

HP P63x0/P65x0 Enterprise Virtual Array Installation Guide

Abstract

This guide provides instructions to set up, install, and configure HP P63x0/65x0 EVAs. It is intended for HP P63x0 EVA self-install customers or HP-authorized P65x0 service providers.



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Acknowledgements

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NOTE: IPv6 is supported on server-based management HP P6000 Command View beginning with 8.0.2. IPv6 is supported on array-based management HP P6000 Command View beginning with version 9.2.

USGv6 is supported on array-based management HP P6000 Command View beginning with version 10.1. Internet Protocol Security (IPsec) is not supported with HP P6000 Command View array-based management.

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1 Reviewing and confirming your plans

Overview

Before installing the P63x0/P65x0 EVA, HP recommends that you:

- Develop an installation and configuration plan for your Fibre Channel FC-SAN and/or Ethernet IP-SAN environments.
- Review all videos and documentation.

NOTE: If also upgrading from P6300/P6500 to P6350/P6550, respectively, see the *HP P6000 EVA Upgrade Instructions — P6300 to P6350 or P6500 to P6550*.

- Determine if the FC host ports will be fabric-attached (N port connected to a Fibre Channel switch) or direct-attached (NL port connected to a Fibre Channel adapter in a server or to a bridge). The P63x0/P65x0 EVAs are factory configured for fabric-attached. To change to direct-attached mode, see [“Connecting to the management module” \(page 56\)](#).
- Determine if the IP SAN will be lossy or lossless and if iSCSI and/or FCoE are being supported.

Prerequisites

Prerequisites for using this product include:

- A Fibre Channel switch installed in your environment for fabric-attached configurations
- An equipment cabinet suitable for 2U sized enclosures
- A 1 GbE or 10 GbE Ethernet switch, if you configure the P63x0/P65x0 EVA 1 GbE iSCSI modules (or iSCSI modules) or the 10 GbE iSCSI/FCoE modules (or iSCSI/FCoE modules) as iSCSI targets
- A converged network switch, if you configure the P63x0/P65x0 EVA 10 GbE iSCSI/FCoE modules as iSCSI/FCoE targets, and separately configured iSCSI and FCoE VLANs
- Version 3.2.2.11 firmware must be on the HP StorageWorks MEZ50/MEZ75 module (HP P6000 iSCSI Controller model)
- One of the following is required for P63x0/P65x0 EVA management:
 - A management server running Microsoft Windows Server for HP P6000 Command View software (server-based management); the management server must have either an FC HBA, a 1 GbE iSCSI initiator, a 10 GbE iSCSI initiator, or a converged network adapter
 - A management module running HP P6000 Command View software (array-based management)

For specific hardware and software support matrix, see *HP P6000 Enterprise Virtual Array Compatibility Reference*.

- A CD/DVD drive attached to either the management server or the server attached to the management module
- Cat5e or Cat6 cabling to the 1 GbE iSCSI module data ports
- For connections to the controller 10 GbE iSCSI/FCoE module data ports, HP recommends either one of the following:
 - 10 GbE SFP+ optical transceivers with optical Fibre Channel cables (PremierFlex or OM3 cables) when connecting outside of the cabinet.
 - 10 GbE SFP+ copper cabling when connecting inside of the cabinet.

See the *P6000 QuickSpecs* for SFP transceiver and cable part numbers.

Plan your storage configuration

Proper planning of the system storage and its subsequent performance is critical to a successful deployment of the EVA. Improper planning or implementation can result in wasted storage space, degraded performance, or inability to expand the system to meet growing storage needs. Planning considerations include:

- System and performance expectations
- Striping methods
- RAID levels
- Disk drive sizes and types
- Spare drives
- Array sizing (capacity)
- Number of Fibre-Channel-presented virtual LUNs
- Number of iSCSI and FCoE initiators
 - iSCSI module: Maximum of 256 initiators or logins
 - iSCSI/FCoE module: Maximum of 1,024 initiators or logins
- Number of virtual LUNs to be presented to the iSCSI and FCoE initiators
 - iSCSI module: Maximum of 255 LUNs (plus LUN 0); 1,020 iSCSI LUNs (plus LUN 0 from each virtual port group) supported by Mezz50-3.2.2.11 and Mezz75-3.2.2.11 firmware and later revisions.
 - iSCSI/FCoE module: Maximum of 1020 combined iSCSI and FCoE LUNs (plus LUN 0 from each virtual port group)

NOTE: FCoE requires a converged network switch which implements data center bridging (DCB) standards for lossless Ethernet.

Building a high-performance, highly available IP storage network (IP-SAN) can be done several ways. In general, consider enterprise-class switch infrastructure (described in [“Minimum recommended switch capabilities for a P63x0/P65x0 EVA-based IP-SAN” \(page 7\)](#)) to minimize packet discard, packet loss, and unpredictable performance. For the 10 GbE IP-SAN, consider implementing it on a lossless Ethernet network, utilizing DCB switches. Within a 10 GbE based data center, consider implementing the FCoE protocol.

There is no downgrade and both Mezz50/Mezz75 controllers must be at the same firmware version.

General IP-SAN recommendations

- For Microsoft Windows Server environments, implement MPIO and HP DSM for NIC fault-tolerance and superior performance.
- For other operating systems, where supported, implement NIC bonding in the host software for NIC fault-tolerance and performance.
- Implement a separate subnet or VLAN for the IP storage network for dedicated bandwidth.
- Implement separate FCoE and iSCSI VLANs.
- Implement a fault-tolerant switch environment as a separate VLAN through a core switch infrastructure or multiple redundant switches.
- Set the individual 1 and 10 gigabit ports connected to the storage nodes and servers at auto negotiate full-duplex at both the switch and host/node port level.

- Implement switches with full-duplex non-blocking mesh backplanes with sufficient port buffer cache (at least 512 KB per port).
- Implement flow control on the storage network switch infrastructure. Flow control can dramatically impact performance in a 10 GbE environment. This is especially true in mixed 1 GbE and 10 GbE environments. When a network port becomes saturated, excess frames may be dropped because the port cannot physically handle the amount of traffic received. This causes the packets to be resent, and the overhead of resending the packets can decrease performance.

For example, if a 10 GbE link sends data at 10 Gb/s to a single 1 GbE link, flow control eliminates any problems by controlling the speed at which data is sent to the port. Best practices dictate that flow control always be enabled and it must be enabled on both the switches and the NICs/iSCSI initiators to function properly. If it is not enabled everywhere, the network defaults to the lowest common denominator, which is flow control disabled.

- (Optional) Implement jumbo frames support on the switch, the 1 GbE iSCSI modules, and the 10 GbE iSCSI/FCoE modules when iSCSI is configured, and all servers connected to the IP-SAN. Consider using 4K jumbo frames instead of 9K jumbo frames for better streaming performance. Jumbo frames cannot be configured and are not supported by the iSCSI and iSCSI/FCoE module's Ethernet management port, a normal 1500 byte MTU is the default setting.

NOTE: FCoE requires jumbo frames and is the default configuration of a converged network adapter, converged network switch, and the 10 GbE iSCSI/FCoE modules when FCoE is configured.

Recommended switch infrastructure for an IP-SAN

HP does not recommend a particular IP switch. However, there are minimum switch capabilities that make building a high-performance, fault-tolerant storage network a relatively easy and cost effective task. As a general rule, any enterprise-class managed switch typically has the capabilities most IP-SAN customers require. [Table 1 \(page 7\)](#) summarizes the minimum recommended switch capabilities for a P6000-based IP-SAN.

For FCoE, HP recommends converged network switches. For more information about these switches, go to:

<http://h18006.www1.hp.com/storage/networking/index.html>

These switches are also referenced in the *HP SAN Design Reference Guide*, which is also available through this website.

Table 1 Minimum recommended switch capabilities for a P63x0/P65x0 EVA-based IP-SAN

Switch capability	Description
1 and 10 gigabit Ethernet support	The iSCSI module option of the P6000 comes equipped with eight copper gigabit Ethernet ports (802.3ab). To take advantage of full duplex gigabit capabilities, the cabling infrastructure must be Cat5e or Cat6 cabling. The iSCSI/FCoE module option of the P6000 comes equipped with four SFP+ 10 gigabit ports, and you configure either SFP+ optical or SFP+ copper connectivity. Server connections and switch interconnects can be done with SFP+ fiber and SFP+ copper cabling, in addition to Cat5e or Cat6 cabling, depending on IP switch capabilities.
Fully subscribed non-blocking backplanes	In order to achieve maximum performance on the IP-SAN it is important to select a switch that has a fully subscribed backplane. This means that the backplane is capable of supporting all ports at full-duplex mode. For instance, if the switch has 24 gigabit ports, it will have to have a 48 gigabit backplane to support full duplex gigabit communications.
Adequate per port buffer cache	For optimal switch performance, HP recommends that the switch have at least 512 KB of buffer cache per port. Consult your switch manufacturer specifications for the total buffer cache. For example, if the switch has 48 gigabit ports, this recommendation is to have at least 24 MB of buffer cache dedicated to those ports. If the switch aggregates

Table 1 Minimum recommended switch capabilities for a P63x0/P65x0 EVA-based IP-SAN
(continued)

Switch capability	Description
	cache among a group of ports (for example, 1 MB of cache per 8 ports), space your used ports appropriately to avoid cache oversubscription.
Flow control support	<p>IP storage networks are unique in the amount of sustained bandwidth that is required to maintain adequate performance levels under heavy workloads. Gigabit Ethernet flow control (802.3x) technology should be enabled on the switch to eliminate receive and/or transmit buffer cache pressure.</p> <p>NOTE: Some switch manufacturers do not recommend configuring flow control when using jumbo frames, or jumbo frames with flow control. Consult the switch manufacturer documentation for guidance on this issue. HP recommends implementing flow control over jumbo frames for optimal performance. Flow control is required when using the HP DSM and MPIO.</p>
Individual port speed and duplex setting	All ports on the switch, servers, and storage nodes should be configured to auto-negotiate duplex and speed settings. Although most switches and NICs will auto negotiate the optimal performance setting, if a single port on the IP storage network negotiates a sub-optimal (100 megabit or less and/or half-duplex) setting, the entire SAN performance can be impacted negatively. Check each switch and NIC port to make sure the auto-negotiation is resolved to be 1000 Mb/s or 10 Gb/s with full-duplex.
Link aggregation/trunking support	Link aggregation and/or trunking support is important to enable when building a high performance fault-tolerant IP storage network. HP recommends implementing link aggregation and/or trunking technology when doing switch-to-switch trunking, server NIC load balancing, and server NIC link aggregation (802.3ad).
VLAN support	Implementing a separate subnet or VLAN for the IP storage network is a best IP-SAN practice. If implementing VLAN technology within the switch infrastructure, you typically need to enable VLAN tagging (802.1q) and/or VLAN trunking (802.1q or InterSwitch Link [ISL] from Cisco). Consult your switch manufacturer configuration guidelines when enabling VLAN support.
Spanning tree/rapid spanning tree	<p>In order to build a fault-tolerant IP storage network, multiple switches are typically connected into a single Layer 2 (OSI Model) broadcast domain using multiple interconnects. In order to avoid Layer 2 loops, the Spanning Tree protocol (802.1D) or Rapid Spanning Tree protocol (802.1w) must be implemented in the switch infrastructure. Failing to do so can cause numerous issues on the IP storage networks, including performance degradation or even traffic storms. HP recommends implementing rapid spanning tree if the switch infrastructure supports it for faster spanning tree convergence. If the switch is capable, consider disabling spanning tree on the server switch ports so that they do not participate in the spanning tree convergence protocol timings.</p> <p>NOTE: FCoE should be configured with spanning-tree disabled at the first level server edge switch.</p>
Jumbo frame support	<p>Sequential read and write, or streaming workloads, can benefit from a larger maximum frame size than 1514 bytes. The iSCSI and iSCSI/FCoE modules are capable of frame sizes up to 9 Kbytes. Better performance is realized when the NICs and iSCSI initiators are configured for 4 Kbyte (maximum frame size of 4088 bytes) jumbo frames. Jumbo frames must be enabled on the switch, the iSCSI and iSCSI/FCoE modules, and all servers connected to the IP-SAN. Typically, jumbo frames are enabled globally on the switch or per VLAN and on a per port basis on the server.</p> <p>NOTE: Some switch manufacturers do not recommend configuring jumbo frames when using flow control, or flow control with jumbo frames. Consult the switch manufacturer documentation for guidance on this issue. HP recommends implementing flow control over jumbo frames for optimal performance.</p>

Key configuration notes:

- Switch infrastructure: Use dual redundant 1 or 10 gigabit switches trunked together for bandwidth and fault-tolerance.
- iSCSI and iSCSI/FCoE module connectivity: Ensure at least one port from each module is connected to each switch.
- Host server connectivity: Use dual NICs connected to the IP storage network with a single port connected to each switch. For Windows 2003, 2008, 2012 use HP DSM for MPIO for multiple NIC support.

Network latency

High network latency can be the primary cause of slow I/O performance or iSCSI drive disconnects. It is important to keep network latency (for example, ping response time measurement) on the IP-SAN subnet below two milliseconds. Many factors can contribute to increasing network latency; the most common being congestion, distance, and router hops. Configuring the IP-SAN on a single IP subnet with Layer-2 switching can help lower network latency.

Network bandwidth

Network bandwidth required for an IP-SAN depends on the server applications, maintenance utilities, and backup/recovery processes. Most I/O intensive applications, like Microsoft Exchange and SQL Server, do not consume much network bandwidth but are more sensitive to network latency issues. Bandwidth becomes more important during maintenance operations, like backup/recovery. Any sequential read/write stream could consume significant bandwidth.

NOTE: Storage data transfer rates are typically measured in bytes, while network data transfer rates are measured in bits. A 1 Gb/sec network connection can transfer a maximum of 120–130 MB/sec. Microsoft Windows provides performance monitor counters that can help determine the data-path bandwidth requirements. Disk bytes/sec is the rate bytes are transferred to or from the disk during write or read operations.

The P63x0/P65x0 EVA is available as a single protocol (FC) or as a multi-protocol (FC/iSCSI or FC/iSCSI/FCoE) array. The iSCSI protocol transport is supported at 1 GbE and 10 GbE rates through the 1 GbE iSCSI modules or 10 GbE iSCSI/FCoE modules. [Figure 1 \(page 10\)](#) illustrates the normal multi-protocol data and management connectivity. HP P6000 Command View requires Ethernet access to the 1 GbE iSCSI modules and can also use array-based management with the management module or in-band host-based management with the FC, iSCSI, or FCoE connectivity.

Figure 1 P63x0/P65x0 multi-protocol management and data connectivity example

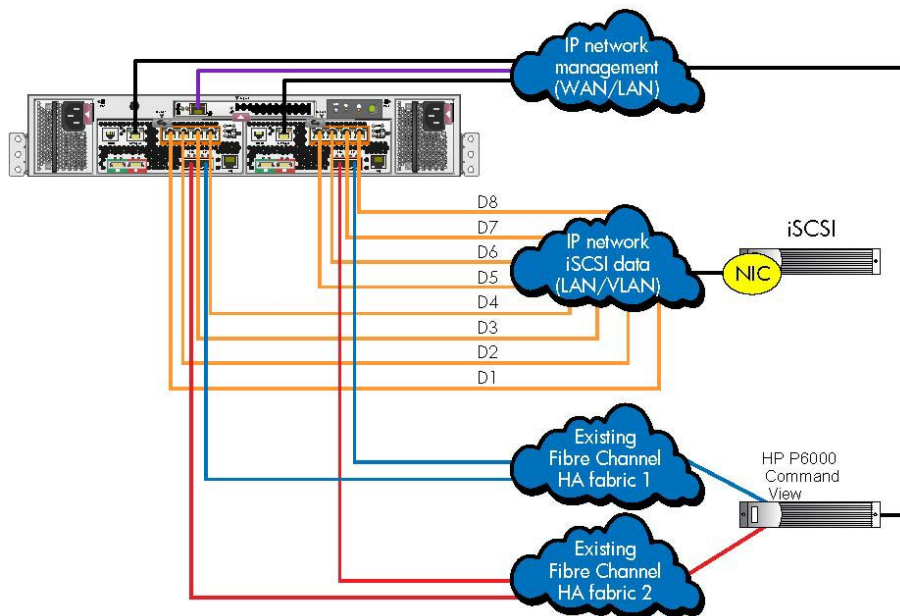


Figure 2 (page 11) illustrates HP P6000 Command View management of the P63x0/P65x0 through the iSCSI connectivity and the 1 GbE iSCSI modules through IP connectivity. When LUN 0 from each controller is presented through the iSCSI or FCoE connectivity, HP P6000 Command View can manage the P63x0/P65x0 EVA controllers.

Figure 2 (page 11) and Figure 3 (page 11) illustrate servers running HP P6000 Command View with iSCSI and FCoE connectivity in support of P6000 management. These configurations are supported based on the auto-presentation of the P6000 controller's LUN 0 to the iSCSI or FCoE initiators. The iSCSI connectivity requires that the initiator discover the P6000 LUN 0 targets and that the initiator log in to the targets before HP P6000 Command View discovery.

Starting from an uninitialized P6000 system with iSCSI or iSCSI/FCoE controllers, follow these steps to enable use of HP P6000 Command View management:

1. Configure the iSCSI or iSCSI/FCoE management and data port IP addresses using the CLI.
2. Verify that the iSCSI or iSCSI/FCoE management and data port cables are installed.
3. From the HP P6000 Command View server, select the iSCSI Initiator Properties Discovery tab and Discover or ADD Target portal tab and enter at least one iSCSI target portal IP address for each iSCSI module.
4. Select the iSCSI Initiator Properties Targets tab and log in at least once to each iSCSI target.



TIP: Additional target port discovery and logins can provide redundant connectivity.

5. Run HP P6000 Command View, discover the Storage System, and select the system to be managed by this instance of HP P6000 Command View.
6. Initialize the storage system and then navigate to the **Hardware > iSCSI Devices** on the navigation pane and click **Discover iSCSI Devices** from the right pane.

With a CNA and FCOE initiator-connected HP P6000 Command View server connected to the iSCSI/FCoE modules, ensure that the initiator and FCoE target portals and target ports are in a

common management zone. This zone should contain at least 6 of the possible 36 target WWNs, the target portal and two storage target ports for each iSCSI/FCoE module, for example:

	iSCSI/FCoE module 1	iSCSI/FCoE module 2
FCoE Target portals:	2100:f4ce:46fb:1a94	2100:f4ce:46fb:297c
FCoE target Storage:	2104:f4ce:46fb:1a94	2104:f4ce:46fb:297c
FCoE target Storage:	2105:f4ce:46fb:1a94	2105:f4ce:46fb:297c

With management zoning enabled, HP P6000 Command View will discover the P6000 system to be managed. Once this connectivity is established, HP P6000 Command View can be used to manage the P6000 system. Proceed to initialize the storage system and then navigate to the **Hardware > iSCSI Devices** tab and **Discover iSCSI Devices**.

Figure 2 P63x0/P65x0 iSCSI and Ethernet management and data connectivity example

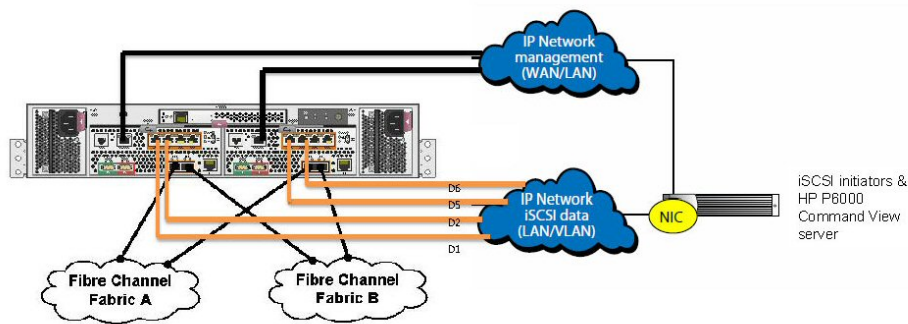
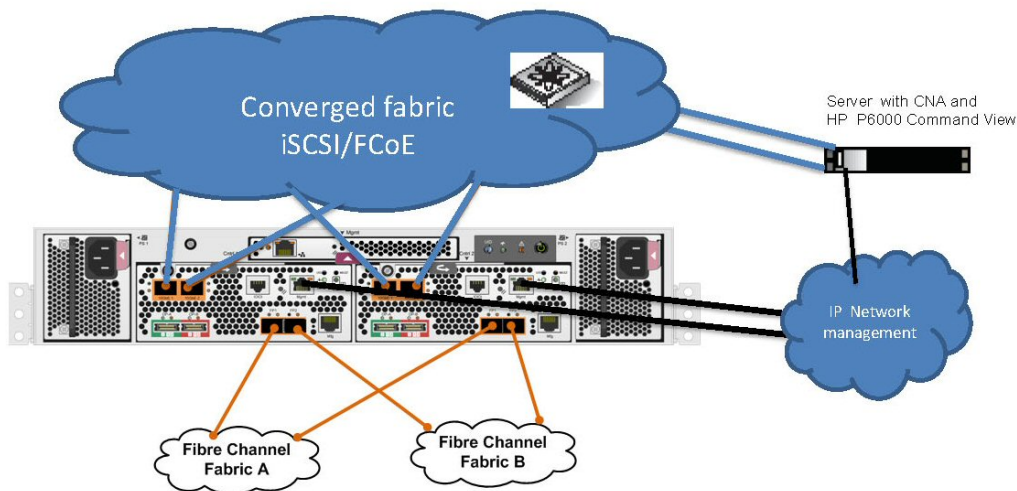


Figure 3 (page 11) illustrates a simplified multi-protocol data and management configuration.

Figure 3 P63x0/P65x0 FCoE management and data connectivity example



NOTE: For the minimum supported configuration and other configuration information, see the QuickSpecs at:

http://h18006.www1.hp.com/storage/disk_storage/eva_diskarrays/index.html

Total number of iSCSI and iSCSI/FCoE initiators

For one P63x0/P65x0 EVA controller, and assuming a redundant configuration, HP P6000 Command View supports 256 initiators and 255 LUNs, plus LUN 0. On the iSCSI/FCoE modules, HP P6000 Command View supports 1024 initiators, 1024 LUNs, and 256 LUNs per virtual port group (VPG).

HP P6000 Command View supports configuring the iSCSI and iSCSI/FCoE modules for redundant operation. Although each module can be configured separately, an expert level of knowledge is required to manage the two LUN presentation levels and to use the CLI of the iSCSI and iSCSI/FCoE modules. HP does not recommend separate module configurations.

When configuring the iSCSI initiators, create path logins to the .1 and .2 iSCSI target IQNs to ensure redundant iSCSI controller path connectivity. For a simplified network configuration, [Figure 4 \(page 12\)](#) illustrates four target paths being displayed for login for the iSCSI module pair. [Figure 5 \(page 13\)](#) shows sixteen target paths (four x four VPGs) being displayed for login for the iSCSI/FCoE module pair.

Figure 4 iSCSI initiator view of the P63x0/P65x0 1 GbE iSCSI module's target paths

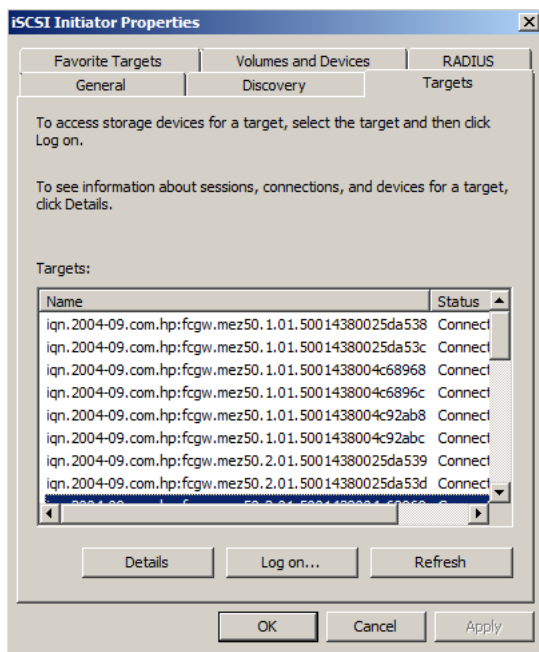
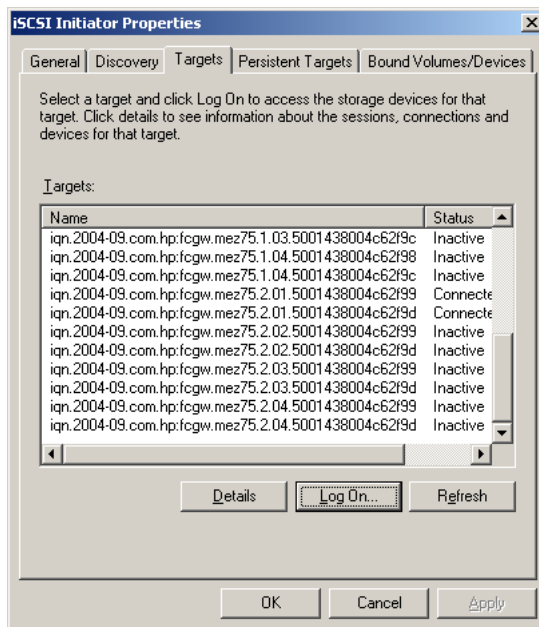


Figure 5 iSCSI initiator view of P63x0/P65x0 10 GbE iSCSI/FCoE module's target paths



The FCoE initiators complete automated logins on all discovered paths, so verify that FCoE connectivity is established to both 10 GbE iSCSI/FCoE modules prior to presenting LUNs using HP P6000 Command View.

Number of paths required per initiator

After establishing the number of initiators, determine how many paths are required by each initiator. The number of connections per iSCSI controller is finite, and every initiator login constitutes a connection to the iSCSI modules or iSCSI/FCoE modules. In a multipath environment, HP recommends a minimum of one connection per module; high-performance applications may require full path connectivity to each iSCSI module.

Using Internet Storage Name Service (iSNS)

The 1 GbE iSCSI modules present two iSCSI targets (P63x0/P65x0 EVA controller 1 and controller 2), for a total of four targets to the pair of iSCSI or iSCSI/FCoE controllers. Each initiator, therefore, discovers two or four FC targets depending on the IP Ethernet configuration. The 10 GbE iSCSI/FCoE modules present one iSCSI target for each virtual port group (VPG) for a total of four. Each iSCSI initiator, therefore, discovers four times the number of FC targets. HP recommends that you use iSNS to present only the required iSCSI targets to the initiator.

