2008, 2012, or 2016. See the operating system documentation to configure virtual disks on other supported guest operating systems.

1. Power on the VM and log in to the Windows Server guest OS.
2. In Windows, go to **Server Manager > Tools > Computer Management > Storage > Disk Management**.

**Note:** If an **Initialize Disk** window appears, select **OK** to initialize now, or **Cancel** to initialize in step 5.

3. If the new disk is not present in the list, right click on **Disk Management** and select **Rescan Disks**.
4. The new hard disk appears in the list (**Disk 1** in Figure 23).

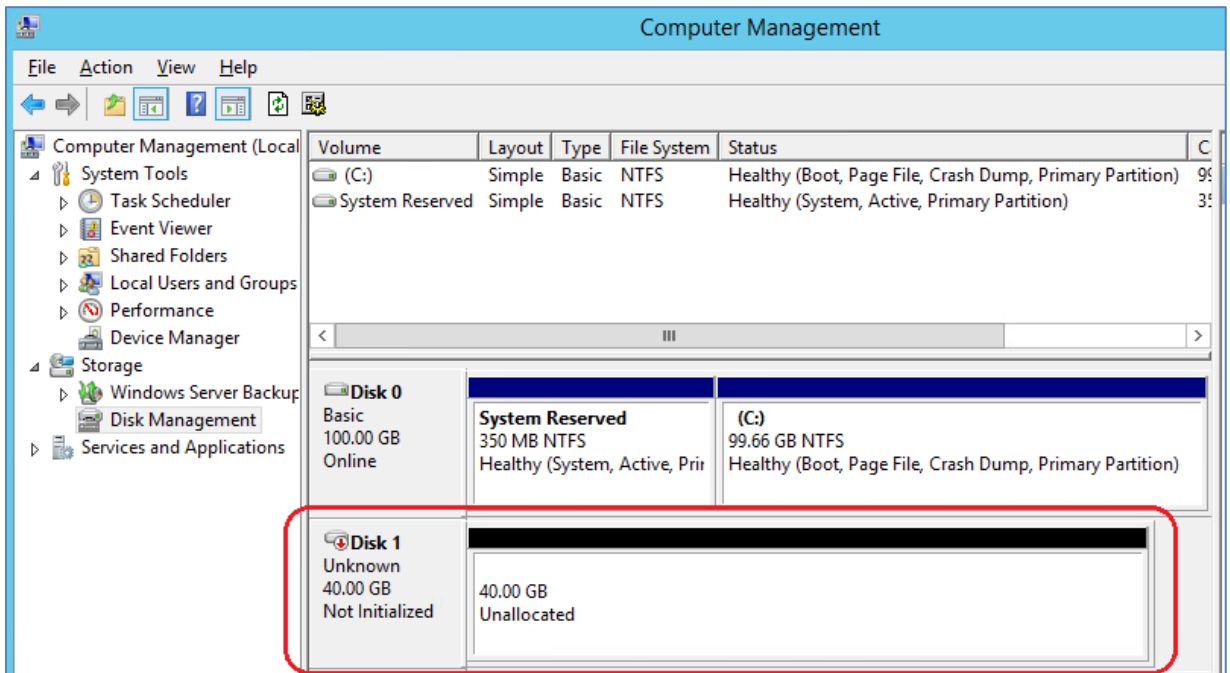


Figure 23 Windows Server Disk Management utility

5. If the disk is not initialized or online, right-click in the box containing the **Disk #**, e.g., **Disk 1** and use the menu options to bring the disk online and initialize it.
6. Continue using the Disk Management application to format the disk.



## A Validated components

The following tables include the hardware, software, and firmware used to configure and validate the examples in this guide.

### A.1 Switches

Table 3 Switches and OS versions

Qty	Item	OS Version
2	Dell EMC Networking S4148U-ON leaf switches	10.4.0E(R3P2)
1	Dell EMC Networking S3048-ON management switch	10.4.0E(R3P2)

### A.2 PowerEdge R640 servers

Table 4 R640 server components

Qty per server	Item	Firmware version
1	Intel Xeon Gold 6126 CPU @ 2.60GHz, 12 cores	-
6	8GB DDR4 DIMMs (48GB total)	-
1	120GB SATA SSD	-
1	PERC H330 Mini Storage Controller	25.5.3.0005
1	QLogic QLE2662 2x16Gb FC HBA (Low Profile)	14.04.09
1	QLogic 57800 rNDC - 2x10GbE SFP+ ports plus 2x1GbE BASE-T ports	14.02.12
-	BIOS	1.3.7
-	iDRAC with Lifecycle Controller	3.00.00.00

### A.3 Storage

Table 5 Storage firmware version

Qty	Item	Firmware Version
1	Unity 500F	4.3.0.1522077968

## A.4 VMware software

The following table lists the VMware software components used to validate the examples in this guide.

Table 6 VMware software versions

Item	Version
VMware ESXi	6.5 U1 - Dell EMC customized image version A10, build 7967591
VMware vCenter Server Appliance	6.5 Update 1d – build 7312210 (Includes vSphere Web Client)

## A.5 VMware licenses

The vCenter Server is licensed by instance. Other VMware product licenses are allocated based on the number of CPU sockets populated in the participating hosts.

Required licenses for the topology built in this guide are as follows:

- VMware vSphere 6 Enterprise Plus – 2 CPUs
- vCenter 6 Server Standard – 1 instance

## B Technical support and resources

[Dell TechCenter](#) is an online technical community where IT professionals have access to numerous resources for Dell EMC software, hardware, and services.

### B.1 Dell EMC product manuals and technical guides

[Manuals and documentation for Dell EMC Networking S3048-ON](#)

[Manuals and documentation for Dell EMC Networking S4148U-ON](#)

[Manuals and documentation for Dell EMC PowerEdge R640](#)

[OS10 Enterprise Edition User Guide Release 10.4.0E\(R3\)](#)

[Dell EMC Unity Technical Documentation](#)

[Dell EMC TechCenter Networking Guides](#)

[Dell EMC Networking Layer 3 Leaf-Spine Deployment and Best Practices with OS10EE](#)

### B.2 VMware product manuals and technical guides

[VMware vSphere Documentation](#)

[vSphere Installation and Setup](#) – This document includes ESXi 6.5 and vCenter Server 6.5.

[VMware Compatibility Guide](#)

## C Support and feedback

### Contacting Technical Support

Support Contact Information

Web: <http://www.dell.com/support>

Telephone: USA: 1-800-945-3355

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