Using iSCSI ports

When configuring the iSCSI module and iSCSI/FCoE module, HP recommends that you use all eight 1 GbE or all four 10 GbE ports for higher average performance and maximum initiator connectivity. When multiple initiators are configured, ensure that logins are spread across the target ports on either the iSCSI modules or iSCSI/FCoE modules.

Security

When configuring a secure IP storage network based on iSCSI, the Challenge Handshake Authentication Protocol (CHAP) is configurable on the iSCSI modules and iSCSI/FCoE modules. CHAP is a protocol used to authenticate the peer of a connection. It is based on the peer sharing a password or secret. Both single-direction (target) and mutual (bi-directional) CHAP are supported. The target iSCSI modules or iSCSI/FCoE modules can have a unique password for the one-way CHAP option. The iSCSI initiator can have a unique password for the bi-directional CHAP option with the target iSCSI modules or the iSCSI/FCoE modules.

NOTE: IPsec is not a supported protocol with iSCSI connectivity of the target iSCSI or iSCSI/FCoE modules.

To enable single direction CHAP for the discovered iSCSI initiator entry of the iSCSI or iSCSI/FCoE modules:

1. Run the `set chap` command in the iSCSI CLI to determine if the iSCSI initiator IQN is listed.

```
MEZ75 (admin) #> set chap
```

```
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
```

```
Index   iSCSI Name
-----  -
0       iqn.2004-09.com.hp:fcgw.mez75.1
1       iqn.2004-09.com.hp:fcgw.mez75.1
2       iqn.2004-09.com.hp:fcgw.mez75.1.01.5001438004c68968
3       iqn.2004-09.com.hp:fcgw.mez75.1.01.5001438004c6896c
4       iqn.2004-09.com.hp:fcgw.mez75.1.02.5001438004c68968
5       iqn.2004-09.com.hp:fcgw.mez75.1.03.5001438004c68968
6       iqn.2004-09.com.hp:fcgw.mez75.1.04.5001438004c68968
7       iqn.2004-09.com.hp:fcgw.mez75.1.02.5001438004c6896c
8       iqn.2004-09.com.hp:fcgw.mez75.1.03.5001438004c6896c
9       iqn.2004-09.com.hp:fcgw.mez75.1.04.5001438004c6896c
10      iqn.1991-05.com.microsoft.perf2.sandbox.com
```

```
Please select a iSCSI node from the list above ('q' to quit): 10
```

```
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
```

```
CHAP (0=Enable, 1=Disable)                [Disabled] 0
CHAP Secret (Max = 100 characters)        [          ] *****
```

```
All attribute values that have been changed will now be saved.
```

If the iSCSI initiator IQN is listed, enter the index number of the initiator. Then, enter 0 (zero) to enable CHAP, and enter the CHAP secret, for example, `CHAPsecret01`, as shown in the CLI example.

2. If the iSCSI initiator IQN is not listed, you can use either the CLI or HP P6000 Command View to add the iSCSI initiator IQN:

- CLI: Use the initiator add command.

```
MEZ75 (admin) #> initiator add
```

```
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
```

```
Initiator Protocol (0=iSCSI, 1=FC, 2=FCOE) [iSCSI] 0
```

```
Only valid iSCSI name characters will be accepted. Valid characters include
lower-case alphabetical (a-z), numerical (0-9), colon, hyphen, and period.
```

```
iSCSI Initiator Name (Max = 223 characters) [          ] iqn.1991-05.com.microsoft.perf2.sandbox.com
```

```
OS Type (0=Windows, 1=Linux, 2=Solaris,
          3=OpenVMS, 4=VMWare, 5=Mac OS X,
          6=Windows2008, 7=HP-UX, 8=AIX,
          9=Other) [Windows] 6
```

```
All attribute values that have been changed will now be saved.
```

- HP P6000 Command View: Add the iSCSI initiator IQN using the Add Host function (select **Hosts** in the Navigation pane, and then select **Add Host**).

To enable CHAP for the Microsoft iSCSI initiator running on the iSCSI server:

1. Click the **Discovery** tab and when manually discovering iSCSI target portals:
 - a. Click **Add** under Target Portals.
 - b. Enter the IP address of the iSCSI port of the 1 GbE iSCSI Modules or the 10GbE iSCSI/FCoE modules.
 - c. Click **Advanced**.
 - d. Select the **CHAP Login Information** check box.
 - e. Enter the CHAP secret, for example, CHAPsecret01, for the 1 GbE iSCSI modules or the 10GbE iSCSI/FCoE modules discovered iSCSI initiator in the Target Secret box, for example, CHAPsecret01.
 - f. Click **OK** and the initiator completes target discovery.
2. Click **Targets** and select the appropriate target for login.
3. Click **Log On** and then click **Advanced**.
4. Select the **CHAP Login Information** check box.
5. Enter the CHAP secret, for example, CHAPsecret01, for the discovered iSCSI initiator of the iSCSI or iSCSI/FCoE modules in the Target Secret box.
6. Click **OK** twice.

To enable bi-directional CHAP for the iSCSI initiator entries of the iSCSI or iSCSI/FCoE modules:

1. Run the `set chap` CLI command to determine if the iSCSI initiator IQN is listed.

```
MEZ75 (admin) #> set chap
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Index iSCSI Name
-----
0 iqn.2004-09.com.hp:fcgw.mez75.1
1 iqn.2004-09.com.hp:fcgw.mez75.1
2 iqn.2004-09.com.hp:fcgw.mez75.1.01.5001438004c68968
3 iqn.2004-09.com.hp:fcgw.mez75.1.01.5001438004c6896c
4 iqn.2004-09.com.hp:fcgw.mez75.1.02.5001438004c68968
5 iqn.2004-09.com.hp:fcgw.mez75.1.03.5001438004c68968
6 iqn.2004-09.com.hp:fcgw.mez75.1.04.5001438004c68968
7 iqn.2004-09.com.hp:fcgw.mez75.1.02.5001438004c6896c
8 iqn.2004-09.com.hp:fcgw.mez75.1.03.5001438004c6896c
9 iqn.2004-09.com.hp:fcgw.mez75.1.04.5001438004c6896c
10 iqn.1991-05.com.microsoft.perf2.sandbox.com
Please select a iSCSI node from the list above ('q' to quit): 10
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
CHAP (0=Enable, 1=Disable) [Disabled] 0
CHAP Secret (Max = 100 characters) [ ] *****
All attribute values that have been changed will now be saved.
```

2. Perform one of the following, depending on whether the IQN was listed.
 - a. If the iSCSI initiator IQN is listed, enter the index number of the initiator. Then, enter 0 (zero) to enable CHAP, and enter the CHAP secret, for example, CHAPsecret01, as shown in the CLI example.
 - b. If the iSCSI initiator IQN is not listed, you can use either the CLI or HP P6000 Command View to add the iSCSI initiator IQN.
 - Using the `initiator add` command with the CLI:


```
MEZ75 (admin) #> initiator add
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Initiator Protocol (0=iSCSI, 1=FC, 2=FCOE) [iSCSI] 0
Only valid iSCSI name characters will be accepted. Valid characters include
lower-case alphabetical (a-z), numerical (0-9), colon, hyphen, and period.
iSCSI Initiator Name (Max = 223 characters) [ ] iqn.1991-05.com.microsoft.perf2.sandbox.com
OS Type (0=Windows, 1=Linux, 2=Solaris,
3=OpenVMS, 4=VMWare, 5=Mac OS X,
6=Windows2008, 7=HP-UX, 8=AIX,
9=Other) [Windows] 6
All attribute values that have been changed will now be saved.
```
 - Using HP P6000 Command View: Add the initiator IQN using the Add Host function (select **Hosts** in the Navigation pane, and then select **Add Host**).
3. Enable CHAP for the iSCSI or iSCSI/FCoE port using HP P6000 Command View or the CLI.
 - If using HP P6000 Command View:
 - a. Choose the appropriate iSCSI or iSCSI/FCoE controller, select the IP Ports tab, and then select the appropriate IP port.
 - b. Under Security, select **Enabled** in CHAP Status, then enter the CHAP secret. For example: `hpstorage`
 - c. Click the **Save Changes** tab to save the changes.
 - If using the CLI to enable CHAP for the iSCSI or iSCSI/FCoE port:
 - a. Enter the `set chap` command.
 - b. Select the appropriate Portal IQN name index to which the initiator will log in.
 - c. Select **0** to enable CHAP.
 - d. Enter a CHAP secret. For example: `hpstorage`.
4. Enable CHAP for the iSCSI or iSCSI/FCoE presented target. To enable CHAP for the Discovered iSCSI Initiator entry using the CLI:
 - a. Enter the `set chap` command.
 - b. Select the presented target to which the initiator will log in.
 - c. Enable CHAP and enter a CHAP secret. For example: `hpstorage`.

5. Enable CHAP for the Microsoft iSCSI initiator running on the iSCSI server:
 - a. Click the **General** tab.
 - b. Click **Secret** in the middle of the screen.
 - c. Click **Reset**.
 - d. Enter the iSCSI or iSCSI/FCoE presented target CHAP secret. For example: hpstorage.
 - e. Click **OK**.
 - f. Click the **Discovery** tab and when manually discovering iSCSI target portals:
 - i. Click **Add** under Target Portals.
 - ii. Enter the IP address of the iSCSI port of the 1 GbE iSCSI modules or the 10GbE iSCSI/FCoE modules.
 - iii. Click **Advanced**.
 - iv. Select the **CHAP Login Information** check box.
 - v. Enter the CHAP secret for the 1 GbE iSCSI modules or the 10GbE iSCSI/FCoE modules discovered iSCSI initiator in the Target Secret box, for example, CHAPsecret01.
 - vi. Select the **Mutual Authentication** check box.
 - vii. Click **OK** twice and the initiator completes target discovery.
 - g. Click **Targets** and select the appropriate target for login.
 - h. Click **Log On** and then click **Advanced**.
 - i. Select the **CHAP Login Information** check box.
 - j. Enter the CHAP secret for the discovered iSCSI initiator of the iSCSI or iSCSI/FCoE modules in the Target Secret box, for example, CHAPsecret01.
 - k. Select the **Mutual Authentication** check box.
 - l. Click **OK** twice, and the initiator completes normal login.

System and performance expectations

To help determine the best way to configure your storage, rank the following three storage characteristics in order of importance:

- Fault tolerance (high availability)
- I/O performance
- Storage efficiency

With your priorities established, you can determine which striping method and RAID level to use.

As highlighted in the following section, some configuration methods offer greater fault tolerance, while other configuration methods offer better I/O performance or storage efficiency.

RAID levels

Vraid is the HP term for the implementation of RAID storage on EVAs. Vraid is also referred to as *redundancy* in HP management software. Virtual disks with HP Vraid use three key RAID methods: data striping, data mirroring, and parity error checking. Unlike traditional RAID, all HP Vraid levels distribute data across *all* available physical disks.

Data striping improves speed by performing virtual disk I/O with an entire group of physical disks at the same time. Mirroring provides data redundancy by storing data and a copy of the data. Parity also provides data redundancy by storing data and the calculated parity for each stripe of data. If a subset of the data on a physical disk becomes corrupt or the entire physical disk fails, the data can be automatically recovered from redundancy so that data loss does not occur.

The EVA has four Vraid types: Vraid0, Vraid1, Vraid5, and Vraid6. Each Vraid type provides unique I/O speed and has a different level of data redundancy, which directly effects the amount of physical space used. Once a virtual disk is created, the Vraid type or level cannot be changed.

See Table 2 (page 18) for a comparison of the different RAID levels.

Table 2 RAID level comparison

	Summary	Best practices	Data redundancy	RAID method
Vraid0	Vraid0 is optimized for I/O speed and efficient use of physical disk capacity, but provides no data redundancy.	IMPORTANT: HP does not recommend using Vraid0 for virtual disks when high availability is required. Consider Vraid0 only for noncritical storage. Vraid0 virtual disks provide the best performance for applications that use random I/O.	None	Striping
Vraid1	Vraid1 is optimized for data redundancy and I/O speed, but uses the most physical disk space. IMPORTANT: Vraid1 uses about 100% more physical disk space than Vraid0.	In general, Vraid1 virtual disks provide better performance characteristics over a wider range of application workloads than Vraid5.	High	Striping and mirroring
Vraid5	Vraid5 provides a balance of data redundancy, I/O speed, and efficient use of physical disk space. Vraid5 uses about 20% more physical disk space than Vraid0.	Vraid5 virtual disks provide as good or better performance than Vraid1 for applications that use sequential writes. Vraid5 has much lower random write performance in comparison to Vraid1, but has much higher capacity efficiency.	Medium	Striping and parity
Vraid6	Vraid6 is similar to Vraid5, but provides a higher level of redundancy by storing two parity blocks per stripe instead of one. Vraid6 uses 33% more physical disk space than Vraid0.	Performance characteristics of Vraid6 for random and sequential write workloads will be slightly slower than Vraid5. Vraid6 provides the highest level of redundancy protection of all the Vraid types. IMPORTANT: If a disk group includes large physical disks (for example, 1 TB or larger), HP recommends using Vraid6 for the virtual disk.	Very high	Striping and double parity

NOTE: For best practice information, see the *HP P63x0/P65x0 Enterprise Virtual Array Systems configuration best practices white paper* available at:

http://h18006.www1.hp.com/storage/arraywhitepapers.html?jumpid=reg_R1002_USEN

HP P6000 Command View implementation

HP P6000 Command View can be implemented in two ways:

- **Server-based management**—HP P6000 Command View is installed on a management server connected to the EVA, providing management of multiple storage systems. All components of the software suite (HP P6000 Command View, HP Command View EVAPerf, HP Storage System Scripting Utility, SMI-S EVA) are installed. Server-based management is applicable to all EVA models.
- **Array-based management**—The P63x0/P65x0 EVAs are shipped with HP P6000 Command View pre-installed on the management module within the controller enclosure. Only one component of the software suite (HP P6000 Command View) is installed.

2 Preparing your site

Overview

Preparing your site means providing:

- Physical rack space for the equipment
- AC power for the array
- Proper ventilation and temperature conditions
- LAN or Fibre Channel cables to attach the array hardware to your network

To ensure continuous, safe, and reliable operation of your equipment, place your system in an approved environment.

Consider using the HP Enterprise Configurator (eCO) to help plan and configure racks and rack-mountable devices. The eCO is available on the HP website:

<http://h30099.www3.hp.com/configurator>

Click **Configure** under Disk products.

Provide adequate structural support for the floor

Calculate the total weight of your equipment and verify that your site can support the weight.

Provide adequate clearance space and ventilation

Be sure to provide adequate clearance around the front and back of the racks. Provide at least 25 inches (63.5 cm) in the front of the rack to allow the doors to open fully and provide at least 30 inches (76.2 cm) in the rear of the rack to allow for servicing and airflow.

If there are unused spaces in your rack, attach blanking panels across those empty spaces to force the airflow through the components instead of through the open spaces.

Provide adequate and redundant sources of power

Make sure that you have two high-line power feeds installed near your computer. These two power sources usually come from the same external power grid, but occasionally may originate from different grids or even entirely different sources.

For protection against a power-source failure, obtain and include two uninterruptible power supplies in your installation.

For power consumption specifications, see the QuickSpecs document at:

<http://www.hp.com/go/P6000>

Remove product from packaging

1. Remove product from boxes.
2. Verify that contents match your expectations and site requirements.
 - P63x0 EVA controller enclosure should contain:
 - One 2U controller enclosure with two HSV340 controller modules, two power supply modules, two fan modules, and two battery modules installed.
 - Rack mounting hardware
 - Two 2.0 meter SAS cables
 - Two power cords

- Installation documentation
- XCS controller software recovery CD
- P65x0 EVA controller enclosure should contain:
 - One 2U controller enclosure with two HSV360 controller modules, two power supply modules, two fan modules, and two battery modules installed.
 - Rack mounting hardware
 - Two 2.0 meter SAS Y-cables
 - Two power cords
 - Installation documentation
 - XCS controller software recovery CD
- Each FC disk enclosure should contain:
 - A minimum of one 2U M6612 or M6625 disk enclosure, two power supply modules, two fan modules, and two battery modules.
 - Rack mounting hardware kit
 - Two 0.7 meter SAS cables
 - Two power cords

NOTE: Controllers are shipped with Small Form Factor Pluggable (SFP) transceiver modules on all FC ports. If you ordered the AF092A rack, HP recommends that you use the 1.37 meter (minimum length) power cords.

3. Inspect for damage.

If damage is present, contact your local HP representative.

3 Installing components

Overview

Component installation includes:

- Rail kits
- Controller and disk enclosures
- Disk drives

ⓘ **IMPORTANT:** The P65x0 EVA requires installation service by an HP-authorized service provider. For more information, contact HP technical support in North America at 1-800-474-6836. Outside North America, call HP technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website <http://www.hp.com/support>.

The P63x0 EVA is customer installable. Videos of the installation procedures are available for viewing at the Services Media Library website <http://www.hp.com/go/sml>. Optionally, you can purchase installation service by an HP-authorized service provider.

NOTE: If you have ordered the factory integrated product, skip this chapter and go to “Turning on power” (page 32).

Rack installation best practices

In addition to industry-standard recommendations, consider the following:

- Locate the heaviest items, such as uninterruptible power supplies (UPS) and additional disk enclosures near the bottom of the rack.
- To make cabling easy, install the disk enclosures below the controller enclosure.
- Install similar components next to each other in the rack. Because enclosures, switches, and servers are of differing depths, if you have more than one of a device, mount those devices adjacent to one another to accommodate working behind the rack.

⚠ **WARNING!** To reduce the risk of personal injury or damage to the equipment, be sure that:

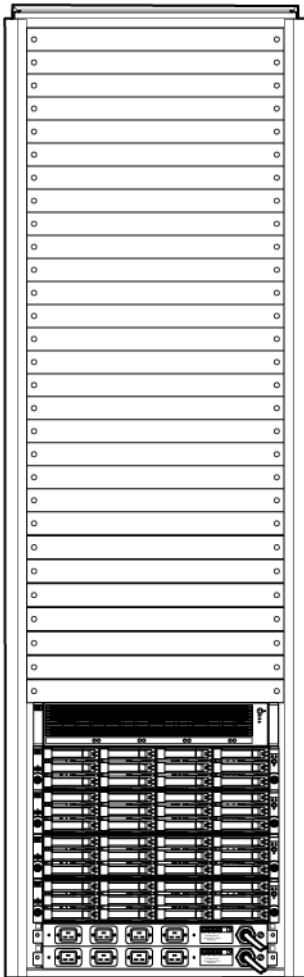
- At least two people lift the storage system during removal or installation, if the weight exceeds 22.7 kg (50 lb). If the system is being loaded into the rack above chest level, a third person **MUST** assist with aligning the system with the rails while the other two people support the weight of the system.
- The leveling jacks on the rack are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component in a rack is extended at a time. A rack may become unstable if more than one component is extended.
- To prevent damage and to ease insertion of the device into the rack, support the weight of the device and keep it level when sliding it into the rack.

There are two typical rack configurations (Figure 6 (page 22)):

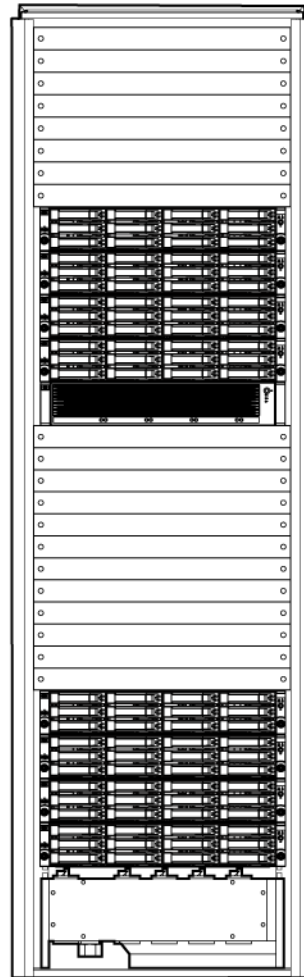
- Multiproduct—maximizes space
- Storage-centric—Makes future expansion easier

NOTE: The power distribution units can be assembled either vertically (using the PDU hinge) as shown for configuring for expansion, or horizontally as shown for configuring for maximum rack space.

Figure 6 Typical rack configurations



P63x0 configured for maximum rack space



P65x0 configured for expansion

Attach the brackets for a longer chassis

If you are installing a longer chassis into your cabinet, such as for the controller enclosure, you must remove the shipping retaining bracket and install the smaller brackets supplied in the accessory kit.

NOTE: A No. 2 Phillips head screwdriver is required for this procedure.

1. Remove the existing screw and shipping retaining bracket from the rear of the rail.
2. Insert a screw through the bottom hole of the new bracket and loosely secure the bracket to the rear of the rail.

Figure 7 Inserting screw into the new bracket

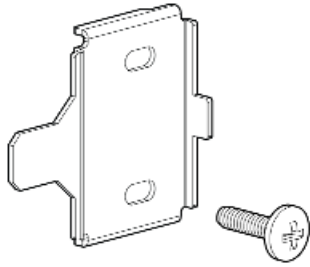
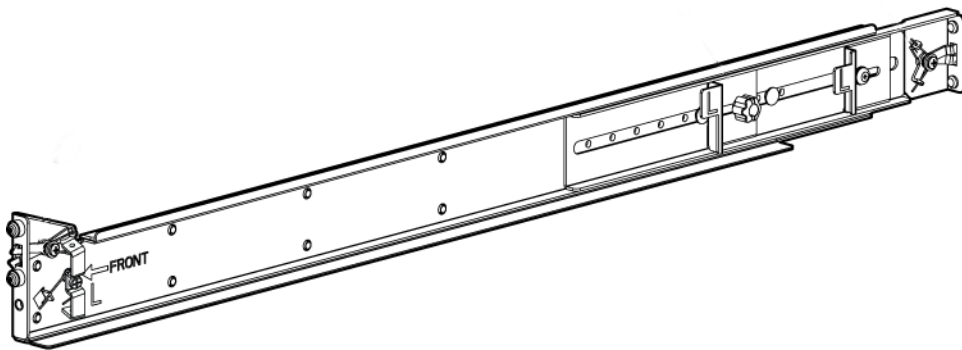


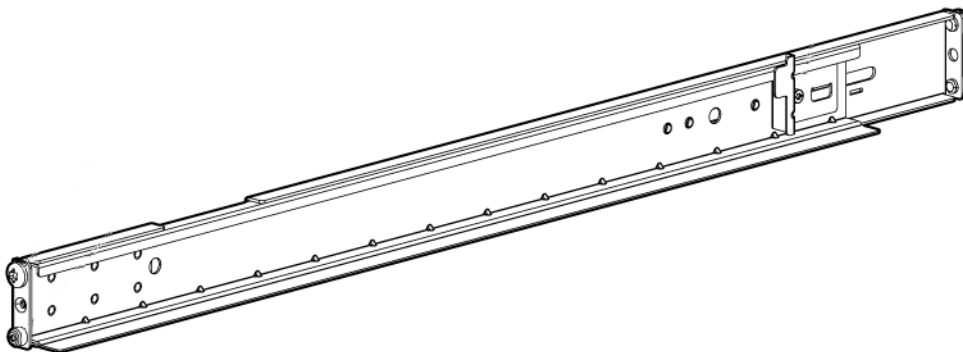
Figure 8 Attaching brackets to rail



3. Repeat [Step 1](#) and [Step 2](#) for the remaining rail.

[Figure 9](#) (page 23) shows the disk enclosure rail.

Figure 9 Disk enclosure rail



Attach the rails

NOTE: The left and right rails are designated by the letters R (right) and L (left) or the words Right and Left stamped in the metal on the front of the rack.

Consider the following when installing the rails:

- Installing the rails does not require any tools for assembly.
- HP recommends that you install all the rail kits before installing any other components.
- Ensure that the rails are level before installing any other components.



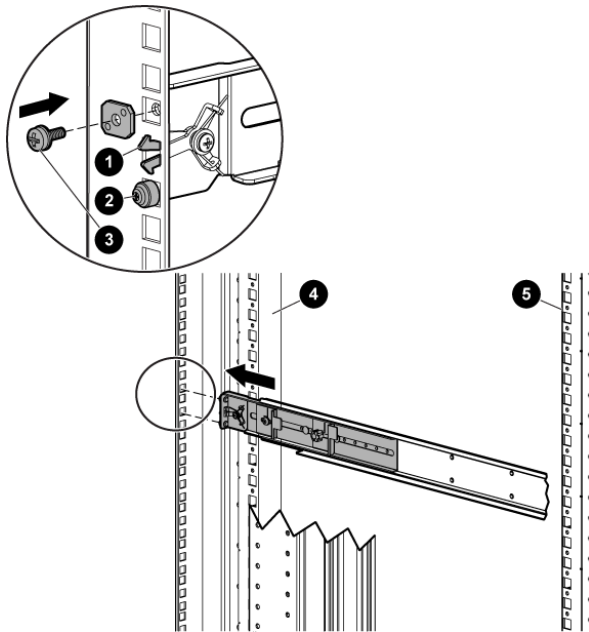
WARNING! Before you begin, ensure that the rack is sufficiently stable. If provided, lower the rack leveler feet and make sure any required stabilizers are installed. If provided, extend the anti-tip device. Failure to extend the anti-tip device could cause personal injury or damage if the rack tips over.

To install the controller enclosure rails:

NOTE: Although the disk enclosure rails do not have scissor latches, you can use these steps as a guideline to install the disk enclosure rails.

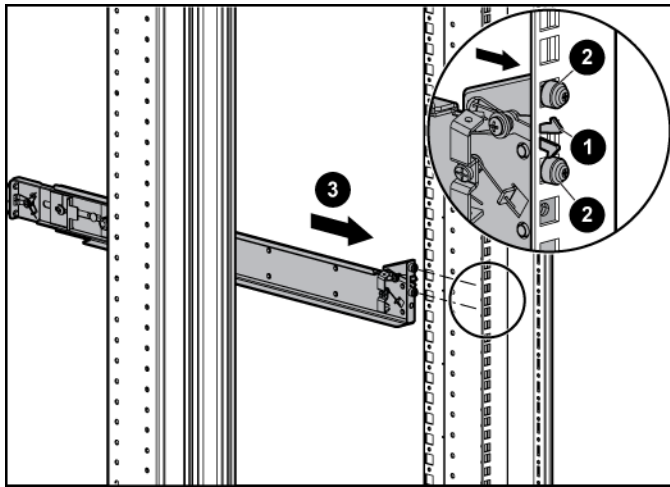
1. Insert the rear end of the rail into the inside back of the rack until the pin in the bottom hole (2, [Figure 10 \(page 24\)](#)) extends through the hole in the rack mounting rail.
2. Install a washer onto one screw and insert the screw into the top hole of the rail to secure the rear rack mounting rail (3, [Figure 10 \(page 24\)](#)).
3. Pull the locking latch to release the scissor locking latch and squeeze the scissor latch (1, [Figure 10 \(page 24\)](#)) together to insert the rail and pins through the rack mounting rail until the latch engages.

Figure 10 Attaching the rear rail



4. Extend the front end of the rail toward the inside front of the rack.
5. Pull the locking latch to release the scissors latch (1, [Figure 11 \(page 25\)](#)) and squeeze the scissors latch together to insert the rail and pins through the rack mounting rail until the latch engages.

Figure 11 Attaching the front rail

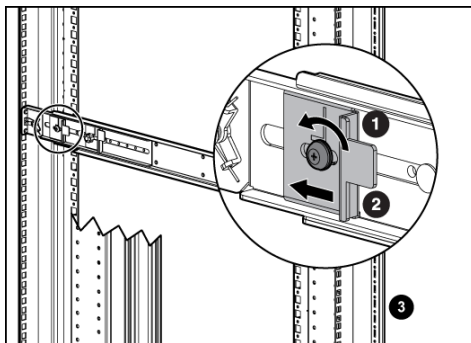


CAUTION: Ensure that the scissor locking latch engages the scissor latch when you push the end of the rail into the rack mounting rail.

- Loosen the locking screw (1, [Figure 12 \(page 25\)](#)) on the shipping retaining bracket (2) and slide the bracket to the farthest position on the rear of the rail. This moves the bracket out of the way to allow you to install the chassis in the rails.

NOTE: [Figure 12 \(page 25\)](#) shows a disk enclosure rail and bracket. If you are installing a longer chassis into your cabinet, such as a chassis for a controller enclosure, see [“Attach the brackets for a longer chassis” \(page 22\)](#) for additional information.

Figure 12 Locking screw and retaining bracket



- After installing the rail, gently grip and move it to be sure it is firmly engaged in the rack and that all locking latches are engaged in the scissor latches.
- Repeat [Step 3](#) through [Step 7](#) for the other rail.

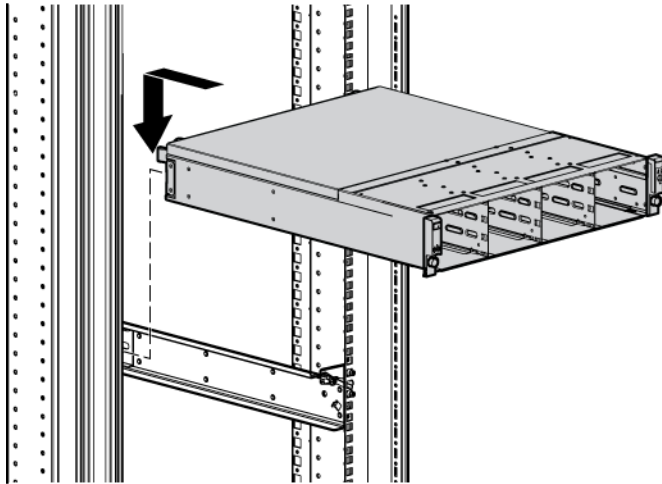
Install the enclosures

NOTE: The disk enclosures can either be large form factor (LFF), supporting 12 disk drives, or small form factor (SFF), supporting 25 disk drives. The disk enclosures shown in this section may not look the same as those you are installing.

To install disk and controller enclosures:

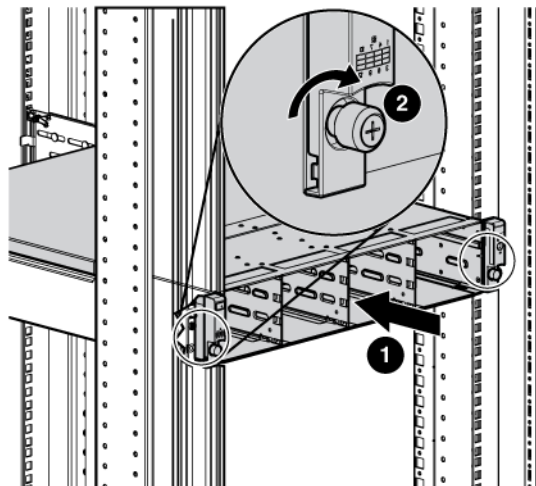
1. Align the enclosure with the rails and slide it into the rack ([Figure 13 \(page 26\)](#)).

Figure 13 Installing an enclosure (view from front of rack)



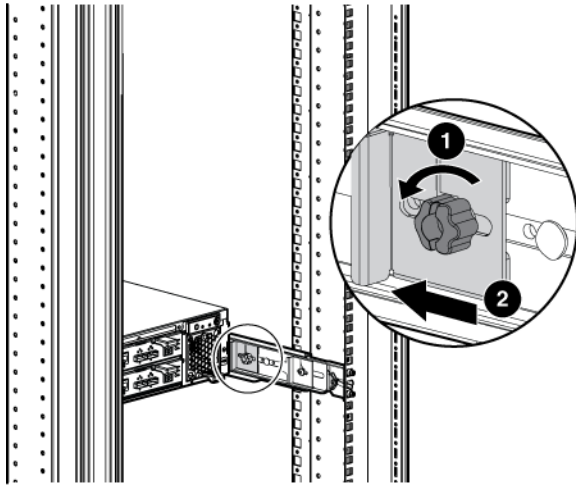
2. Continue sliding the enclosure into the rack until the front edge is flush with the front of the rack (1, [Figure 14 \(page 26\)](#)). Tighten the enclosure screws into the rack (2) taking care not to strip the screws.

Figure 14 Securing the rear of the enclosure in the rack (view from front of rack)



3. At the rear of the rack, loosen the screw on the shipping retaining bracket (1, [Figure 15 \(page 27\)](#)) and slide the bracket forward (2) until the tab engages the slot in the chassis. Tighten the screw on the bracket.

Figure 15 Securing the rear of the enclosure (view from rear of rack)



4. Repeat [Step 1](#) through [Step 3](#) to install the controller enclosures.

Installing the disk drives into the drive bays

After the disk enclosures are secured in the rack, install the disk drives into the drive bays. Drives must be installed in the proper bay sequence (see [Figure 16 \(page 27\)](#) and [Figure 17 \(page 28\)](#)) in the enclosures for optimum performance and data integrity.

For example, if you have four enclosures and eight drives, you should install four drives into bay 1 of each enclosure and four drives into bay 2 of each enclosure. Do not install all the drives into enclosure 1 and leave the other enclosures empty.

Figure 16 M6625 disk drive numbering (SFF)

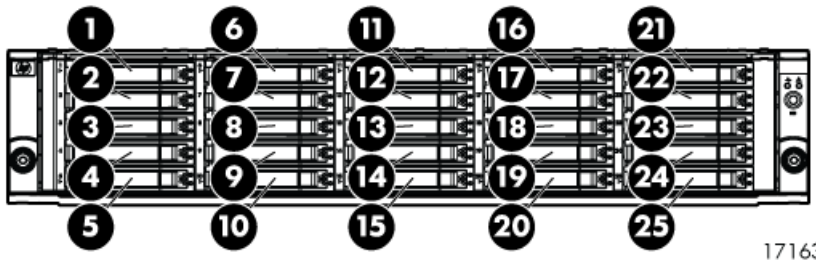
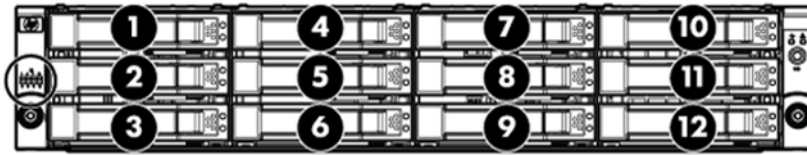


Figure 17 M6612 disk drive numbering (LFF)



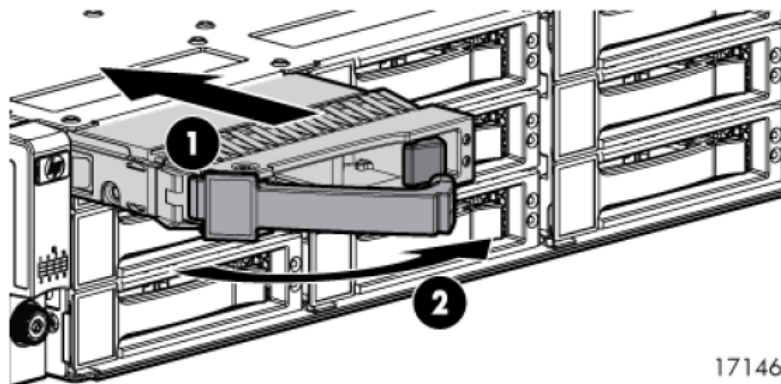
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- △ **CAUTION:** Install disk drives in the enclosures only after securing the enclosures in the rack. Observe the following precautions:
- An enclosure populated with disk drives is too heavy to lift safely.
 - Movement of an enclosure during installation might damage the internal storage media of installed disk drives.
 - Follow industry-standard practices when handling disk drives. Internal storage media can be damaged when drives are shaken, dropped, or roughly placed on a work surface.
 - When installing a disk drive, make sure it is fully seated in the drive bay.
 - When removing a disk drive, press the release button and pull the drive only slightly out of the enclosure. Then, to allow time for the internal disk to stop rotating, wait approximately 10 seconds before completely removing the drive from the enclosure.

To install the disk drives:

1. Unlatch and swing out the drive handle, and slide the drive into the enclosure (1, [Figure 18 \(page 28\)](#)).
2. Rotate the drive lever to the right (2, [Figure 18 \(page 28\)](#)) until it locks.

Figure 18 Installing drive into enclosure



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4 Connecting cables and power cords

Overview

NOTE: If you have ordered the factory integrated product, skip this chapter and go to “Turning on power” (page 32).

To connect cables and power cords:

1. Read the cabling best practices.
2. Attach Fibre Channel, SAS, and/or LAN cables to controllers, drives, and servers.
3. Label all cables using the supplied cable labeling kit.
4. Plug in all power cables.

Cabling best practices

- Use the shortest possible cable between devices. Shorter cables are easier to manage and route along the back of the rack. In addition, shorter cables reduce the possibility of signal degradation that may occur over longer distances.
- Gather the cables in the rear of the array to ensure that the cabling in the back of the rack system does not interfere with system operation or maintenance. Bind the cables loosely with cable ties and route the excess cables out of the way, along the side of the rack. When the cables are tied together and routed down the side of the rack, system components and indicators are easily visible and accessible.
- Attach a label near both ends of each cable to identify the device connected to that cable. Include the device type, device name, port, or other information that you think will be helpful.
- Use colored markers to color code both ends of each cable, to help you visually identify a particular cable without having to read or locate the label.
- In multipath configurations, you may want to loosely bind the matching pair of cables connecting devices.

Connecting cables

To connect the EVA to the SAN, use standard Fibre Channel and/or SAS cables, observing the following caution for good cabling-handling practices.

- △ CAUTION:** Use appropriate precautions when handling cables:
- Touching the end of a cable can damage the cable or cause performance problems, including intermittent difficulties accessing the storage.
 - Whenever a cable is not connected, replace the protective covers on the ends of the cable.
 - Make certain that the cables are installed and supported so that no excess weight is placed on the connectors. This prevents damage to the connector and cable. Excess cable should be loosely coiled and tied out of the way, being careful not to coil the cable in a tight loop.
 - The minimum bend radius is 25 mm for 50, 62.5, and 9 micron fiber optic cable. The bend radius for the 0.5 meter SAS cable is 33 mm (1.3 inches); for the 2 meter SAS cable, it is 40.6 mm (1.6 inches).
-

Connecting the array to the disk enclosures

See “Cabling the P63x0/P65x0 EVA” (page 66) for examples of connecting the P63x0/P65x0 EVA to the disk enclosures.

Connecting the array to servers and switches

See “Cabling the P63x0/P65x0 EVA” (page 66) for examples of connecting servers and switches to the array in server-based management and array-based management configurations.

Labeling cables using labeling kit

A labeling kit is provided with the disk enclosure. Label both ends of each cable using the materials in the supplied labeling kit.

Connecting the power cords



WARNING! To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- To remove power to the equipment, unplug the power cord from the power supply.
- Route the power cord so that it is not likely to be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord is attached to the array.

To protect your system from power failure related downtime, each array ships with a redundant power supply. See [Table 3 \(page 31\)](#) to determine the best method for connecting your power supplies to your power source to eliminate downtime due to power-related failure.

When connecting the power cables, use the power cables shipped with the array. After power is supplied to the array, the power supply automatically senses the input voltage and the power supply LED illuminates as solid amber.

NOTE: If you ordered the AF092A rack, HP recommends that you use the 1.37 meter (minimum length) power cords.

For accessibility, the PDU can be lowered out of the rack. As shown in [Figure 19 \(page 30\)](#), remove the mounting the screws (1) and pull down on the PDU (2) until it is in the fully lowered position (3).

Figure 19 Accessing the PDU

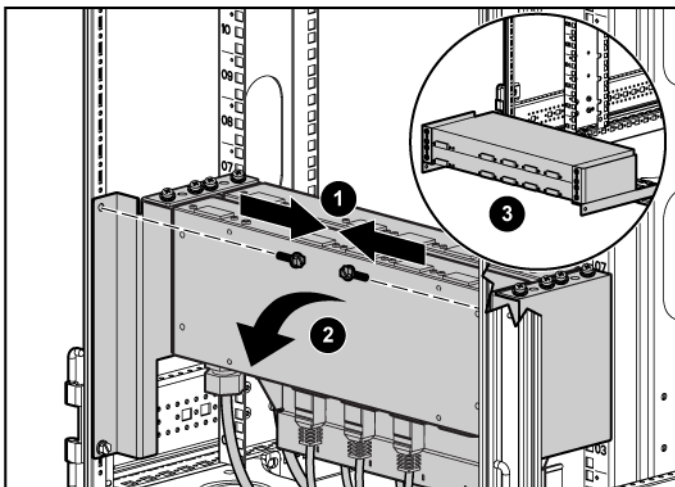


Table 3 Power cable connections

Connection Method	Level of Protection
Array power supplies connected to one power source	Protects you from downtime when one of the array power supplies fails. The remaining power supply/fan module can operate the array until you install a replacement module.
Array power supplies connected to two separate power sources	Protects you from downtime when one of the array power supplies fails. Protects you from data loss when one of your power sources fails, due to a pulled cable or tripped breaker. The remaining power source can power the EVA until the failed power source is restored or relocated. Depending on the cause and duration of the power outage, you can use this time to properly shut down your storage subsystem.
Array power supplies connected to: <ul style="list-style-type: none">• Two uninterruptible power supplies• Two separate power sources	Protects you from downtime when one of the array power supplies fails. Protects you from data loss when one or both of your power sources fails, due to a pulled cable, tripped breaker, or local power outage. The remaining power source or the UPS will power the array until power is restored to the source. Depending on the cause and duration of the power outage, you can use this time to properly shut down your storage subsystem.

For more information about power sources, see the *HP P63x0/P65x0 Enterprise Virtual Array User Guide*.

5 Turning on power

After the controllers and disk enclosures are physically installed and cabled, power on all devices and verify that they are operating properly. For cabling procedures, see “Cabling the P63x0/P65x0 EVA” (page 66).

Power on the devices

Power on best practices

Observe the following best practices before powering up the array for the first time:

- Install the controller enclosure.
- Install the disk enclosures.
- Install disk drives in the disk enclosures.
- Connect the SAS cables and power cords to the disk enclosures.
- Connect the FC and/or SAS cables and power cords to the controller enclosure.

Power on procedure

1. Ensure all power cords are connected to the controller enclosure and disk enclosures. Apply power to the controller enclosure (rear panel on the enclosure). The disk enclosures will power on automatically. Wait for a solid green status LED on the controller enclosure and disk enclosures (approximately five minutes).
2. Apply power to each external switch, if applicable.
Wait (up to five minutes) for the array to complete its startup routine and for the switches to boot.
3. Apply power to the servers in the SAN with access to the array, start the operating system, and log in as administrator.

△ CAUTION:

- If power is applied to a server and it attempts to boot off of an array that has not been powered on properly, the server will not start.
 - If a New Hardware Found message appears when you power on a server, cancel the message and ensure that supported drivers are installed on the server.
-

Verify the operating status of the controller enclosures

The following status LEDs are located on the controller enclosure:

- Health—indicates that the enclosure is powered up and functioning normally.
- Fault—indicates when a fault has occurred.
- UID—Unit identification, this blue LED is on when locating an enclosure.
- Link status—indicates the status of the host connection.

To verify the controllers are operating properly, view the controller LEDs and compare them with the patterns described in [Table 4 \(page 33\)](#). For more information on the controller status LEDs, see the *HP P63x0/P65x0 Enterprise Virtual Array User Guide*.

Figure 20 LED panel



Table 4 LED panel status conditions

LED	Startup condition	Normal operating condition	Fault condition
1. UID (Unit identification)	Blinking blue	Off	Off
2. Health	Blinking green	Solid green	Off
3. Fault	Blinking amber	Off	Blinking or solid amber
4. Link status	Blinking amber	Solid green – successfully connected to host	Amber – host connection lost

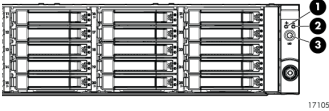
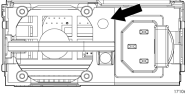
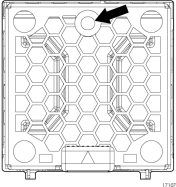
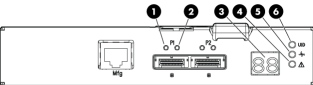
Verify the operating status of the disk enclosures

The following status LEDs are located on the disk enclosure:

- I/O module status LEDs:
 - Health—indicates that the enclosure is powered up and functioning normally. Located in front and rear.
 - Fault—indicates when a fault has occurred. A blinking LED indicates a lesser fault; a solid LED indicates a more serious fault. Located in front and rear.
 - UID—Unit identification, this blue LED is on when locating a disk enclosure. Located in front and rear.
 - Port link—indicates the link status. Located in rear.
 - Port error—indicates if a port error has occurred. Located in rear.
- Power supply status—indicates status of the power supply module. If the power supply module is not connected properly, the LED will be off. Located in rear.
- Fan status—indicates status of the fan module. Located in rear.

To verify that the disk enclosures and disk drives are operating properly, view the enclosure and disk drive LEDs and compare them with the patterns shown in [Table 5 \(page 34\)](#). For more information on the disk enclosure status LEDs, see the *HP P63x0/P65x0 Enterprise Virtual Array User Guide*.

Table 5 Disk enclosure operating status

Disk enclosure component	LED	Startup condition	Normal operating condition	Fault condition
Front UID module LEDs 	1. Health	Blinking green	Solid green	Off (No power)
	2. Fault	Blinking amber	Off	Blinking or Solid Amber
	3. UID (Unit identification)	Blinking blue	Off	Off
Power supply module 	Status	Green	Solid green	Amber
Fan module 	Status	Solid green	Solid green	Blinking or solid amber
I/O module 	1. Port Link		Blinking or solid green	Off
	2. Port Error		Off	Solid amber
	3. 7-segment display		A unique number representing the enclosure number	Off
	4. Fault		Off	Blinking or solid amber
	5. Health	Blinking green	Solid green	Off
	6. UID (Unit identification)		Off	Off

If LED patterns are not as expected:

- Check cable connections between the devices.
- Check the availability of your power source.
- Review the installation procedures.
- Remove and reinsert the module.

Verify the operating status of the Fibre Channel switches and adapters

To verify that your switches are operating properly, view the switch LEDs and compare them with the patterns described in the documentation for these devices. If the LEDs indicate a fault, see the documentation that came with the switch for help.

Optional Step: If you will be using Fibre Channel to attach the array to your existing servers, you must install Fibre Channel adapters in those servers and test the Fibre Channel adapters prior to installing HP P6000 Command View.

Ensure that you have the correct quantity and length of Fibre Channel cables available to attach your servers to the array.

Installing Fibre Channel drivers

If you are using Windows, use the ProLiant Service Pack (PSP) to install the applicable Fibre Channel drivers. Older PSPs will not have current drivers, so ensure your driver version are current.

For other operating systems, load the drivers as directed in “Configuring application servers” in the *HP P63x0/P65x0 Enterprise Virtual Array User Guide*.

6 Managing the iSCSI or iSCSI/FCoE module using HP P6000 Command View

This chapter provides instructions for configuring the iSCSI and the iSCSI/FCoE module management ports, HP P6000 Command View discovery and host instantiation, the iSCSI IP ports, and the date and time.

HP P6000 Command View management of a P6000 with the iSCSI or iSCSI/FCoE modules is supported in-band through Fibre Channel, 1 Gbe or 10 Gbe iSCSI, Fibre Channel over Ethernet, or through an Ethernet network using array-based management. HP P6000 Command View management of the iSCSI modules and iSCSI/FCoE modules is only supported through an Ethernet network.

Initializing the storage system

When installing a storage system, it appears as uninitialized. Initializing a storage system makes it ready for use, binds the controllers as an operational pair (for models other than the HP EVA4400 and P6x00), and establishes preliminary data structures on the array. Initializing also sets up the first disk group, which is called the default disk group.

When initializing a storage system, you must enter a name for the array. You can also perform the following optional tasks:

- Enter the number of disks to be included in the default disk group.
- Set the drive type.
- Set the array date and time.
- Enter a console LUN ID.
- Select a disk failure protection level.

For complete information on initializing the storage system, see the *HP P6000 Command View User Guide* or the associated HP P6000 Command View online help.

Configuring the iSCSI and iSCSI/FCoE module management ports

Most management functions are available in HP P6000 Command View to simplify the two levels of LUN mapping and LUN management. Access to the CLI for the iSCSI and iSCSI/FCoE modules is needed for functions not related to LUN mapping or management. Although you can use both HP P6000 Command View and the CLI for LUN mapping and LUN management, HP does not recommend this practice. Direct use of the CLI to alter persistent data such as LUN presentations can cause HP P6000 Command View operational problems due to persistent data synchronization.

HP P6000 Command View uses the 100 Mbps telnet management port connections of the iSCSI and iSCSI/FCoE modules. There are three ways to connect to the CLI of each module.

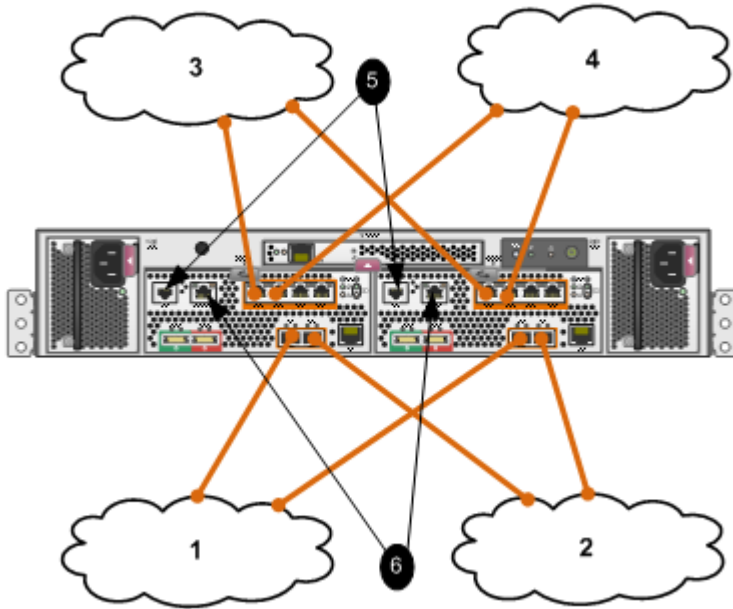
- RS232 serial port (115200 baud rate, 8 data, no parity, 1 stop bit); using a standard RJ-45 cable and the supplied 8-wire RJ-45 to female DB9 connector
- Telnet (100 Mbps); normal 1500 byte MTU
- Secure Shell (SSH)

NOTE: The RS232 serial port can help with initial configuration of Ethernet addresses and can also provide a monitoring port.

By default, the telnet management ports (6, [Figure 21 \(page 37\)](#) and [Figure 22 \(page 38\)](#)) are set up to obtain DHCP addresses. To support HP P6000 Command View, HP recommends configuring static IP addresses which must be in a common class subnet for both modules of a P6000 array. Use of static IP addresses avoids the possibility of DHCP-assigned IP addresses changing and

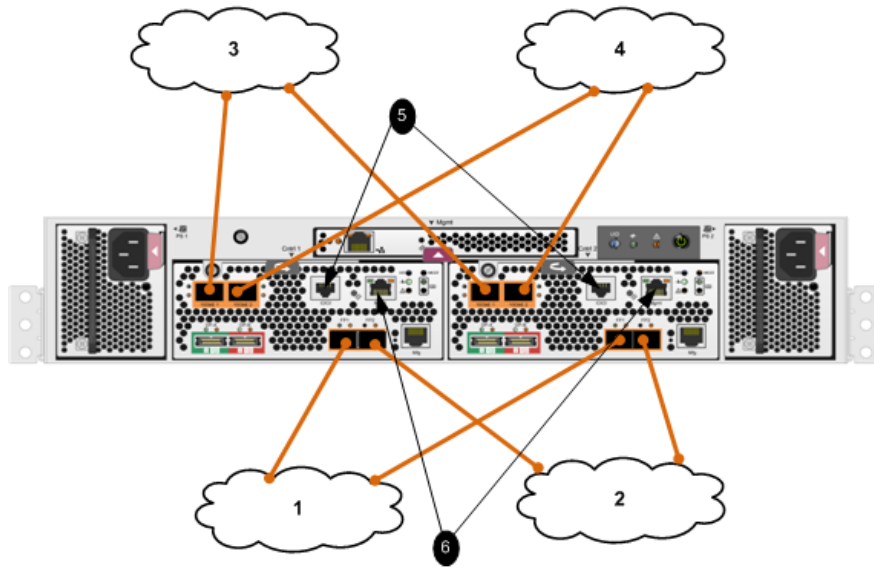
simplifies controller replacement when restoring a configuration. If the telnet management port cannot obtain a DHCP address, controller 1's module will default to a static address of 192.168.0.76 port 2372, mask 255.255.255.0, and controller 2's module will default to 192.168.0.82 port 2372, mask 255.255.255.0. Alternately, use the RS232 serial port (5, [Figure 21 \(page 37\)](#) and [Figure 22 \(page 38\)](#)) to configure static IP addresses for the telnet management ports.

Figure 21 P6000 iSCSI module management ports and P6000 fabrics



- | | |
|---------------------------|----------------------------|
| 1. Fibre Channel fabric A | 4. iSCSI fabric B |
| 2. Fibre Channel fabric B | 5. RS232 management ports |
| 3. iSCSI fabric A | 6. Telnet management ports |

Figure 22 iSCSI/FCoE module management ports and P6000 fabrics



- 1. Fibre Channel fabric A
- 2. Fibre Channel fabric B
- 3. iSCSI/FCoE fabric A
- 4. iSCSI/FCoE fabric B
- 5. RS232 management ports
- 6. Telnet management ports

The following is an example of using the CLI to configure the telnet management port with a static IPv4 address:

CLI example of: login

```
set mgmt
show mgmt
help
```

```
MEZ75 login: guest
Password: password
Welcome to MEZ75
*****
*                                     *
*               HP StorageWorks MEZ75               *
*                                     *
*****
MEZ75 #> admin start -p config
MEZ75 (admin) #> set mgmt
```

A list of attributes with formatting and current values will follow. Enter a new value or simply press the ENTER key to accept the current value. If you wish to terminate this process before reaching the end of the list press 'q' or 'Q' and the ENTER key to do so.

```
WARNING:
The following command might cause a loss of connections to the MGMT port.

IPv4 Interface (0=Enable, 1=Disable)           [Enabled           ] 0
IPv4 Mode (0=Static, 1=DHCP, 2=Bootp, 3=Rarp) [Static            ] 0
IPv4 Address                                   [0.0.0.0           ] 10.6.6.130
IPv4 Subnet Mask                              [0.0.0.0           ] 255.255.140.0
IPv4 Gateway                                  [0.0.0.0           ] 10.6.4.201
IPv6 Interface (0=Enable, 1=Disable)          [Disabled          ]
```

All attribute values that have been changed will now be saved.

```
MEZ75 (admin) #> show mgmt

Management Port Information
-----
```

```

IPv4 Interface      Enabled
IPv4 Mode          Static
IPv4 IP Address     10.6.6.130
IPv4 Subnet Mask    255.255.240.0
IPv4 Gateway        10.6.4.200
IPv6 Interface      Disabled
Link Status         Up
MAC Address         f4-ce-46-fb-0a-40

```

```

MEZ75 (admin) #> help
General Command Set:
=====
admin [ begin | end | start | stop | cancel ]
beacon [ on | off ]
clear [ logs | stats ]
date [ <MMDDhhmmCCYY> ]
exit
fru [ restore | save ]
help
history
image [ cleanup | list | unpack ]
    image cleanup
    image list
    image unpack [ <filename> ]
initiator [ add | rm ]
logout
passwd
ping
quit
reboot
reset [ factory | mappings ]
save [ capture | logs | traces ]
set [ alias          | chap          | chassis  | fc
     features        | iscsi         | isns     | mgmt
     ntp              | properties   | snmp     | system
     vpgroups ]
set alias
set chap
set fc [ <PORT_NUM> ]
set features
set iscsi [ <PORT_NUM> ]
set isns
set mgmt
set ntp
set properties
set snmp [trap_destinations [ <DEST_NUM> ]]
set system
set vpgroups [vpgroup index]
show [ chap          | chassis  | fc          | features
     feature_keys    | initiators | iostats    | iscsi
     isns             | logs       | luninfo    | luns
     memory           | mgmt       | ntp        | perf
     presented_initiators | presented_targets | properties | snmp
     stats            | system     | targets    | vpgroups ]
show chap
show fc [ <PORT_NUM> ]
show features
show feature_keys
show initiators [ fc | iscsi ]
show iscsi [ <PORT_NUM> ]
show isns
show logs [ <ENTRIES> ]
show luninfo
show luns
show memory
show mgmt
show ntp
show perf [ byte | init_rbyte | init_wbyte | tgt_rbyte | tgt_wbyte ]
show presented_initiators [ fc | iscsi ]
show presented_targets [ fc | iscsi ]
show properties

```

```

show rpcinfo
show snmp
show stats
show system
show targets [ fc | iscsi ]
show vpgroups [vpgroup index]
shutdown
target [ add | rm ]
targetmap [ add | rm ]
traceroute

iSCSI Server Connectivity Command Set:
=====
lunmask [ add | rm ]
show [initiators_lunmask | lunmask ]
show initiators_lunmask
show lunmask

```

Once you have established initial connectivity with the iSCSI or iSCSI/FCoE module management ports, HP recommends that you verify the iSCSI or iSCSI/FCoE modules are in a defined state (before using HP P6000 Command View and beginning a new configuration). To do this, use the iSCSI and iSCSI/FCoE CLI to reset default factory settings or mappings. This will clear IP addresses that were set and requires a reboot. The following is an example of resetting factory settings and mappings on the iSCSI module:

CLI example of: login

```

reset [ factory | mappings ]
reboot

```

```

MEZ50 login: guest
Password: password
Welcome to MEZ50

```

```

*****
*
*           HP StorageWorks MEZ50           *
*
*****

```

```

MEZ50 #> admin start -p config

```

```

MEZ50 #> reset factory
Are you sure you want to restore to factory default settings (y/n): y
Please reboot the System for the settings to take affect.

```

```

MEZ50 #> reboot
Are you sure you want to reboot the System (y/n): y
System will now be rebooted...

```

Note: The CLI reset factory operation returns the management port IP address to the DHCP mode and clears all other persistent settings.

Or

```

MEZ50 (admin) #> reset mappings
Are you sure you want to reset the mappings in the system (y/n): y
Please reboot the System for the settings to take affect.

```

```

MEZ50 (admin) #> reboot
Are you sure you want to reboot the System (y/n): y
System will now be rebooted...

```

Note: The CLI reset mappings operation only clears user defined LUN mappings, and does not alter other persistent data such as IP addresses.

Fibre Channel zoning

The iSCSI and iSCSI/FCoE modules are directly attached to the array controllers through Fibre Channel ports (Figure 23 (page 41) and Figure 24 (page 42)), therefore, there are no Fibre Channel zoning requirements for iSCSI connectivity to the P63x0/P65x0 EVA. HP P6000 Command View instantiates host objects which contain Fibre Channel ports, with consideration of multipath LUN presentation through both controllers. If you are implementing FCoE connectivity, zoning the FCoE storage target port WWNs from the iSCSI/FCoE modules is managed through the converged fabric switch.

Figure 23 P6000 iSCSI configuration with one or four HP P6000 Command View hosts (256 or 1024 LUNs)

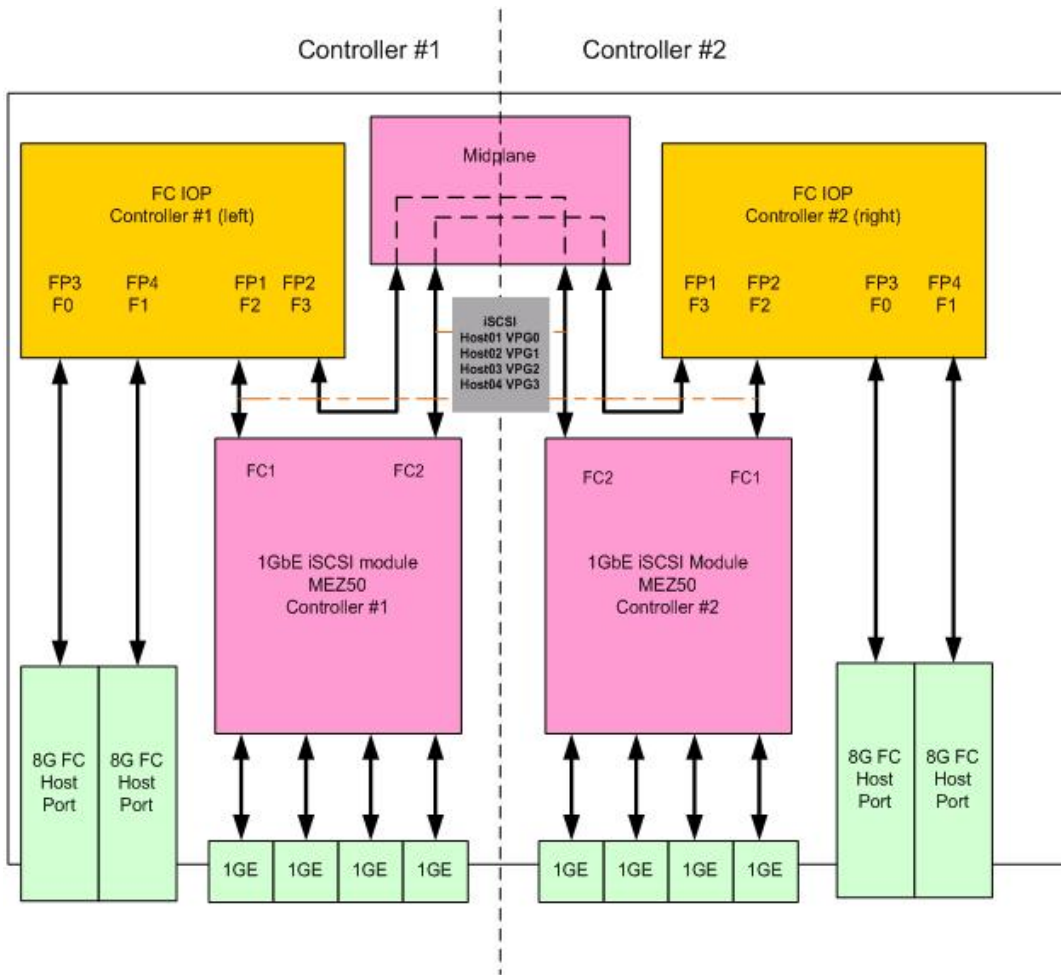
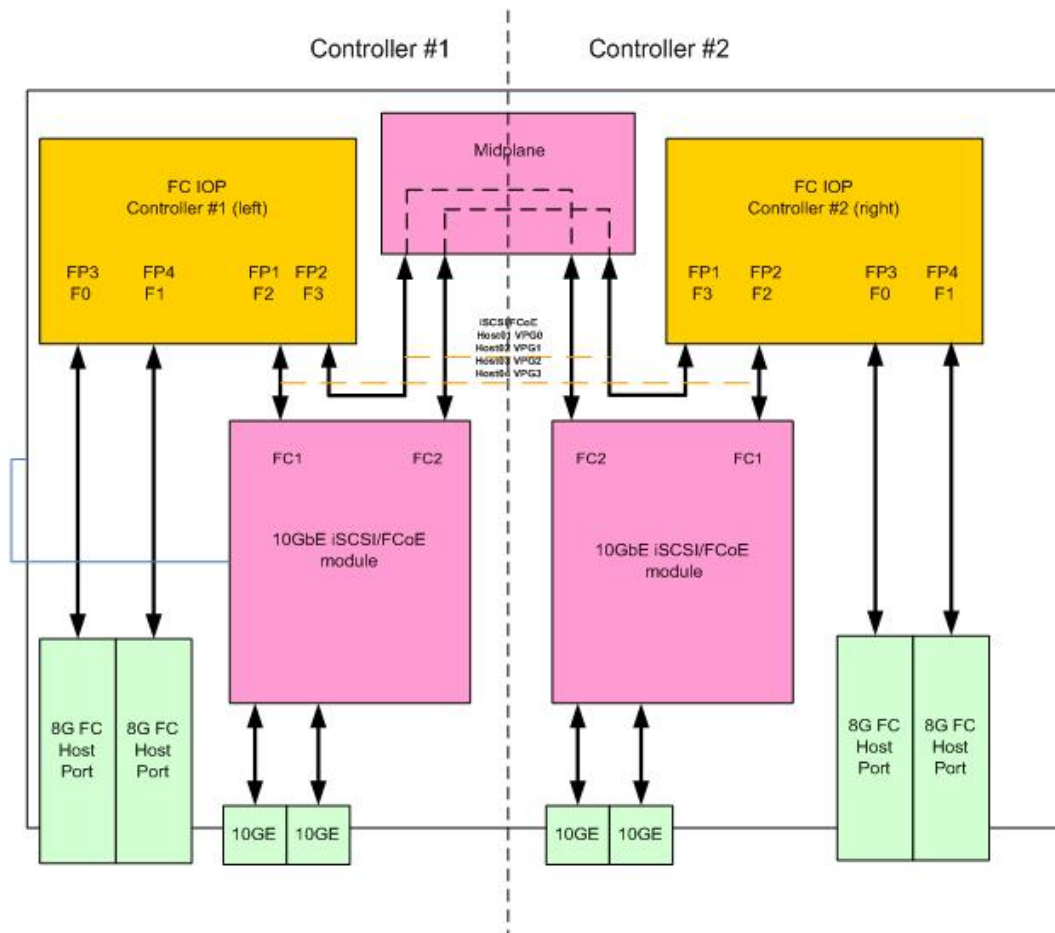


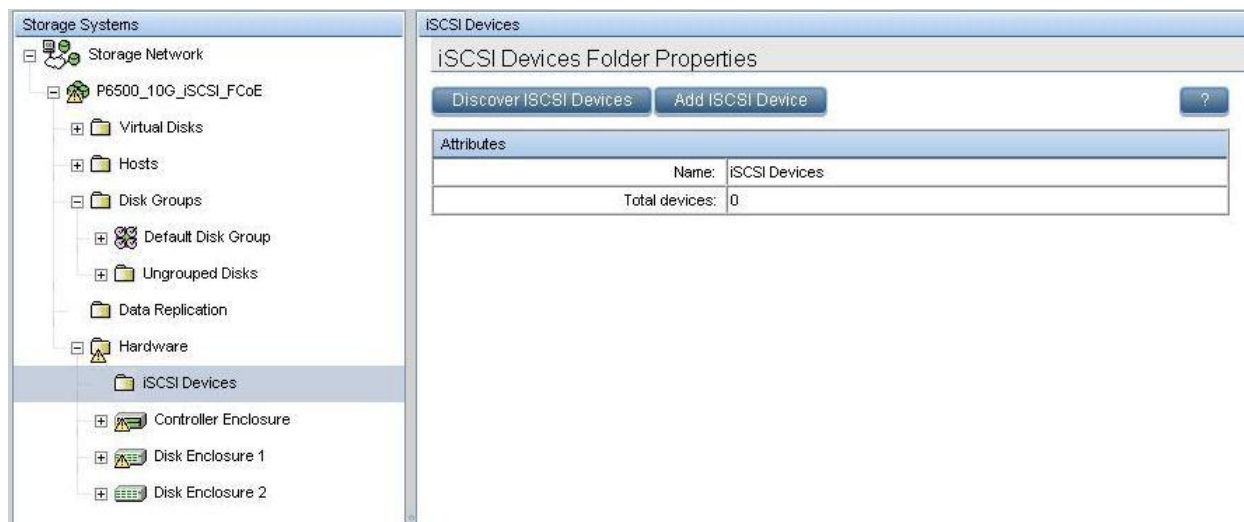
Figure 24 P6000 iSCSI configuration with four HP P6000 Command View hosts (1024 LUNs)



HP P6000 Command View discovery

The iSCSI and iSCSI/FCoE module FC ports are logged in to the array when the controllers are powered on and in an active state. Now you can use HP P6000 Command View to perform device discovery of the array and modules. In the Navigation pane, select **Hardware > iSCSI Devices**. The iSCSI Devices Folder Properties window opens. Click **Discover iSCSI Devices** or, to specify the IP addresses, click **Add iSCSI Device** (Figure 25 (page 42)).

Figure 25 iSCSI device folder properties



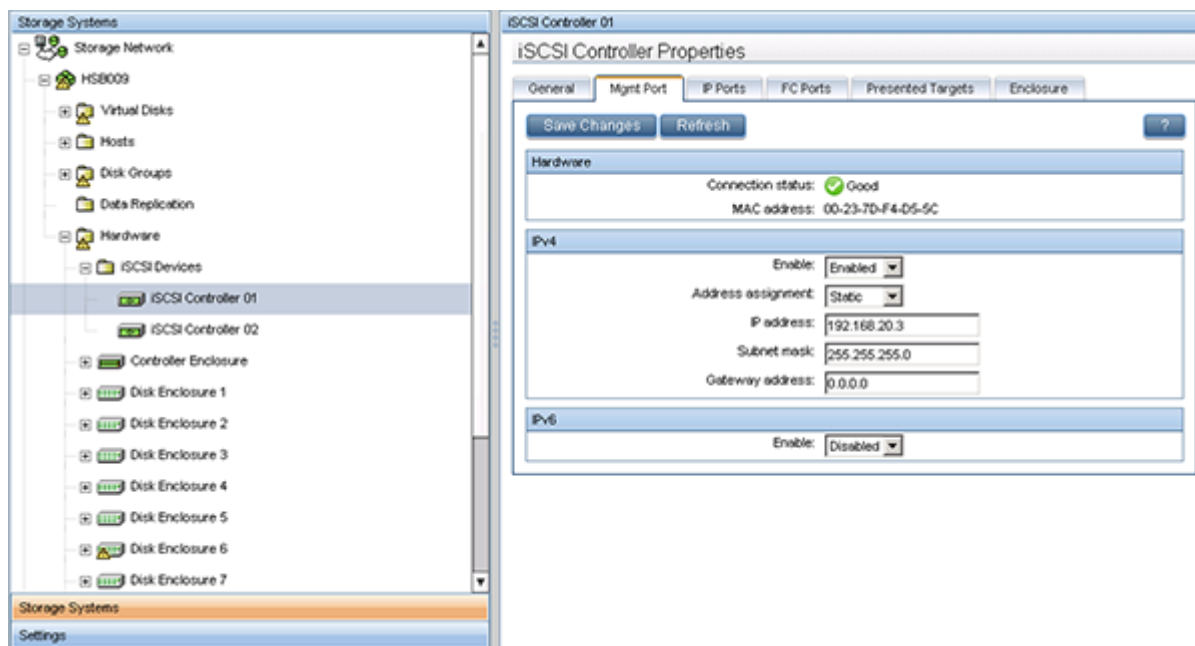
When discovery is complete, the iSCSI or iSCSI/FCoE modules will be listed under iSCSI Devices (Figure 26 (page 43)). The modules are listed as iSCSI Controller 01 and iSCSI Controller 02. Select a controller to display the iSCSI Controller Properties window. Select the **Mgmt Port** tab to configure the telnet management port IP addresses to a common class subnet and to configure other settings. The telnet management port can be configured using IPv4 and IPv6 addressing.

NOTE: HP recommends setting static IP addresses in a common class subnet on the telnet management ports for consistent connectivity and to support peer pairing for persistent reservations. If an iSCSI controller pairing failure is displayed in HP P6000 Command View, use the following CLI commands to help repair the issue and possibly avoid having to remove the controller and rediscover the controller actions:

- show peers
- peer rm
- peer add

❗ **IMPORTANT:** If either P63x0/P65x0 controller is down or halted, you cannot modify the existing iSCSI or iSCSI/FCoE module LUN presentations in HP P6000 Command View.

Figure 26 iSCSI Controller Mgmt Port properties



The iSCSI modules are configured as one instantiated host—both Fibre Channel ports from each iSCSI module (as illustrated in Figure 22 (page 38)) and as iSCSI MPX hosts in the Hosts folder (Figure 27 (page 44)). The Fibre Channel ports associated with each iSCSI host come from the IEEE format 5 HP-registered MAC addresses and represent the WWNs of the FC ports of the iSCSI modules. The iSCSI/FCoE modules are configured as four instantiated hosts—two Fibre Channel ports from each module (as illustrated in Figure 24 (page 42)) and as iSCSI MPX hosts 01, 02, 03, and 04 (Figure 28 (page 44), Figure 29 (page 45), Figure 30 (page 45), and Figure 31 (page 45)). The Fibre Channel ports associated with each iSCSI/FCoE host come from the IEEE format 2 HP-registered MAC addresses and represent N-port ID virtualization (NPIV) functionality called Virtual Port Groups (VPG). The iSCSI module does not support VPGs.

Figure 27 iSCSI Host 01 properties

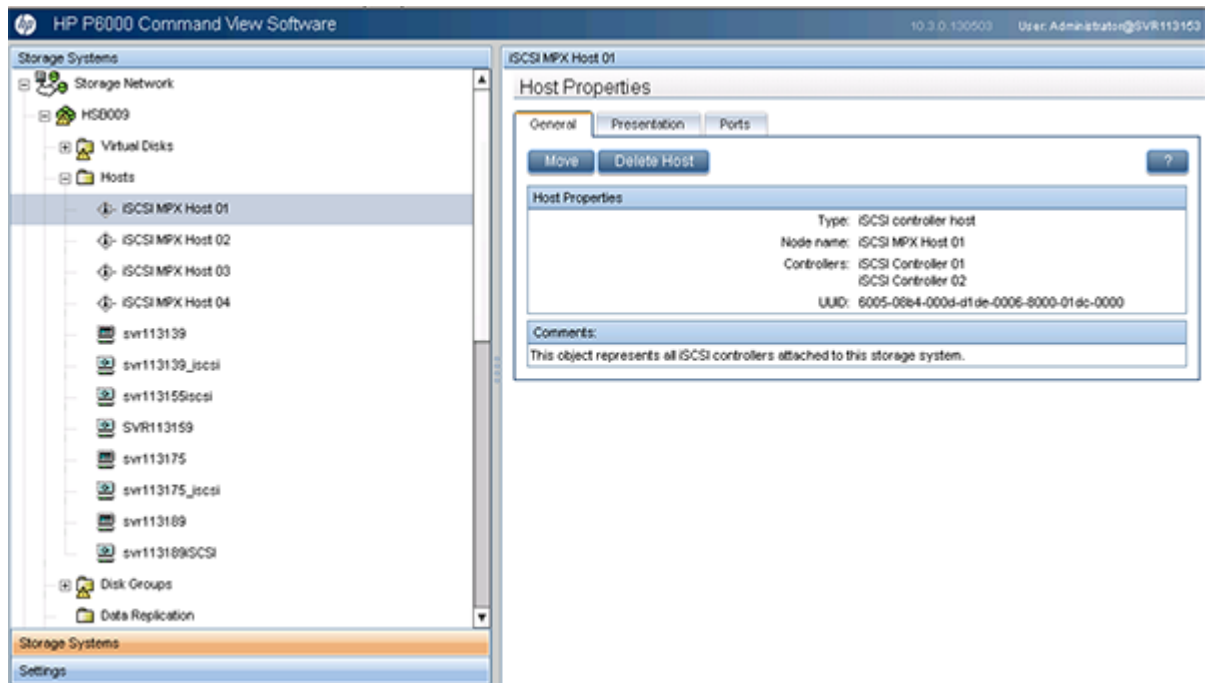


Figure 28 iSCSI/FCoE VPGO, Host 01 properties

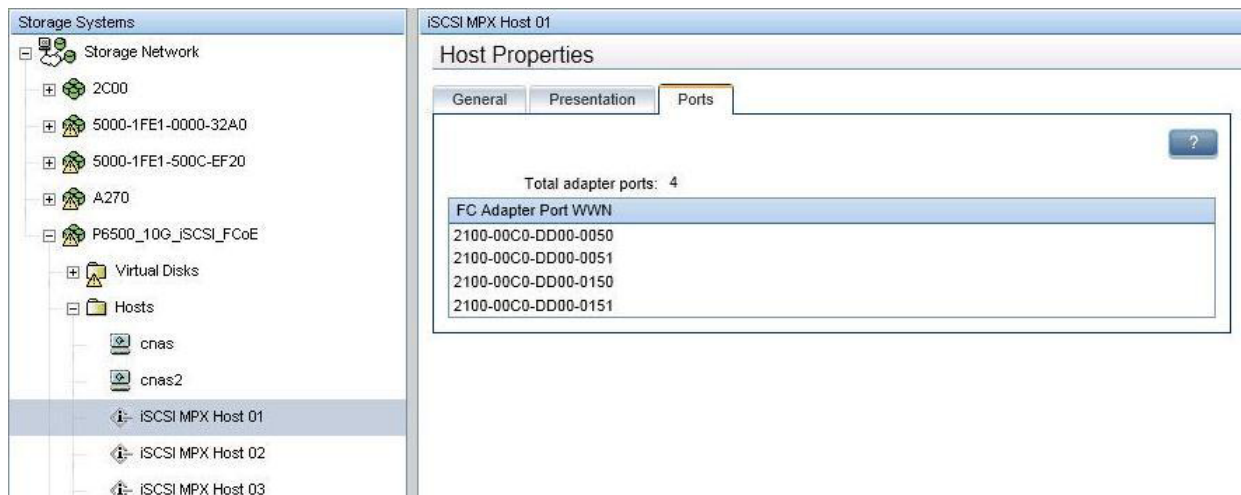


Figure 29 iSCSI/FCoE VPG1, Host 02 properties

The screenshot displays the HP Command View interface. On the left, the 'Storage Systems' tree shows a hierarchy: Storage Network > P6500_10G_iSCSI_FCoE > Hosts > iSCSI MPX Host 02. The right pane shows the 'Host Properties' dialog for 'iSCSI MPX Host 02'. The 'Ports' tab is selected, showing a table of FC Adapter Port WWNs:

FC Adapter Port WWN
2101-00C0-DD00-0050
2101-00C0-DD00-0051
2101-00C0-DD00-0150
2101-00C0-DD00-0151

Figure 30 iSCSI/FCoE VPG2, Host 03 properties

The screenshot displays the HP Command View interface. On the left, the 'Storage Systems' tree shows a hierarchy: Storage Network > P6500_10G_iSCSI_FCoE > Hosts > iSCSI MPX Host 03. The right pane shows the 'Host Properties' dialog for 'iSCSI MPX Host 03'. The 'Ports' tab is selected, showing a table of FC Adapter Port WWNs:

FC Adapter Port WWN
2102-00C0-DD00-0050
2102-00C0-DD00-0051
2102-00C0-DD00-0150
2102-00C0-DD00-0151

Figure 31 iSCSI/FCoE VPG3, Host 04 properties

The screenshot displays the HP Command View interface. On the left, the 'Storage Systems' tree shows a hierarchy: Storage Network > P6500_10G_iSCSI_FCoE > Hosts > iSCSI MPX Host 04. The right pane shows the 'Host Properties' dialog for 'iSCSI MPX Host 04'. The 'Ports' tab is selected, showing 'Move' and 'Delete Host' buttons. Below, the 'Host Properties' table is displayed:

Type:	iSCSI controller host
Node name:	iSCSI MPX Host 04
Controllers:	iSCSI Controller 01 iSCSI Controller 02
UUID:	6001-4380-05df-ea61-0001-4000-39ba-0000

The 'Comments' section contains the text: "This object represents all iSCSI controllers attached to this storage system."

The FCoE ports have assigned WWNs (Figure 32 (page 46)). HP P6000 Command View manages two levels of LUN mapping. The first level is to the iSCSI MPX host (and underlying iSCSI or iSCSI/FCoE module FC ports) and the second level is to an iSCSI or an FCoE initiator. The FCoE initiator is shown in Figure 33 (page 46). An FCoE host is defined with one WWN, and in support of multipathing LUN presentations, presents a LUN to multiple FCoE hosts, which are under common multipathing management. HP P6000 Command View supports instantiating FC, iSCSI, and FCoE host types (as shown in Figure 33 (page 46)). Simultaneous presentation of a virtual disk to different host types, spanning multiple protocols is not supported.

Figure 32 iSCSI/FCoE module FC and FCoE ports displayed based on WWNs

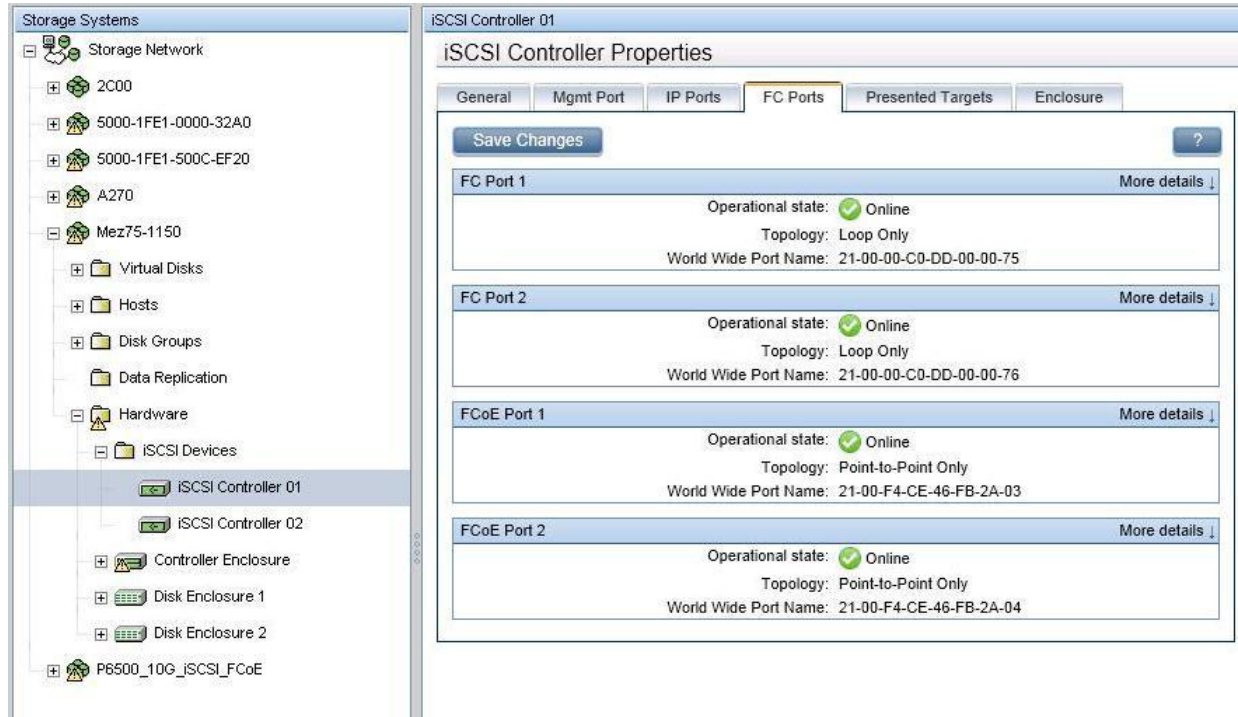
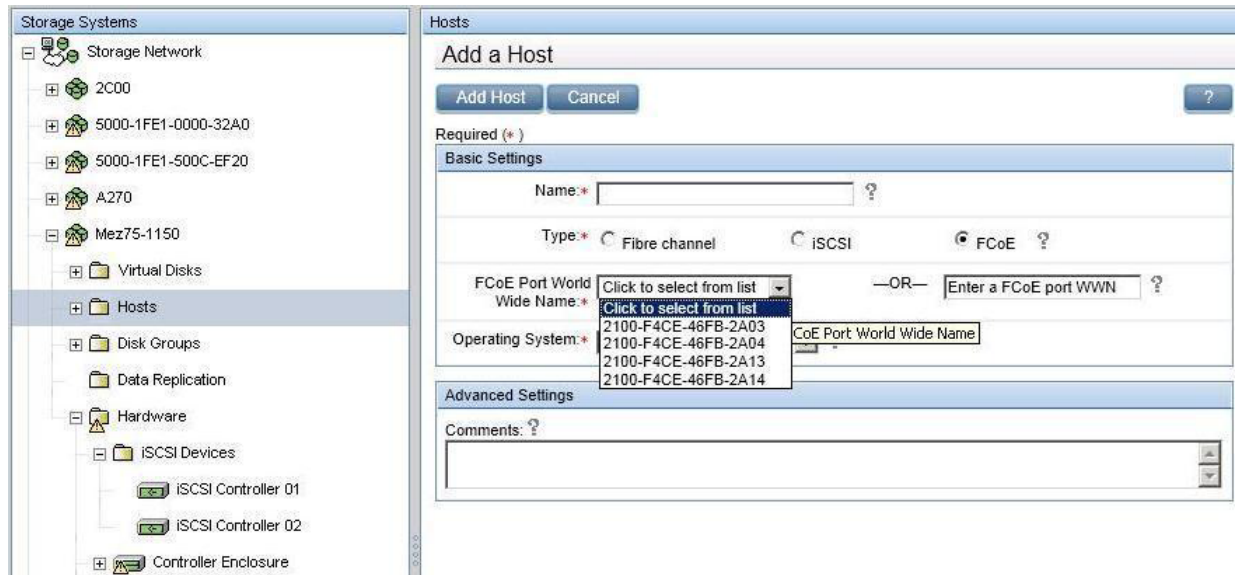


Figure 33 Add FCoE host based on a WWN



iSCSI uses iSCSI Qualified Name (IQN) naming of the target and initiator while FC and FCoE use World Wide Name (WWN) naming of the target and initiator.

The format of the iSCSI module IQN is:

iqn.2004-09.com.hp:mez50.<module>.<vp_group>.<Target Port WWPN>
 <vp_group> is 01, 02, 03, 04;
 <module> can be 1 (left) or 2 (right)

Example 1 iSCSI module IQN

iqn.2004-09.com.hp:fcgw.mez50.1.01.5001438004448a08

The format of the iSCSI/FCoE module IQN is as follows :

Iqn.2004-09.com.hp.mez75.<module>.<vp_group>.<TargetPortWWPN>
 <vp_group> is 01, 02, 03, 04;
 <module> can be 1 (left) or 2 (right)

Example 2 iSCSI/FCoE module IQN

iqn.2004-09.com.hp:fcgw.mez75.2.02.5001438004448a09

Figure 34 (page 47) shows the two levels of FCoE LUN mapping.

Figure 34 iSCSI/FCoE two level LUN mapping presentation

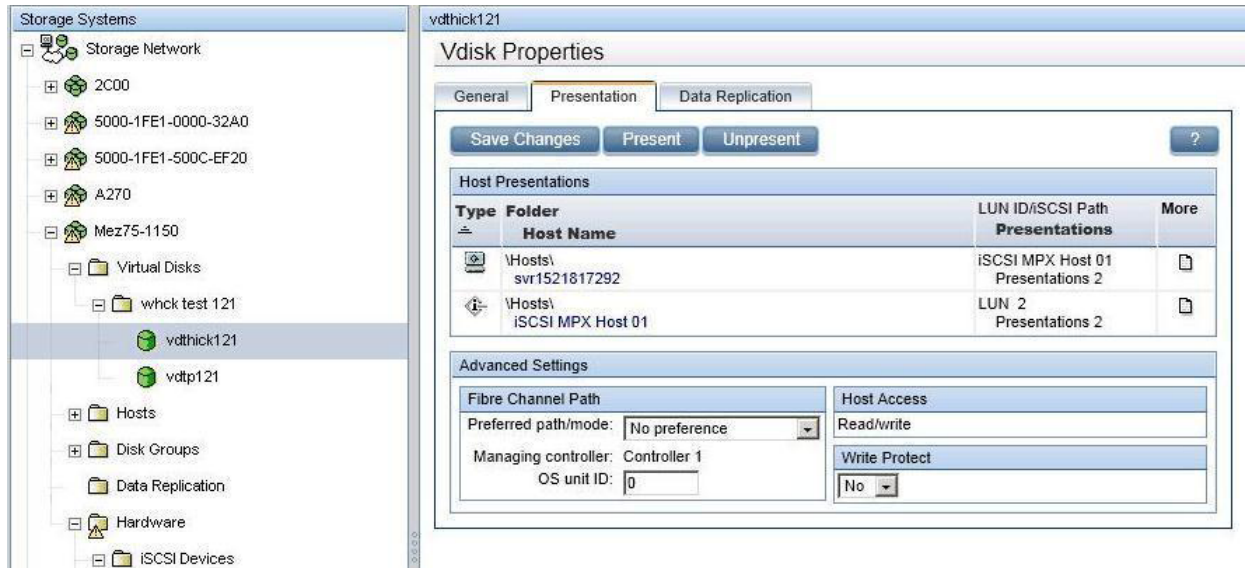
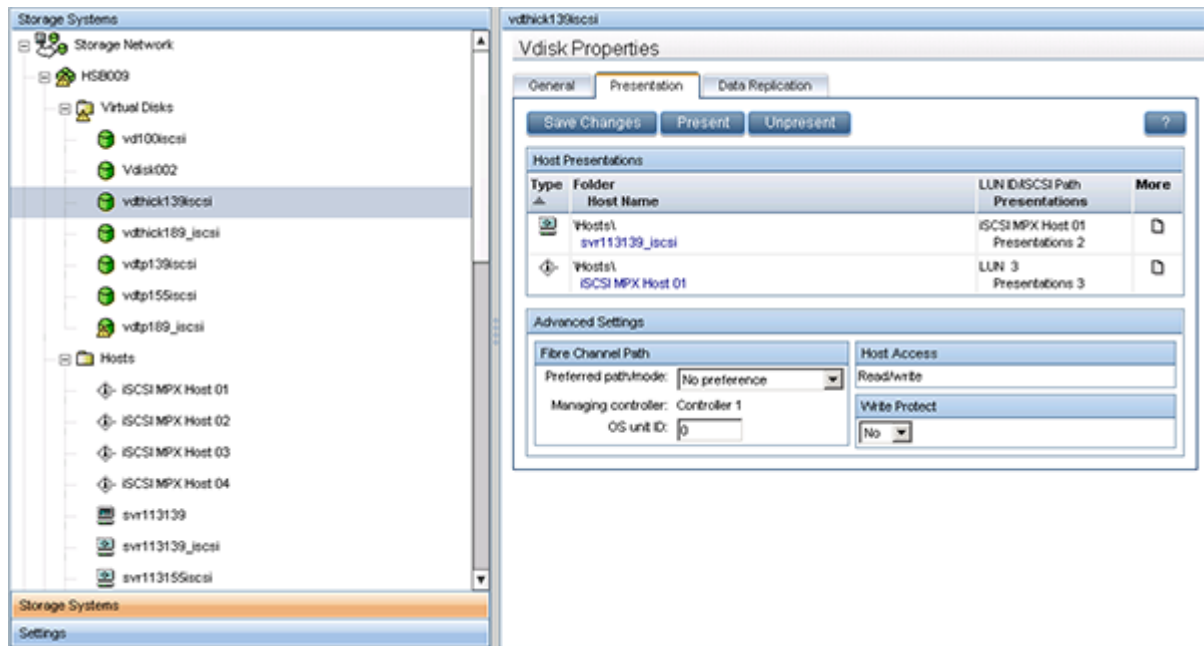


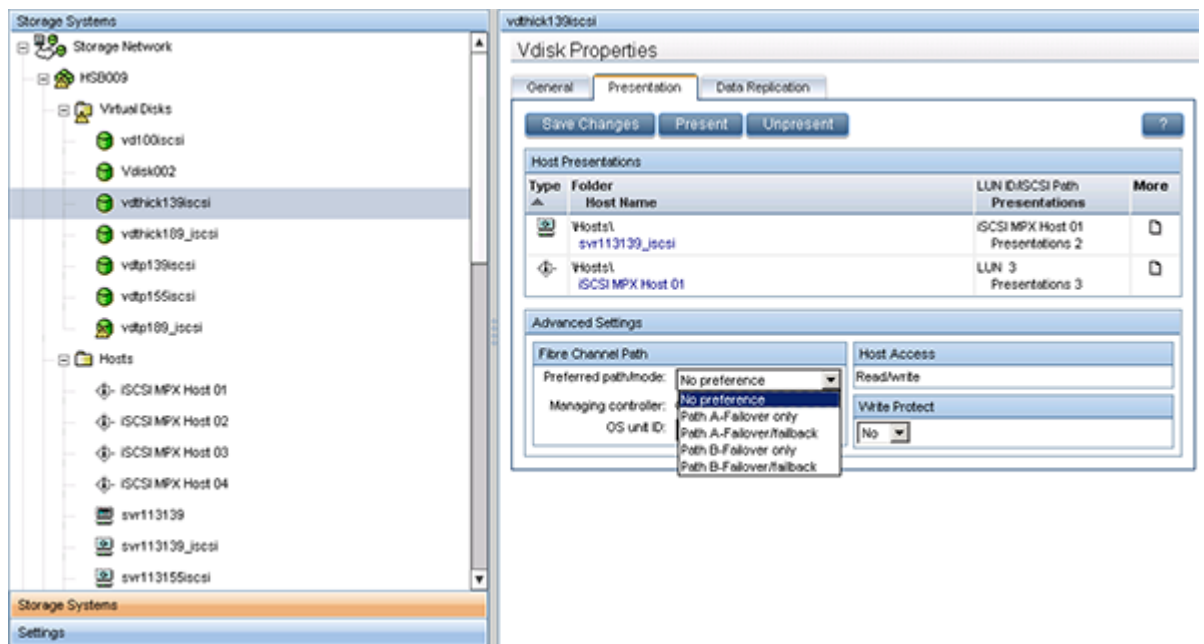
Figure 35 (page 48) shows the two levels of iSCSI LUN mapping.

Figure 35 iSCSI two level LUN mapping presentation



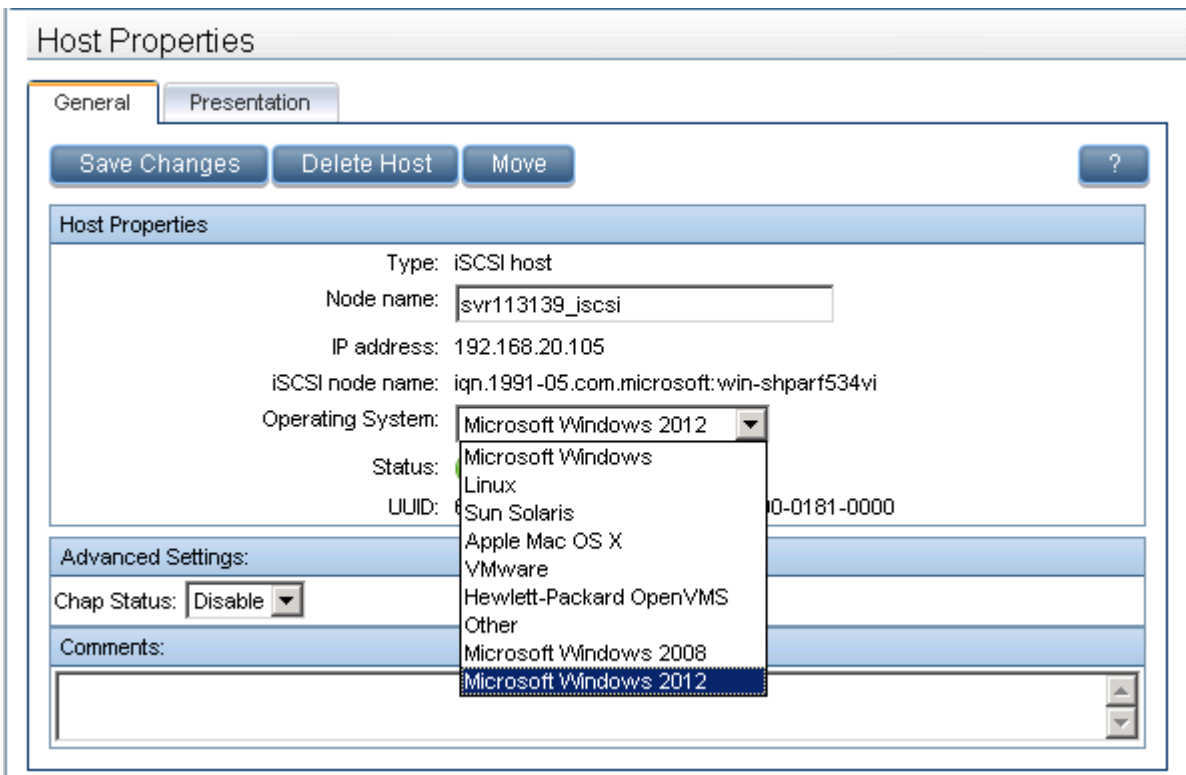
You can also select an additional level of optimization by selecting which controller manages the presented LUN by specifying the managing controller and the failover option (Figure 36 (page 48)).

Figure 36 iSCSI/FCoE preferred path optimization



While presenting the Vdisk to a Windows 2012 host, selected Microsoft Windows 2012 from the **Operating System** menu.

Figure 37 Selecting a Windows 2012 host



Configuring the iSCSI IP ports

To use the iSCSI IP data ports, each must have an IP address and be enabled. By default, the data ports are disabled.

1. Select the iSCSI or iSCSI/FCoE controller in the Navigation pane to display the iSCSI Controller Properties window (Figure 38 (page 50)).
2. Select the **IP Ports** tab.
3. Set the IP attributes for each iSCSI port and enable the port (Figure 39 (page 50)).

Both IPv4 and IPv6 are supported for configuration. Security and integrity may be enhanced by using CHAP, Header and/or Data digests. Although there is negligible throughput impact with Header digest, the combined effects of the initiator and target data digests may have significant throughput impact.

NOTE: An iSCSI target portal IQN is created for each configured IP address.

Figure 38 iSCSI Controller Properties

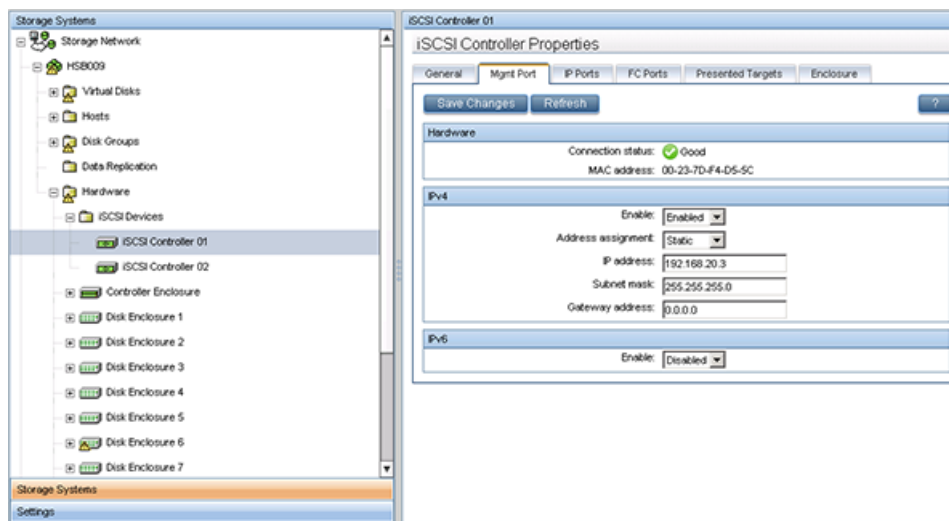
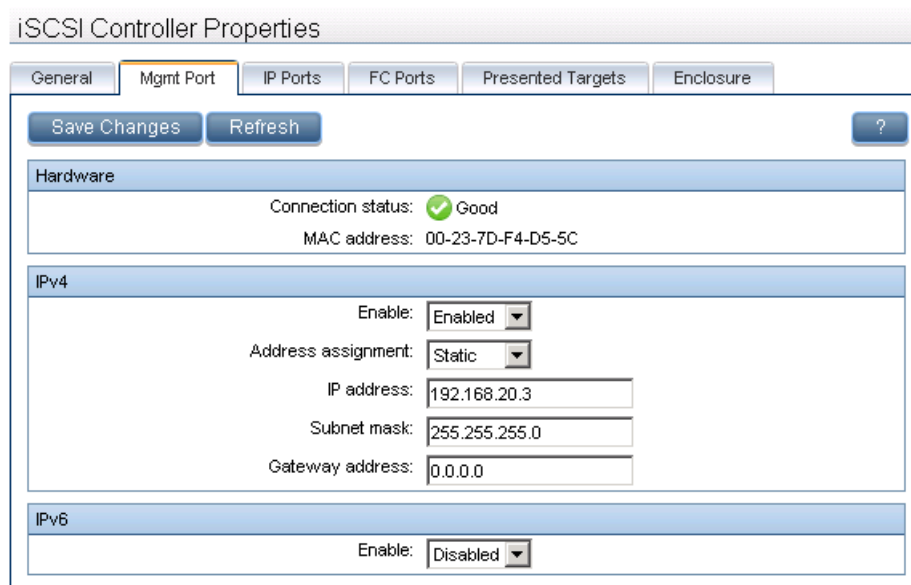


Figure 39 IP Ports Properties



Setting the time on the iSCSI or iSCSI/FCoE modules

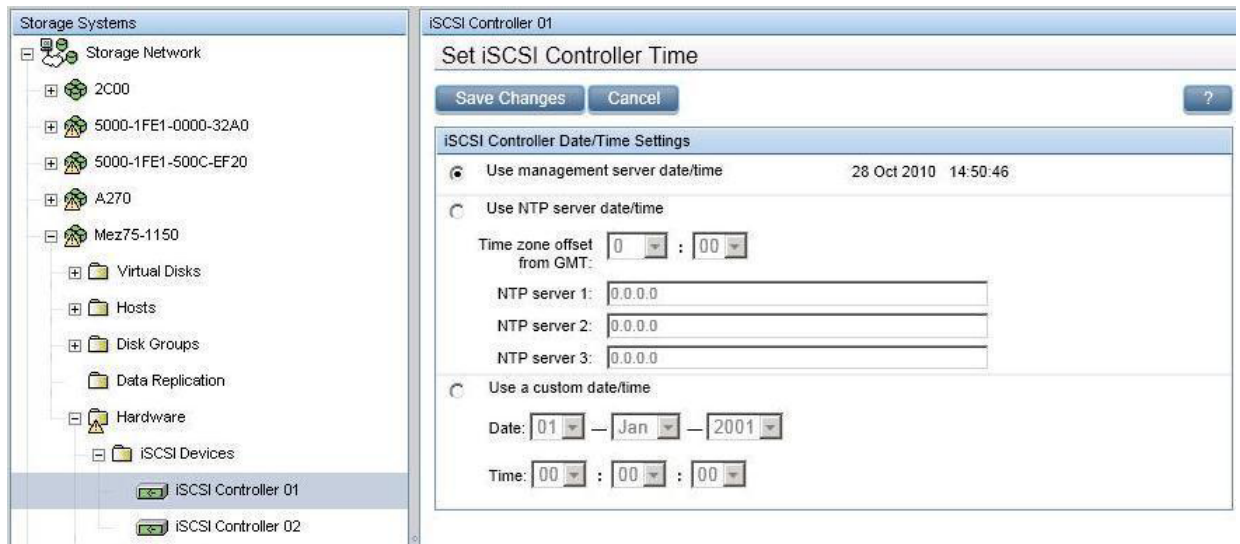
Setting the time is important to synchronize the event logs of the P6000 controllers (1 and 2) with the initiator event logs and to assist in troubleshooting.

1. Select the iSCSI controller in the Navigation pane.
2. Select **Set Options**, and then select **Set time options** from the iSCSI Controller Options menu.

HP P6000 Command View provides three options for setting the time as shown in [Figure 40 \(page 51\)](#).

NOTE: HP recommends using NTP settings if available on your IP network. This can provide redundancy with multiple time servers.

Figure 40 Set iSCSI Controller Time



Upgrading the iSCSI or iSCSI/FCoE module firmware

NOTE: HP recommends that you always use the current versions of iSCSI and iSCSI/FCoE module firmware, which is available on HP Software Depot:

<http://www.hp.com/support/software>

Updating the iSCSI or iSCSI/FCoE module firmware is separate from upgrading the XCS controller software, but the process is the same (using the Code Load function in HP P6000 Command View).

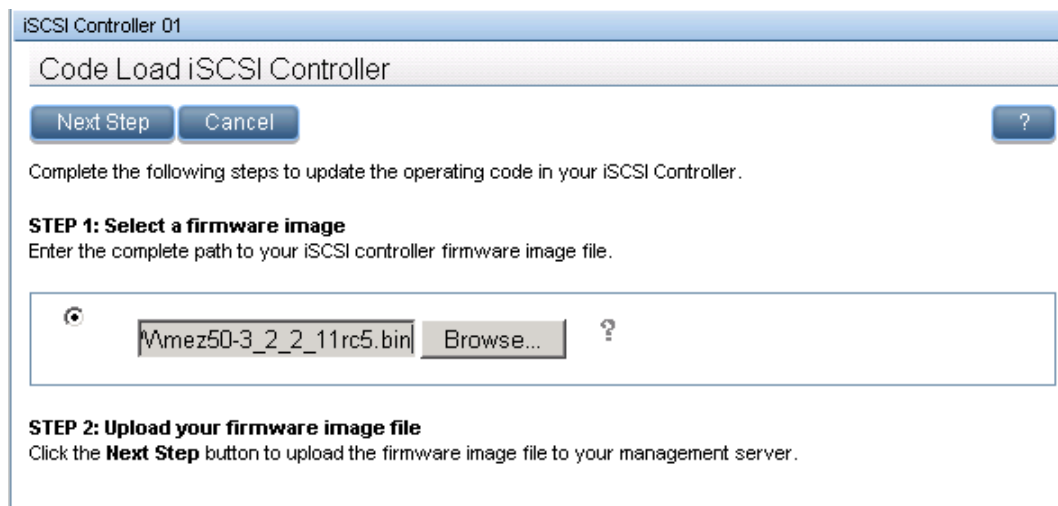
NOTE: HP recommends that you update one module at a time to avoid a service interruption.

To update the module firmware:

1. Select the iSCSI controller in the Navigation pane.
2. Select **Code Load**.

The Code Load iSCSI Controller window opens (Figure 41 (page 51)).

Figure 41 Code Load iSCSI Controller



3. Select **Browse**, and navigate to the new image file.
4. Select **Next Step**.
5. Select **Finish**.

6. Enter **YES** in the open dialog box.
7. Select **Update**.
The iSCSI or iSCSI/FCoE module will reboot after it is upgraded.

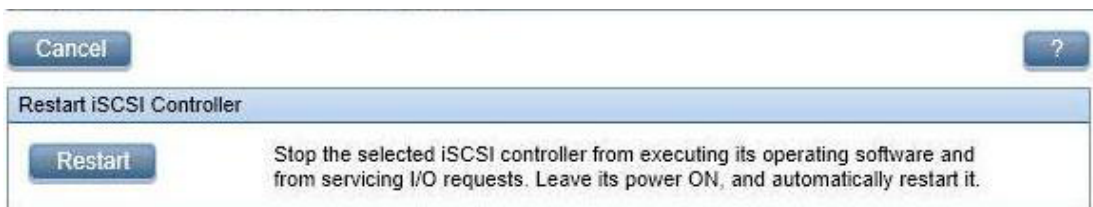
Restarting the iSCSI or iSCSI/FCoE module

If you determine that the iSCSI or iSCSI/FCoE modules must be rebooted, you can use HP P6000 Command View to restart the modules. Shutting down the iSCSI or iSCSI/FCoE modules through HP P6000 Command View is not supported. You must use the CLI to shut down the modules and then power cycle the array to power on the modules after the shutdown.

To restart a module:

1. Select the iSCSI controller in the Navigation pane.
2. Select **Shutdown** on the iSCSI Controller Properties window.
3. Select **Restart** on the iSCSI Controller Shutdown Options window (Figure 42 (page 52)).

Figure 42 iSCSI Controller Shutdown Options



To shut down an iSCSI or iSCSI/FCoE module using the CLI:

1. Log in to the serial or management port CLI.
2. Log in to the administrator account.
3. Enter the shutdown command. For example:

```
MEZ75 login: guest
Password: password
Welcome to MEZ75
*****
*
*                HP StorageWorks MEZ75
*
*
*****
MEZ75 #> admin start
Password      : *****
MEZ75 (admin) #> shutdown
Are you sure you want to shutdown the System (y/n): y
Shutdown completed.
System is in a state that is ready to be powered off.
MEZ75 #>
Connection to host lost.
```

NOTE: A shutdown places the iSCSI or iSCSI/FCoE module into a low power sleep state. A wake-up requires a controller power cycle, either by use of the on/off push button or by removing and re-installing the controller.

Saving or restoring the iSCSI or iSCSI/FCoE module configuration

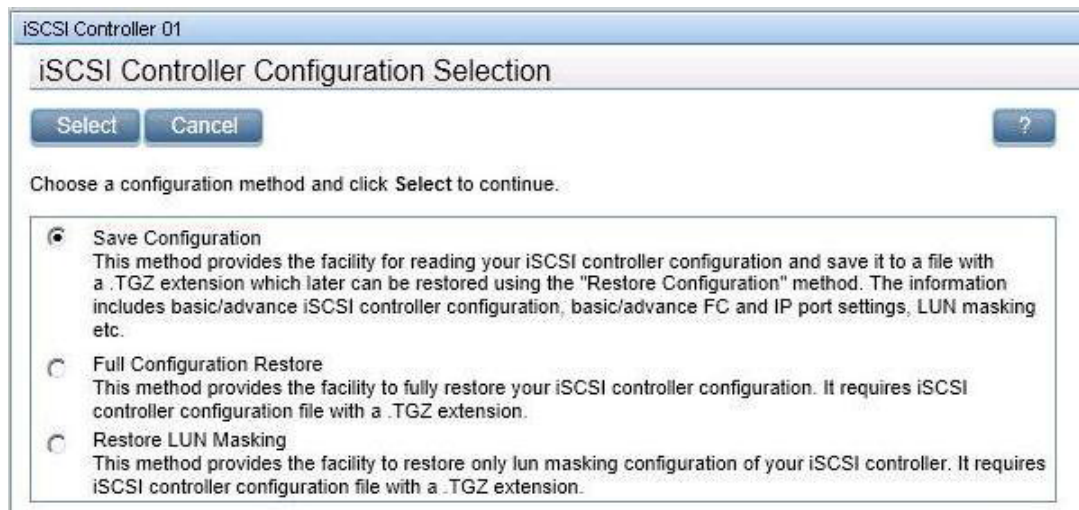
After the initial setup of the iSCSI or iSCSI/FCoE modules, save the configuration for each module, in case a service action is required. The Save Configuration function (Figure 43 (page 53)) enables you to save the configuration from a selected module to a file on the management server. You can use this file as a restoration point. The Full Configuration Restore function enables the restoration of the configuration to the point when the configuration was last saved (such as during the LUN

presentation to new initiators), and does not require the iSCSI or iSCSI/FCoE module to be in a factory reset state. If a new controller is installed, the full configuration can be restored and no reconfiguration is required. When using HP P6000 Command View to uninitialized a P63x0 or P65x0 array, the iSCSI or iSCSI/FCoE modules are issued reset mappings and are rebooted, to avoid stale persistent data, without clearing configured IP addresses.

NOTE: A Restore action will reboot the iSCSI or iSCSI/FCoE modules.

Periodic backup helps restore the iSCSI controller configuration for offline replacement. While enabling the backup configuration for iSCSI controller, you have to specify the time for periodic backup. This retrieves the existing iSCSI configuration from the controllers and save it on the local system.

Figure 43 iSCSI controller configuration selection



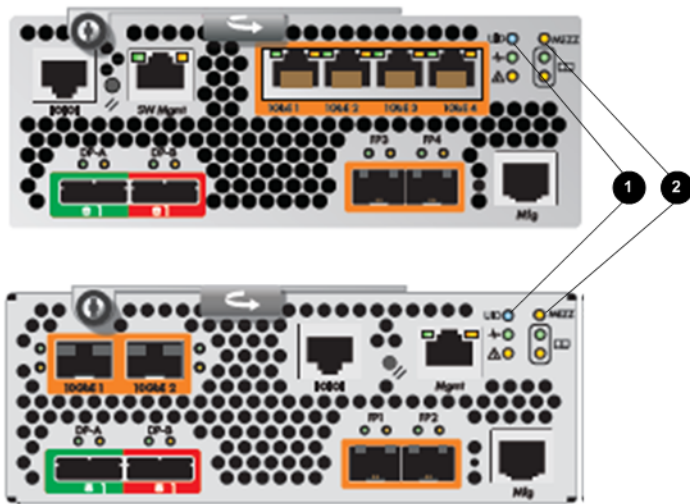
To save or restore the configuration:

1. Select the iSCSI controller in the Navigation pane.
2. Select **Set Options**.
3. Select **Save/Restore configuration**.
4. Select the configuration method.

Locating the iSCSI or iSCSI/FCoE modules

A blue UID LED (1, [Figure 44 \(page 54\)](#)) on each P6000 controller is shared by the array and the iSCSI and iSCSI/FCoE modules to indicate its location when the LED is flashing. The amber MEZZ LED (2, [Figure 44 \(page 54\)](#)) indicates the status of the iSCSI or iSCSI/FCoE module.

Figure 44 Controller UID LED and iSCSI module status LED

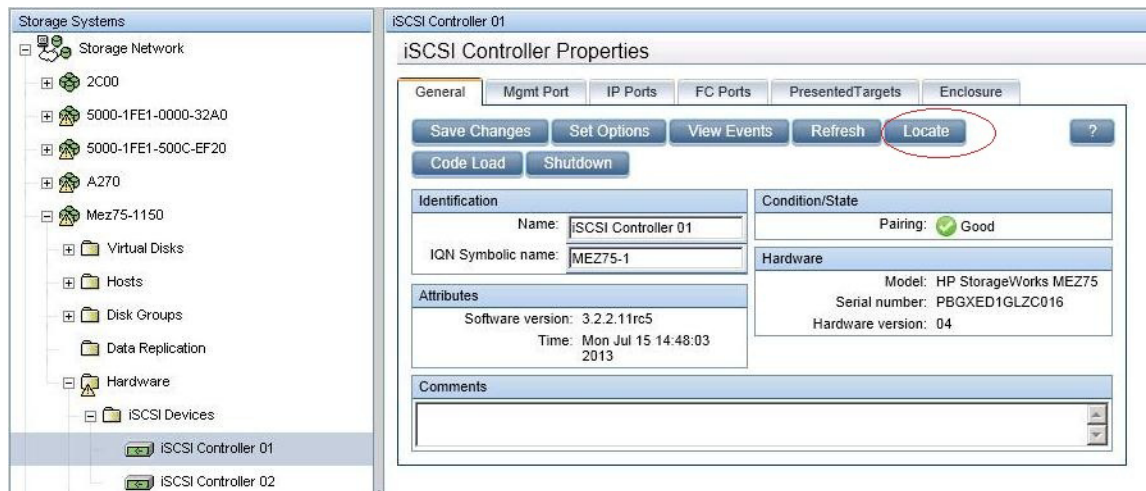


- 1. UID LED
- 2. MEZZ LED

To locate the iSCSI or iSCSI/FCoE module (and make the blue UID LED flash):

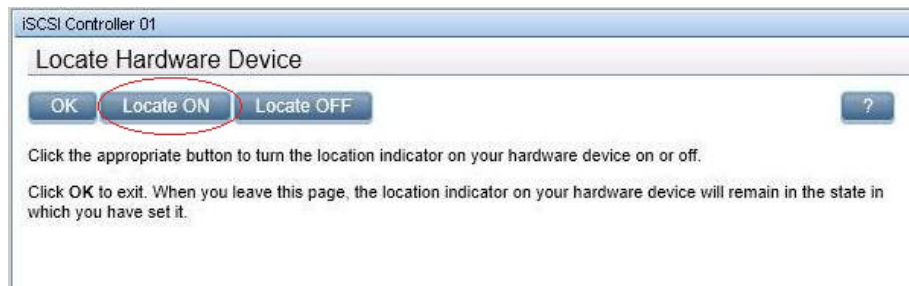
1. Select the iSCSI Controller in the Navigation pane.
2. Select **Locate** on the iSCSI Controller Properties window (Figure 45 (page 54)).

Figure 45 Locate button in iSCSI Controller Properties



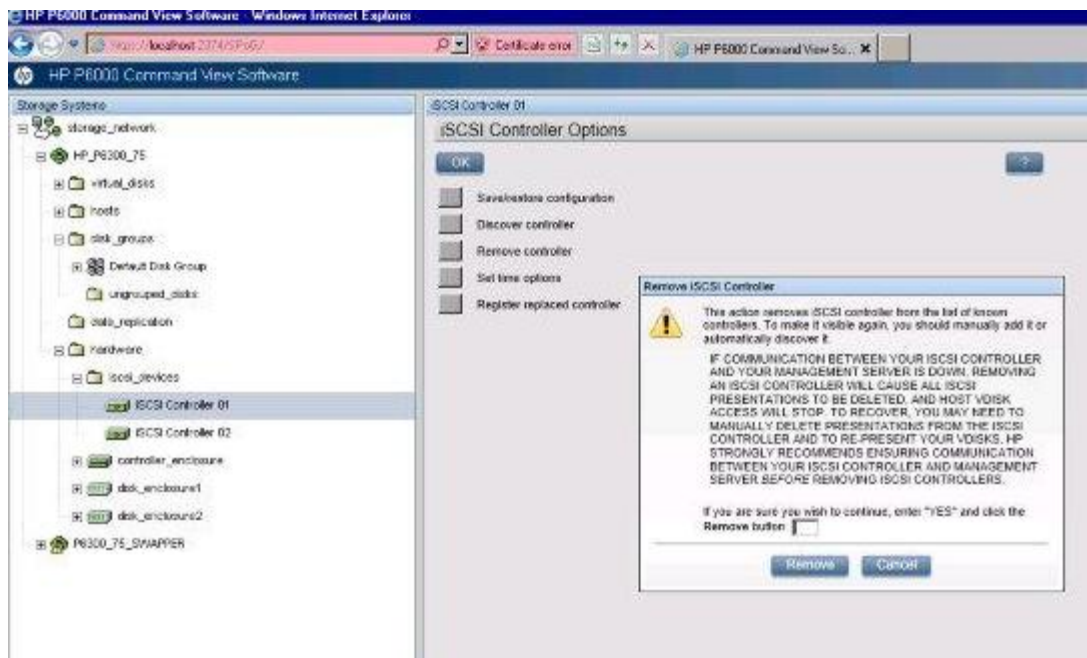
3. Select **Locate ON** on the Locate Hardware Device window (Figure 46 (page 54)).

Figure 46 Locate hardware device



NOTE: The flashing blue Locate LED turns off after 15 minutes.

Figure 47 iSCSI Controller options



P6000 Command View supports re-configuration of the iSCSI and iSCSI/FCoE modules by first providing the option to remove the controller from those discovered. This function is typically utilized when it is necessary to return to iSCSI Device discovery, perhaps due to management IP port address change, controller replacement, or a controller pairing failure. As illustrated in [Figure 47 \(page 55\)](#), the Remove controller function will delete the selected iSCSI Controller 01 or iSCSI Controller 02.

This function will not execute unless iSCSI and FCoE virtual disk presentations have been removed from the selected iSCSI Controller, however this function does not erase other iSCSI or iSCSI/FCoE configuration information, such as IP addresses or initiator registrations. Reset mappings or reset factory is required for each removed controller prior to returning and selecting the Discover or Add iSCSI Devices tabs. This allows P6000 Command View and the user to build new configuration settings.

7 Connecting to the management module

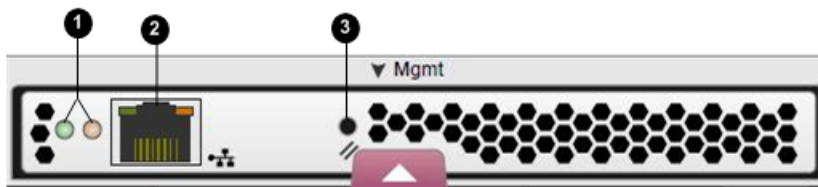
Overview

This chapter describes several optional procedures. Complete the procedures if any of the following situations apply. Otherwise, continue with [“Configuring servers using HP P6000 SmartStart”](#) (page 60).

- Run HP P6000 Command View from the management module, which eliminates the requirement for a management server.
- Change the host port default operating mode from the HP P6000 Control Panel for a direct connect configuration.
- Access the HP P6000 Control Panel to view array state and status information and edit basic configuration settings. See the HP P6000 Control Panel user guide for more information.

The management module has an MDI-X port that supports straight-through or crossover Ethernet cables. Use a Cat5e or greater cable to connect the management module from its Ethernet jack (2, [Figure 48](#) (page 56)) to the management server.

Figure 48 management module



1. Status LEDs
2. Ethernet jack
3. Reset button

Connecting to the management module

You can connect to the management module through a public or a private network.

NOTE: If you are using HP P6000 Command View on the management server to manage the P63x0/P65x0 EVAs, HP recommends that when accessing HP P6000 Command View on either the management server (server-based management) or the management module (array-based management), you use the same network. This is recommended until a multi-homed solution is available, which would allow the management module access to be configured on a separate network (private or different).

If you use a laptop to connect to the management module, configure the laptop to have an address in the same IP range as the management module (for example, 192.168.0.2 with a subnet mask of 255.255.255.0).

Connecting through a public network

1. Initialize the P63x0 EVA or P65x0 EVA storage system using HP P6000 Command View. For more information, see [“Initializing the storage system”](#) (page 36).
2. If it is currently connected, disconnect the public network LAN cable from the back of the management module in the controller enclosure.
3. Press and hold the recessed Reset button (3, [Figure 48](#) (page 56)) for 4 to 5 seconds. The green LED on the management module (1, [Figure 48](#) (page 56)) blinks to indicate the configuration reset has started. The reset may take up to 2 minutes to complete. When the

reset is completed, the green LED turns solid. This sets IP addresses of 192.168.0.1/24 (IPv4) and fd50:f2eb:a8a::7/48 (IPv6).

-
- ① **IMPORTANT:** At initial setup, you cannot browse to the HP P6000 Control Panel until you perform this step.
-
4. Do one of the following:
- Temporarily connect a LAN cable from a private network to the management module.
 - Temporarily connect a laptop computer directly to the management module using a LAN patch cable.
5. Browse to `https://192.168.0.1:2373/` or `https://[fd50:f2eb:a8a::7]:2373/` and log in as an HP EVA administrator. HP recommends that you either change or delete the default IPv4 and IPv6 addresses to avoid duplicate address detection issues on your network. The default user name is `admin`. No password is required during the initial setup. The HP P6000 Control Panel GUI appears.
-
- ① **IMPORTANT:** If you change the password for the administrator or user account for the HP P6000 Control Panel, be sure to record the new passwords since they cannot be cleared with resetting the management module.
HP recommends that you change the default passwords.
-
6. Select **Administrator Options > Configure Network Options**.
7. Enter an IP address and other network settings that apply.
-
- NOTE:** The reserved internal IP addresses are 10.253.251.230 through 10.253.251.249.
-
8. Click **Save Changes**. The IP address changes immediately, causing you to lose connectivity to the HP P6000 Control Panel.
The new IP address is stored and remains in effect, even when the storage system is later shut down or restarted.
-
- ① **IMPORTANT:** The new IP address will be lost if the storage system is later uninitialized or the management module is reset.
-
9. Remove the LAN cable to the private network or laptop and reconnect the cable to the public network.
10. From a computer on the public network, browse to `https://new IP:2373` and log in. The HP P6000 Control Panel GUI appears.

Connecting through a private network

1. Press and hold the recessed Reset button (3, [Figure 48 \(page 56\)](#)) for 4 to 5 seconds. The green LED on the management module (1, [Figure 48 \(page 56\)](#)) blinks to indicate the configuration reset has started. The reset may take up to 2 minutes to complete. When the reset is completed, the green LED turns solid. This sets IP addresses of 192.168.0.1/24 (IPv4) and fd50:f2eb:a8a::7/48 (IPv6).
 2. Browse to `https://192.168.0.1:2373/` or `https://[fd50:f2eb:a8a::7]:2373/` and log in as an HP EVA administrator. HP recommends that you either change or delete the default IPv4 and IPv6 addresses to avoid duplicate address detection issues on your network. The default user name is `admin`. No password is required during the initial setup. The HP P6000 Control Panel GUI appears.
-
- ① **IMPORTANT:** At initial setup, you cannot browse to the HP P6000 Control Panel until you perform this step.
-

3. Select **Administrator Options > Configure Network Options**.
4. Enter an IP address and other network settings that apply.

NOTE: The reserved internal IP addresses are 10.253.251.230 through 10.253.251.249.

5. Click **Save Changes**. The IP address changes immediately, causing you to lose connectivity to the HP P6000 Control Panel.

The new IP address is stored and remains in effect, even when the storage system is shut down or restarted.

- ① **IMPORTANT:** The new IP address will be lost if the storage system is later uninitialized or the management module is reset.
-

6. From a computer on the private network, browse to **https://newly configured ip address:2373** and log in. The HP P6000 Control Panel GUI appears.

Accessing HP P6000 Command View on the management module

To access HP P6000 Command View on the management module:

1. Click **Use management module server**.
2. Click **Launch Command View EVA**. The logon window appears.
3. Enter the username and password for accessing HP P6000 Command View.

Changing the host port default operating mode

NOTE: Fibre Channel host ports must be connected or have an optical loopback plug installed. When using the loopback plug, the host port must be configured for direct connect.

By default, a storage system is shipped to operate in a Fibre Channel switch environment and is configured in *fabric* mode. If you choose to connect the storage system directly to a server, you must change the host port operating mode to *direct* mode. If you do not change this mode, the storage system will be unable to communicate with your server. Use the HP P6000 Control Panel to change the default operating mode.

NOTE: Change your browser settings for the HP P6000 Control Panel as described in the *HP P6000 Command View Installation Guide*. You must have administrator privilege to change the settings in the HP P6000 Control Panel.

To change the default operating mode:

1. Connect to the management module using one of the methods described in “[Connecting through a public network](#)” (page 56) or “[Connecting through a private network](#)” (page 57).
2. Log into the HP P6000 Control Panel as an HP P6000 administrator. The HP P6000 Control Panel is displayed.
3. Select **Administrator Options > Configure Controller Host Ports** (Figure 49 (page 59)).
4. Select the controller.

Figure 49 Configure controller host ports window

The screenshot shows the 'StorageWorks Enterprise Virtual Array' web interface. The top navigation bar includes the HP logo and the text 'StorageWorks Enterprise Virtual Array'. On the right, it displays 'Server: 16.16.21.1 admin@mgmtmod' with links for 'Home', 'Help', and 'Log Off'. The left sidebar contains a 'System Status' section with 'System: Good', 'Controller 1: Good', and 'Controller 2: Good'. Below this is the 'Management Options' section, which is divided into 'User Options' (View system information, Configure User login options, View network information, Launch Command View EVA) and 'Administrator Options' (View detailed system information, Configure Administrator login options, Configure network options, Power down or restart system, Update management module firmware, Uninitialize system, **Configure controller host ports**, Configure controller device ports). Under 'Administrator Options', 'Configure controller host ports' is highlighted. Below that are 'Service Options' (View message logs, View last controller fault). The main content area is titled 'Controller 1 Host Port Properties' and has a '?' icon. It features two tabs: 'Controller 1' (selected) and 'Controller 2'. The configuration is organized into sections: 'Fibre Channel Switch' (Operational state: Not installed), 'Port FP1' (Operational state: Good, Connection state: Logged into fabric, World Wide Name: 5000-1FE1-5007-5558, Address: 10-1C-00, Speed: 1 Gb/s, Topology: Fabric, Save changes), and 'Port FP2' (Operational state: Good, Connection state: Logged into fabric, World Wide Name: 5000-1FE1-5007-5559, Address: 10-19-00, Speed: 2 Gb/s, Topology: Fabric, Save changes). The 'Topology' dropdown menu for Port FP1 is open, showing 'Fabric' and 'Direct' options.

5. In the Topology box, select **Direct** from the drop-down menu.
6. Click **Save Changes**.
7. Repeat [Step 4](#) through [Step 6](#) for other ports where direct connect is desired.
8. Close the HP P6000 Control Panel and remove the Ethernet cable from the server, however, you may want to retain access to the ABM to initialize the storage cell, for example.

Accessing the HP P6000 Control Panel through HP P6000 Command View

1. Select the storage system you want to access.
2. Select **Hardware > Controller Enclosure > Management Module**.
3. Click **Launch HP P6000 Control Panel**.

On rare occasions, the Launch HP P6000 Control Panel button may not appear due to invalid array state or if the management module IP address is unknown to HP P6000 Command View.

8 Configuring servers using HP P6000 SmartStart

Configuring management servers using HP P6000 SmartStart

Use this procedure if you are connecting the P63x0 EVA or P65x0 EVA to a management server for server-based management. For information about completing array configuration for server-based management, see the *HP P6000 Command View Installation Guide*.

1. Insert the HP P6000 SmartStart CD in the drive of the management server. The HP P6000 SmartStart tool runs automatically.
2. Read the conceptual information and browse the online help.
3. From the main menu, select **Start Now > Configure HP EVA management server**.
4. Follow the instructions in the wizard.

Configuring application servers using HP P6000 SmartStart

You can use HP P6000 SmartStart to configure Windows or Linux applications servers (hosts).

1. Insert the HP P6000 SmartStart CD in the drive of an application server. This may be the same server as your management server.

The HP P6000 SmartStart Storage tool runs automatically.

2. Do one of the following:
 - Select **Start Now > Configure HP FC application server**.
 - Select **Start Now > Configure iSCSI application server**.

The selected wizard feature appears.

3. Follow the instructions in the wizard.
4. Repeat this configuration process for each server in your HP P6000 Command View configuration.

Configuring application servers manually

For information about manually configuring application servers, see the *HP P63x0/P65x0 Enterprise Virtual Array User Guide*. See “[Related information](#)” (page 62) for the document location.

Using and monitoring your storage

To use the storage you have installed:

1. Start a server application.
2. Browse to a file system window and verify the drive letter of the virtual drive you have created.

Controller software recovery

A recovery CD containing the original XCS controller software installed on the array is shipped with your EVA. The CD is only needed for recovery purposes. The latest controller software can be found on the HP Software Depot web page:

<http://www.software.hp.com>

Installing HP Insight Remote Support software

HP strongly recommends that you install HP Insight Remote Support software to complete the installation or upgrade of your product and to enable enhanced delivery of your HP Warranty, HP Care Pack Service, or HP contractual support agreement. HP Insight Remote Support supplements your monitoring, 24x7, to ensure maximum system availability by providing intelligent event diagnosis, and automatic, secure submission of hardware event notifications to HP, which will initiate a fast and accurate resolution, based on your product’s service level. Notifications may be

sent to your authorized HP Channel Partner for on-site service, if configured and available in your country. The software is available in two variants:

- HP Insight Remote Support Standard: This software supports server and storage devices and is optimized for environments with 1–50 servers. Ideal for customers who can benefit from proactive notification, but do not need proactive service delivery and integration with a management platform.
- HP Insight Remote Support Advanced: This software provides comprehensive remote monitoring and proactive service support for nearly all HP servers, storage, network, and SAN environments, plus selected non-HP servers that have a support obligation with HP. It is integrated with HP Systems Insight Manager. A dedicated server is recommended to host both HP Systems Insight Manager and HP Insight Remote Support Advanced.

Details for both versions are available at:

<http://www.hp.com/go/insightremotesupport>

To download the software, go to Software Depot:

<http://www.software.hp.com>

Select **Insight Remote Support** from the menu on the right.

9 Support and other resources

Contacting HP

HP technical support

For worldwide technical support information, see the HP support website:

<http://www.hp.com/support>

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

Subscription service

HP recommends that you register your product at the Subscriber's Choice for Business website:

<http://www.hp.com/go/wvalerts>

After registering, you will receive e-mail notification of product enhancements, new driver versions, firmware updates, and other product resources.

Documentation feedback

HP welcomes your feedback.

To make comments and suggestions about product documentation, please send a message to storagedocsFeedback@hp.com. All submissions become the property of HP.

Related information

Documents

For documents referenced in this guide, see the **Manuals** page on the Business Support Center website:

<http://www.hp.com/support/manuals>

In the Storage section, click **Disk Storage Systems** or **Storage Software** and then select your product.

Websites

- HP:
<http://www.hp.com>
- HP Storage:
<http://www.hp.com/go/storage>
- HP Partner Locator:
http://www.hp.com/service_locator

- HP Software Downloads:
<http://www.hp.com/support/downloads>
- HP Software Depot:
<http://www.software.hp.com>
- HP Single Point of Connectivity Knowledge (SPOCK):
<http://www.hp.com/storage/spock>
- HP SAN manuals:
<http://www.hp.com/go/sdgmanuals>

Typographic conventions

Table 6 Document conventions

Convention	Uses
Blue text: Table 6 (page 63)	Cross-reference links
Blue, underlined text: http://www.hp.com	Website addresses
Bold text	<ul style="list-style-type: none"> • Keys that are pressed • Text typed into a GUI element, such as a box • GUI elements that are clicked or selected, such as menu and list items, buttons, tabs, and check boxes
<i>Italic</i> text	Text emphasis
Monospace text	<ul style="list-style-type: none"> • File and directory names • System output • Code • Commands, their arguments, and argument values
<i>Monospace, italic</i> text	<ul style="list-style-type: none"> • Code variables • Command variables
Monospace, bold text	Emphasized monospace text
.	Indication that the example continues.
WARNING!	An alert that calls attention to important information that if not understood or followed can result in personal injury.
CAUTION:	An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software.
IMPORTANT:	An alert that calls attention to essential information.
NOTE:	An alert that calls attention to additional or supplementary information.
TIP:	An alert that calls attention to helpful hints and shortcuts.

Customer self repair

HP customer self repair (CSR) programs allow you to repair your storage product. If a CSR part needs replacing, HP ships the part directly to you so that you can install it at your convenience.

Some parts do not qualify for CSR. Your HP-authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or see the CSR website:

<http://www.hp.com/go/selfrepair>

Rack stability

Rack stability protects personnel and equipment.

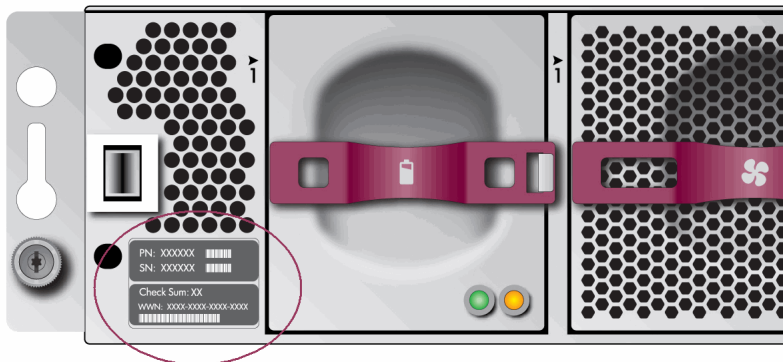
⚠ WARNING! To reduce the risk of personal injury or damage to equipment:

- Extend leveling jacks to the floor.
- Ensure that the full weight of the rack rests on the leveling jacks.
- Install stabilizing feet on the rack.
- In multiple-rack installations, fasten racks together securely.
- Extend only one rack component at a time. Racks can become unstable if more than one component is extended.

Location of WWN and serial number

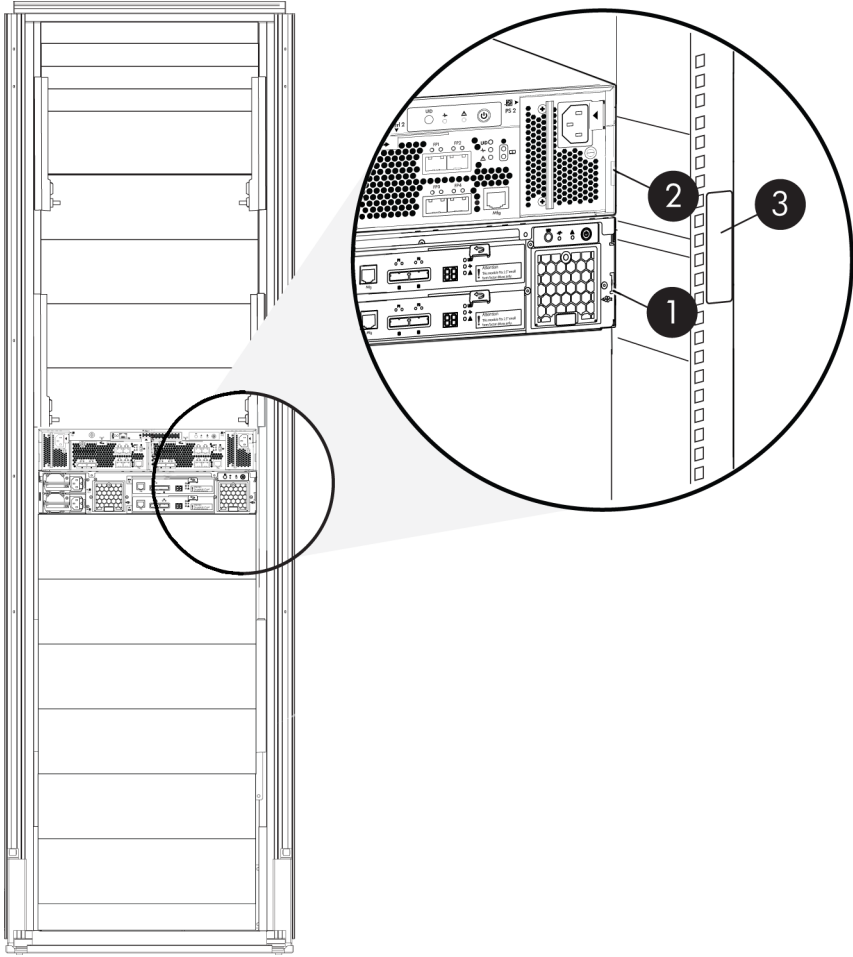
For service and support purposes, the location of the controller serial number, world wide name (WWN), and controller product number (after removing the controller front bezel) is shown in the red circle in [Figure 50 \(page 64\)](#).

Figure 50 Location of WWN and serial number



NOTE: For products ordered as bundled products that contain multiple products, the product number and serial number needed for service and support is shown in the circled area in [Figure 51 \(page 65\)](#), callout 3.

Figure 51 Location of WWN and serial number for bundled products



A Cabling the P63x0/P65x0 EVA

This appendix describes cabling instructions for the P63x0/P65x0 EVA. If you are using the P63x0/P65x0 EVA Fibre Channel controller and plan to configure it with an external iSCSI device, see the *HP MPX200 Multifunction Router User Guide*, which is available at:

<http://www.hp.com/support/manuals>

Under storage, select **Storage Networking**, and then select **HP MPX200 Multifunction Router** under Routers/Gateways/Multiplexers.

Overview

Instructions for a 2C6D configuration (2 controllers, 6 disk enclosures) are provided; these instructions can then be applied to any configuration. See [Table 7 \(page 66\)](#) for the minimum and maximum configurations.

Table 7 Minimum and maximum configurations

Array	Minimum configuration	Maximum configuration
P63x0 EVA	2C1D	2C10D
P65x0 EVA	2C2D	2C20D

The cabling diagrams in this appendix show the recommended fault-tolerant cabling. Fault-tolerant cabling is recommended because it enables the controllers to access the remaining disk enclosures if an I/O module or interconnect component (for example, a cable) fails.

This configuration creates two loops. For redundancy, the data path created by one of the loops starts at the top disk enclosure in the group and ends at the bottom enclosure. The other data path reverses this order; starting at the bottom disk enclosure and ending at the top enclosure.

Depending on your future expansion plans and available racking space, there are different ways to arrange the controller and disk enclosures in the rack (see [Figure 6 \(page 22\)](#)):

- Configure the controllers above the disk enclosures to maximize racking space.
- Configure the controllers between the disk enclosures to ensure future ease of expansion.

For information about adding disk enclosures to an existing configuration, see the *HP P63x0/P65x0 EVA M6612/M6625 Disk Enclosure Installation Instructions*. For information about expanding to another rack, see the *HP P63x0/P65x0 Enterprise Virtual Array Expansion Rack Reference Guide*.

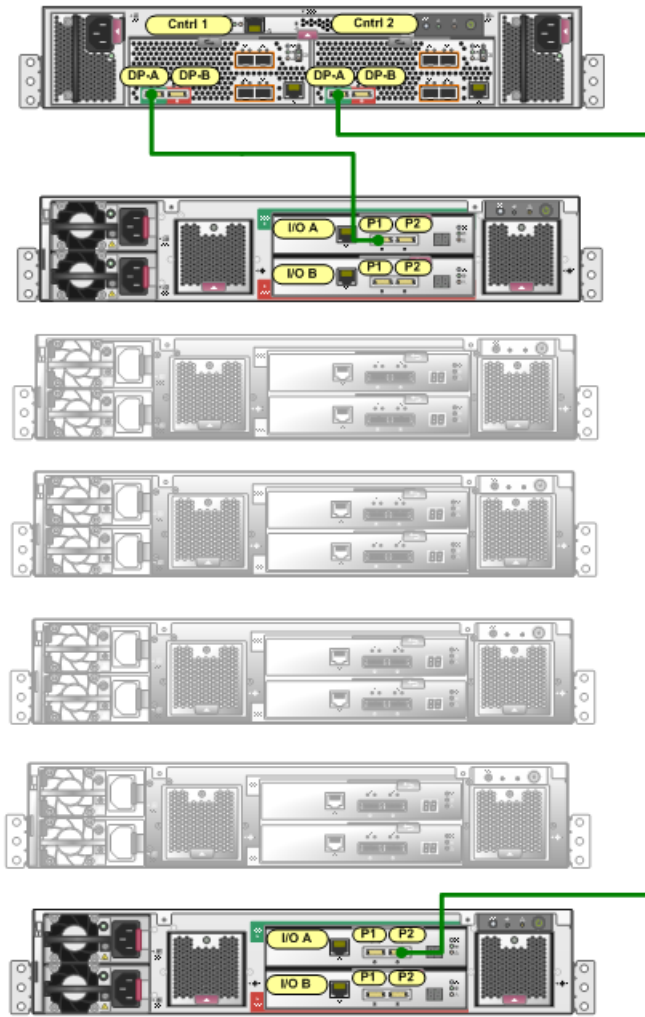
NOTE: When connecting cables, always connect cables to the same colored port (green port to green port, red port to red port). The cables shown in this document are colored green and red to easily identify connections. Use the colored cable labels (green and red) to facilitate color coding and identifying cable connections.

Connecting P63x0 EVA controllers to the disk enclosures (2C6D)

1. In the default configuration for the P63x0 EVA, the disk enclosures are located below the controller enclosure. Locate the top and bottom disk enclosures.

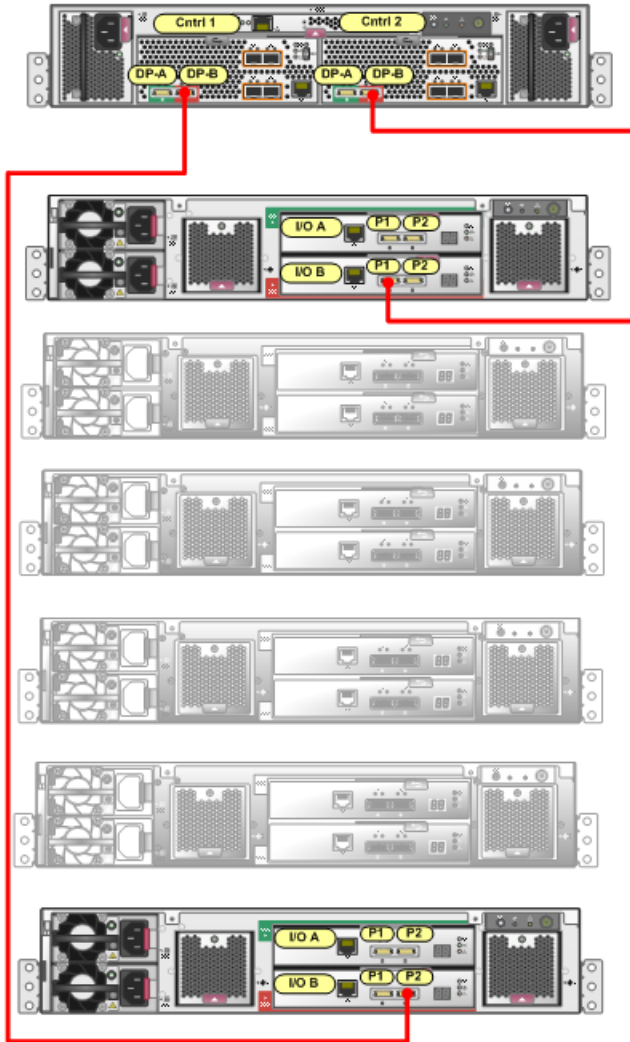
2. Connect the controller enclosure to I/O module A (green ports) on the top and bottom disk enclosures. This cabling represents one of the redundant paths for fault tolerance. Port P1 on I/O module A of the top disk enclosure and port P2 on I/O module A of the bottom disk enclosure represent the beginning and end of the path.

Figure 52 Cabling the first redundant path



3. Connect the controller enclosure to I/O module B (red ports) on the top and bottom disk enclosures. This cabling represents the second redundant path (P1 on I/O module B of the top disk enclosure and P2 on I/O module B of the bottom disk enclosure).

Figure 53 Cabling the second redundant path



4. Connect the disk enclosures together to complete the connectivity.

Figure 54 Cabling the disk enclosures

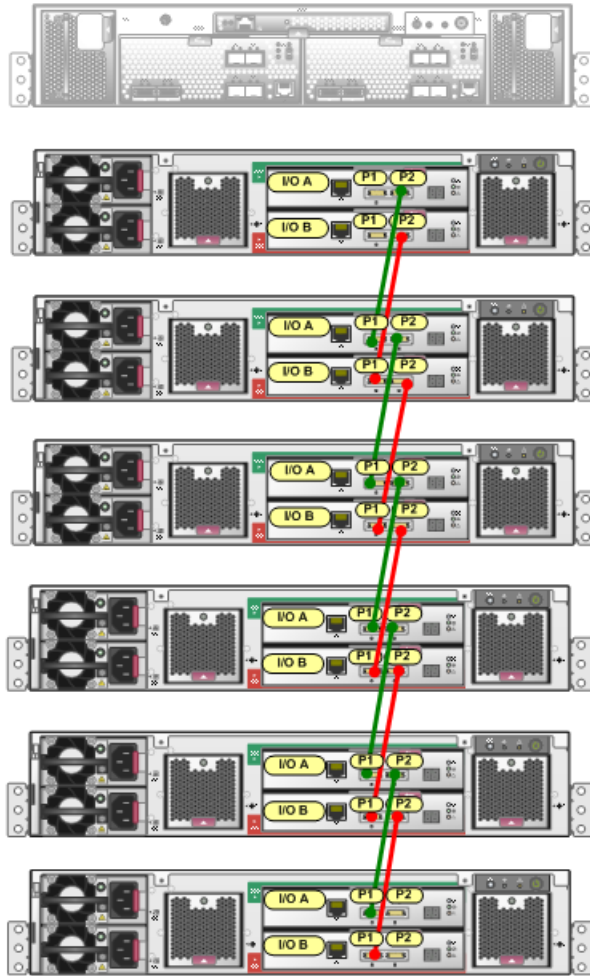
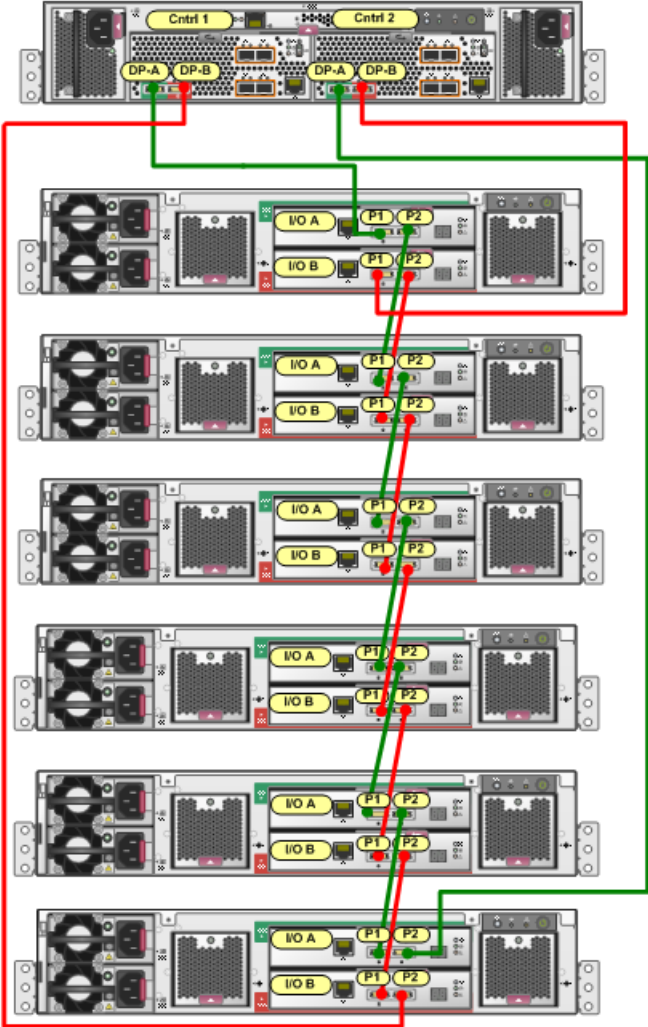


Figure 55 (page 70) shows the complete cabling for the P63x0 EVA 2C6D configuration.

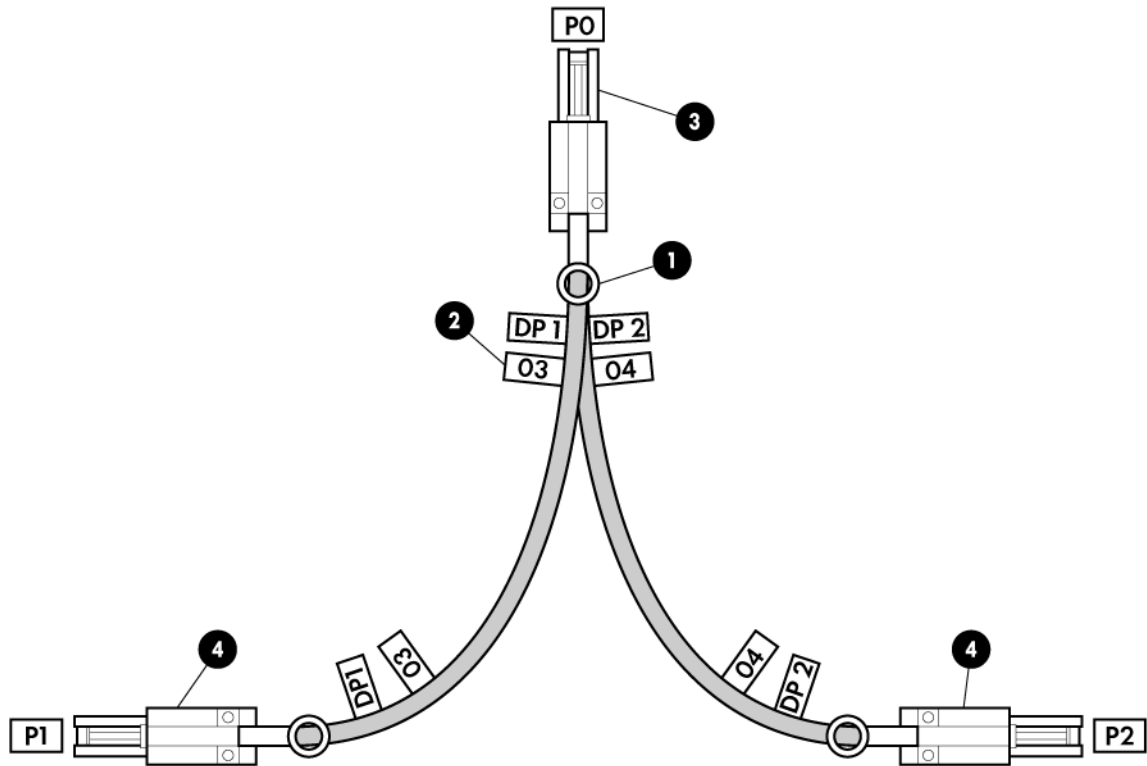
Figure 55 Complete cabling for the P63x0 EVA 2C6D



Connecting P65x0 EVA controllers to the disk enclosures (2C6D)

Y-cables (see [Figure 56 \(page 71\)](#)) are used to connect the P65x0 and enable each controller port to act as two ports. The Y-cables provide connectivity to each SAS domain (indicated as DP-1 and DP-2 on the cables in the diagrams). The Y-cable connector labeled item 3 in [Figure 56 \(page 71\)](#) is the input to a controller port. The two connectors labeled item 4 in the figure are outputs to a disk enclosure port. Each individual connectivity point from the Y-cable is the start of a SAS domain (P1 and P2 in [Figure 56 \(page 71\)](#)).

Figure 56 P65x0 Y-cable

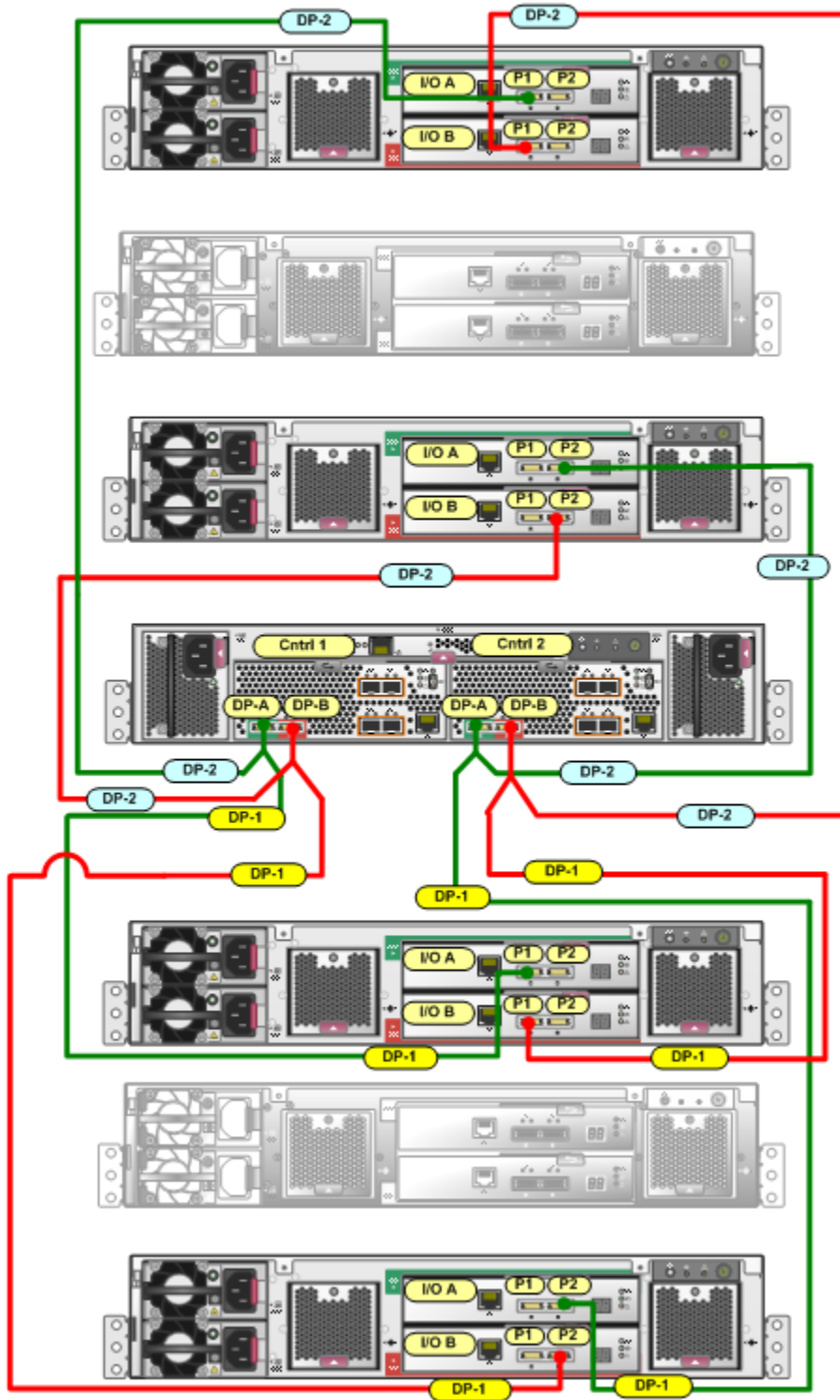


1. Pull tab (may also be a release bar)
3. Controller connector

2. Port number label
4. Disk enclosure connectors

1. Divide the disk enclosures into two groups. The first group contains the disk enclosures below the controller enclosure (domain DP-1); the second group contains the disk enclosures above the controller enclosure (domain DP-2).
2. Connect the top and bottom disk enclosures in each SAS domain. As shown in [Figure 57 \(page 72\)](#), there are two redundant paths in each SAS domain. In SAS domain DP-1, the first redundant path is port P1 of I/O module A on the top disk enclosure and port P2 of I/O module A on the bottom disk enclosure. The second redundant path is P1 of I/O module B on the top disk enclosure and P2 of I/O module B on the bottom disk enclosure. The same redundant paths are made in SAS domain DP-2.

Figure 57 Connecting the redundant paths in each SAS domain



3. Connect the disk enclosures in each group of disk enclosures together to complete the connectivity.

Figure 58 Cabling the disk enclosures together

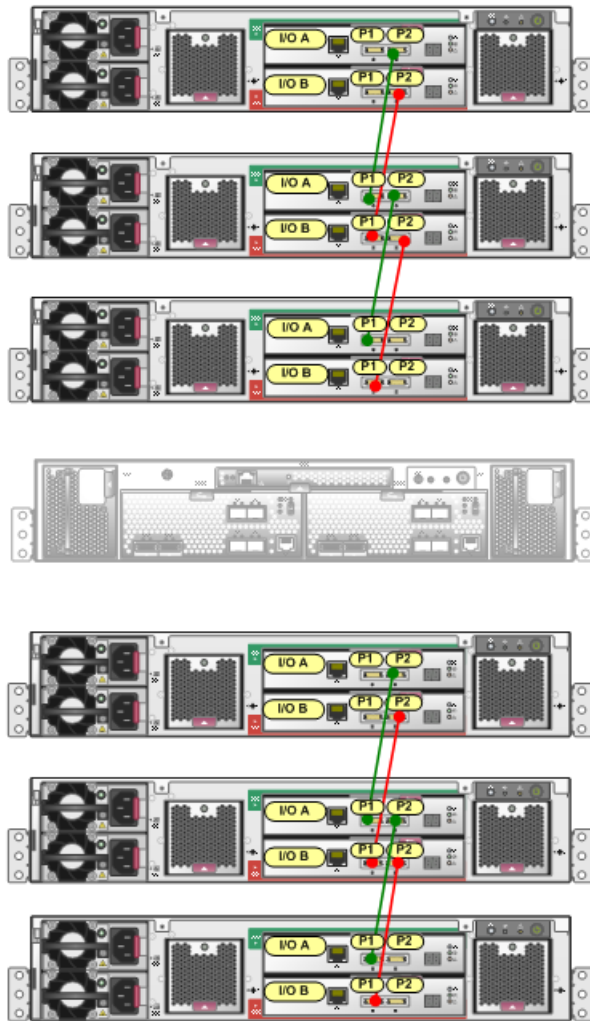
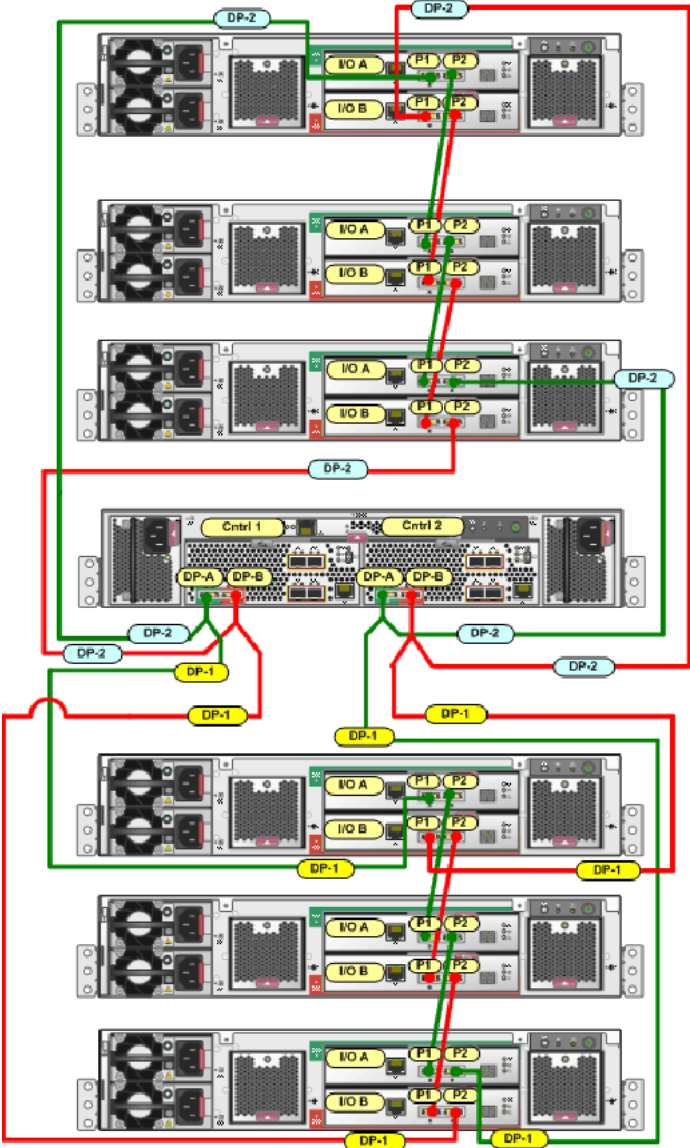


Figure 59 (page 74) shows the complete cabling for the P65x0 EVA 2C6D configuration.

Figure 59 Complete cabling for the P65x0 EVA 2C6D



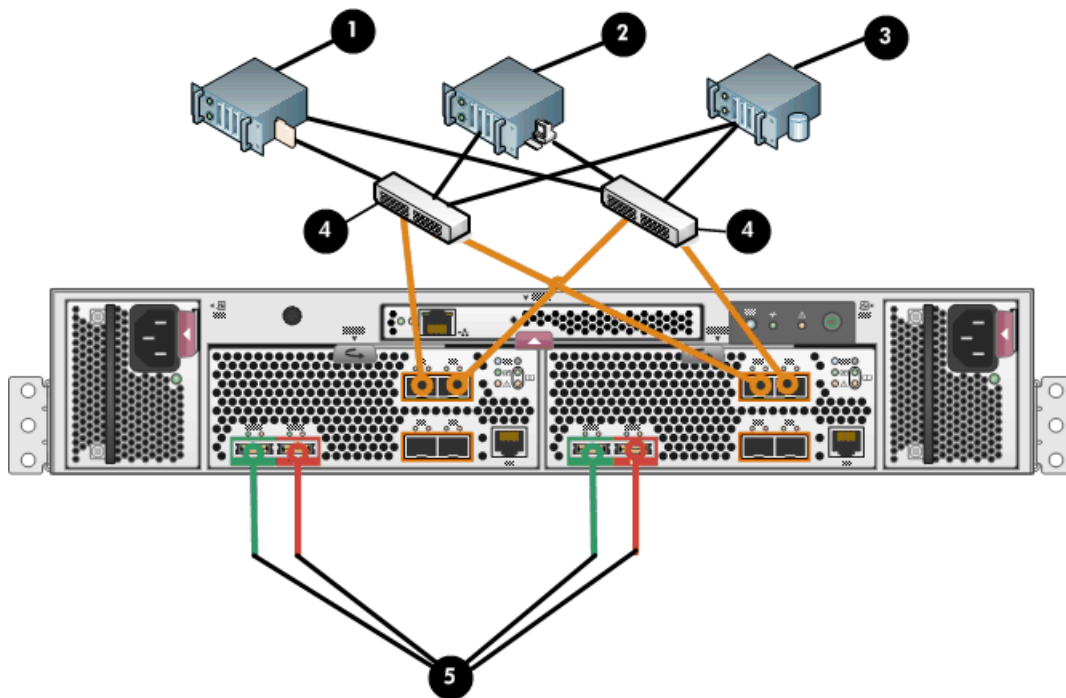
Connecting the P63x0/P65x0 EVA to servers and switches

Fibre Channel

You can connect the front end of the P63x0/P65x0 EVA FC controllers either to external Fibre Channel switches or directly to servers. The standard host port connectivity rule is to connect even controller ports to one fabric and odd controller ports to the other fabric. See [Figure 60 \(page 75\)](#) and [Figure 62 \(page 77\)](#) for front end connections with server-based management. See [Figure 61 \(page 76\)](#) and [Figure 63 \(page 78\)](#) for front end connections with array-based management.

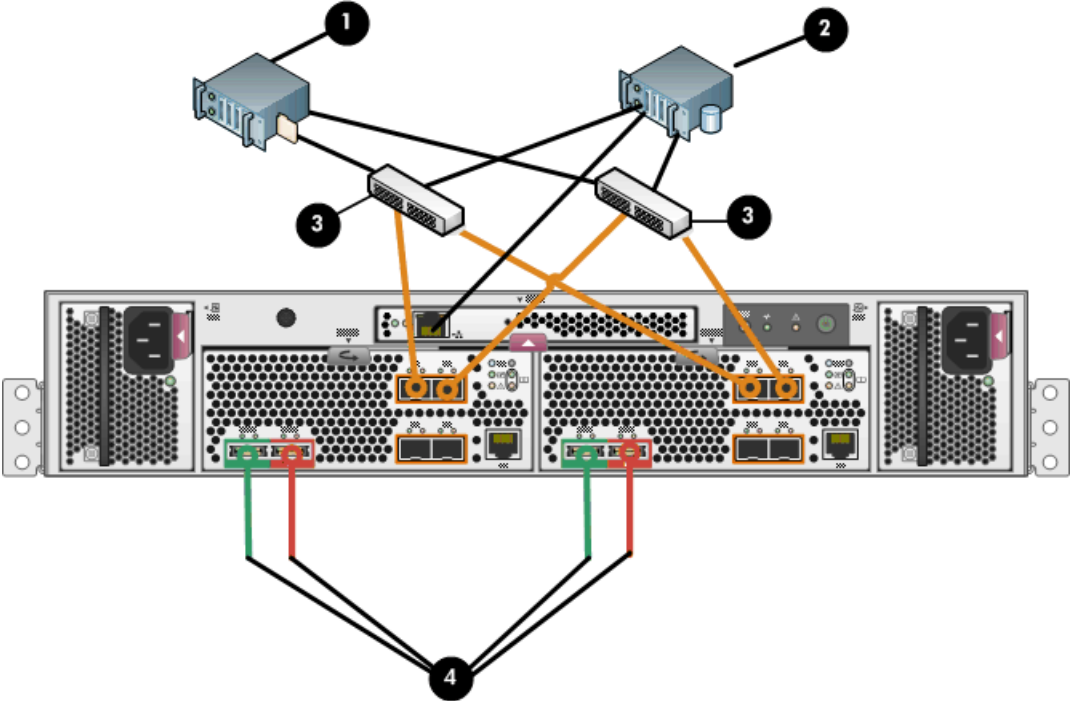
NOTE: The cabling diagrams in [Figure 60 \(page 75\)](#) through [Figure 63 \(page 78\)](#) require fabric connect mode, which is the default as shipped. The P63x0 is shown in these diagrams, but the port count and front-end cable placement is the same for the Fibre Channel version of the P65x0.

Figure 60 Cabling the controller to front end component—Fibre Channel to switch detail view with server-based management



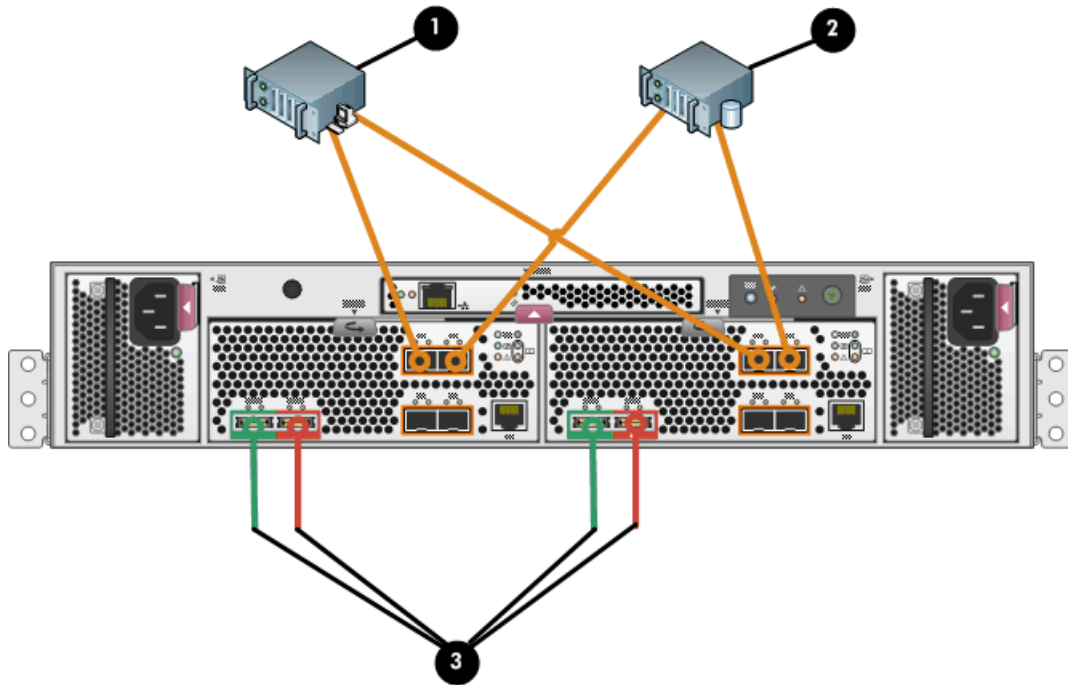
1. File server
2. Management server
3. Database server
4. Fiber channel switch
5. LED status indicators for cabling connections to disk enclosures. See [Figure 55 \(page 70\)](#) and [Figure 59 \(page 74\)](#) for cabling connections.

Figure 61 Cabling the controller to front end components—Fibre Channel to switch detail view with array-based management



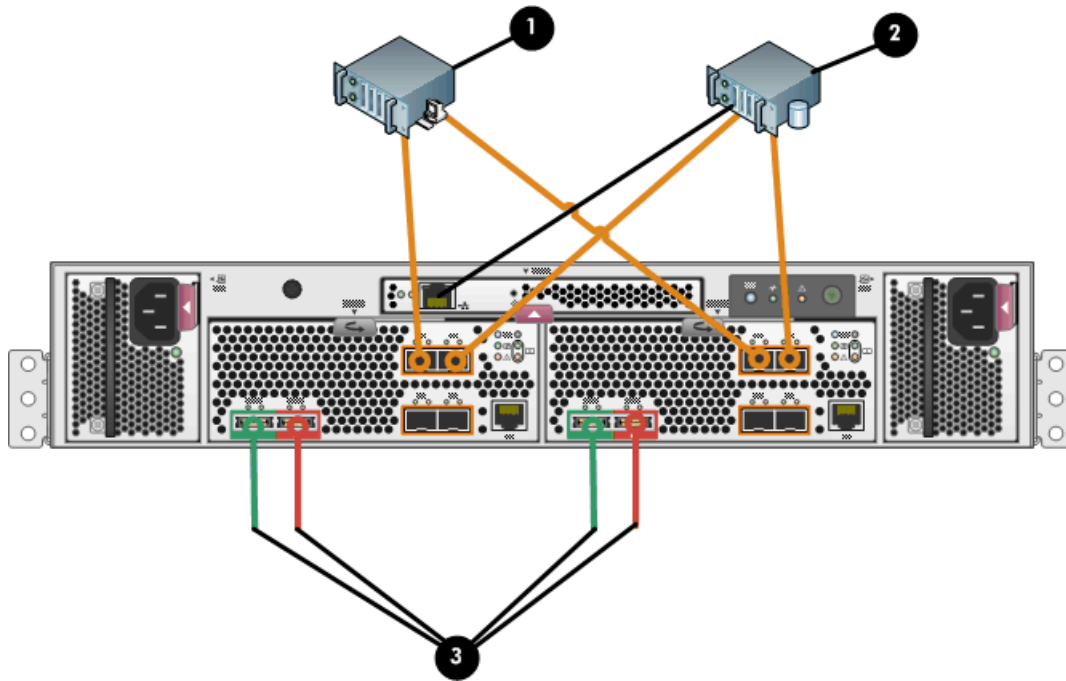
1. File server
2. Database server
3. Fiber channel switch
4. LED status indicators for cabling connections to disk enclosures. See [Figure 55 \(page 70\)](#) and [Figure 59 \(page 74\)](#) for cabling connections.

Figure 62 Cabling the controller to front end components—Direct Fibre Channel to servers with server-based management



1. Management server
2. Database server
3. LED status indicators for cabling connections to disk enclosures. See [Figure 55 \(page 70\)](#) and [Figure 59 \(page 74\)](#) for cabling connections.

Figure 63 Cabling the controller to front end component—direct Fibre Channel to servers with array-based management



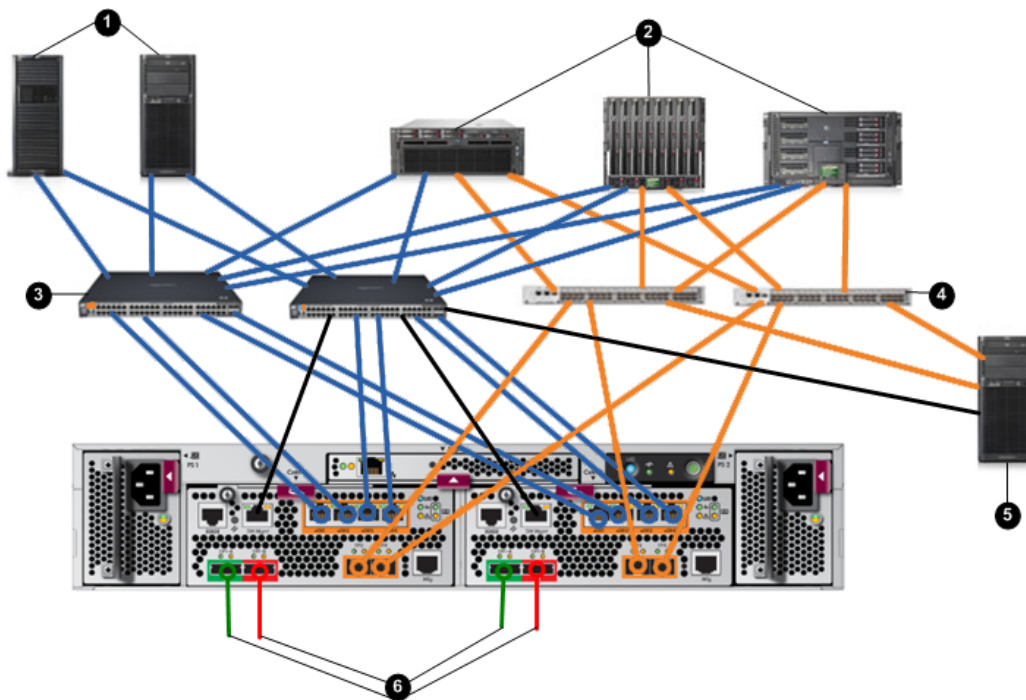
1. File server
2. Database server
3. Indicates cabling connections to disk enclosures. See [Figure 55 \(page 70\)](#) and [Figure 59 \(page 74\)](#) for cabling connections.

iSCSI and iSCSI/FCoE

You can connect the front of the P63x0/P65x0 EVA iSCSI or iSCSI/FCoE controllers to Ethernet, SAN, or FCoE switches as shown in the following diagrams. Connections shown in orange indicate 1 GbE, blue connections indicate 8 Gb/s FC, and black connections indicate Ethernet management.

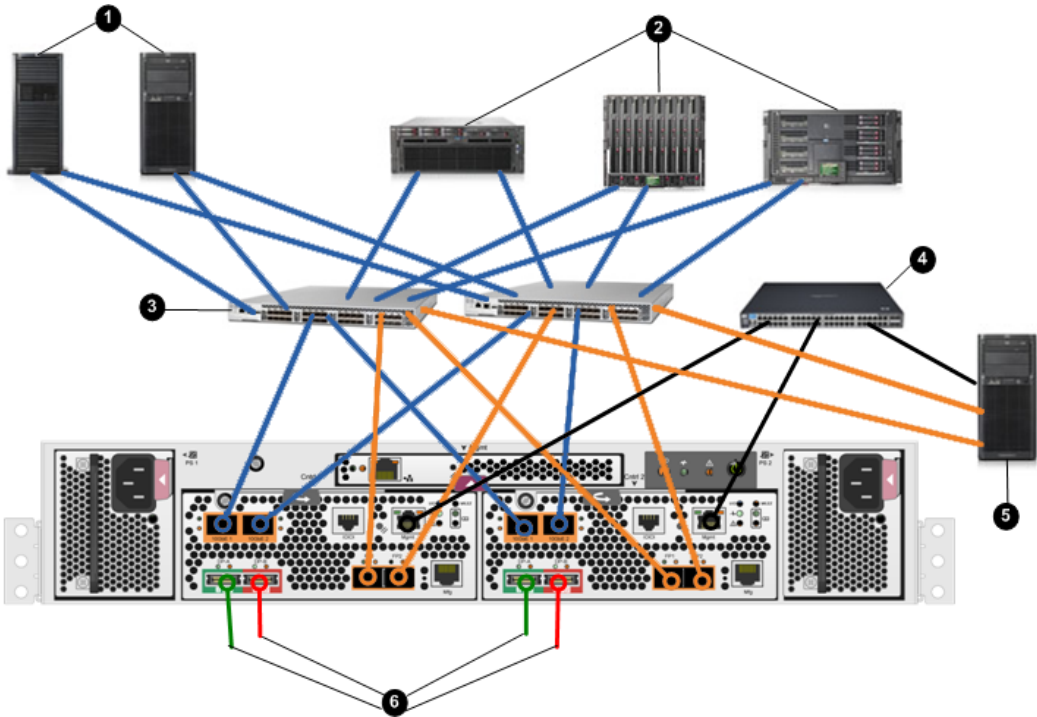
NOTE: The iSCSI/FCoE modules also support 10 GbE SFP+ optical transceivers, LC-LC optical inter-rack cables, and SFP+ copper intra-rack cables.

Figure 64 P63x0 iSCSI and FC connections



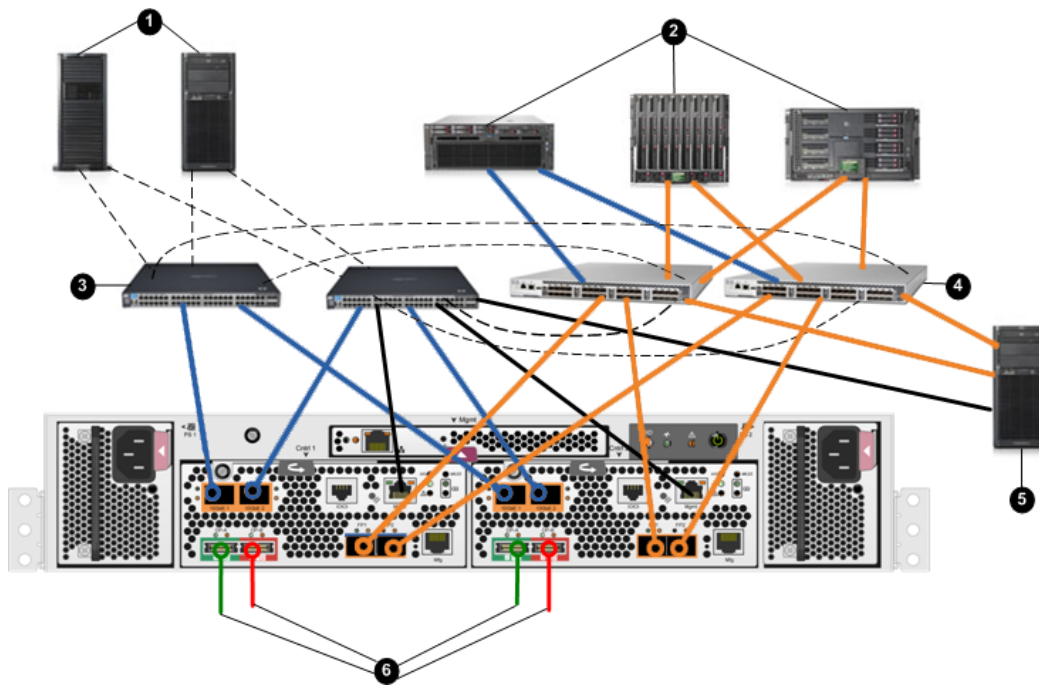
- | | |
|---|---|
| 1. Isolated servers | 4. SAN switches |
| 2. Datacenter servers with FC and Ethernet adapters | 5. Management server running HP P6000 Command View adapters |
| 3. Ethernet switches | 6. Cabling connections to disk enclosures |

Figure 65 P65x0 FCoE and FC connections



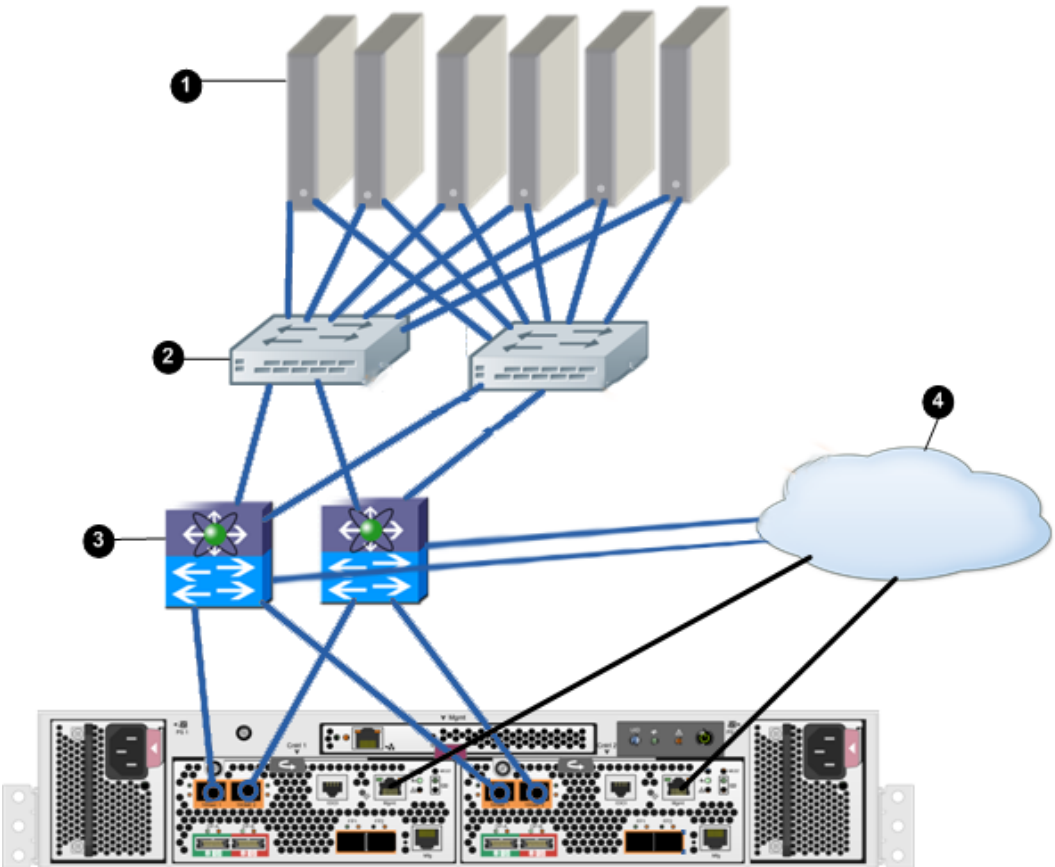
- 1. Isolated servers with converged network adapters
- 2. Datacenter servers with converged network adapters
- 3. Converged network switches
- 4. Ethernet switches
- 5. Management server running HP P6000 Command View
- 6. Cabling connections to disk enclosures

Figure 66 P65x0 iSCSI, FCoE, and FC connections



- | | |
|---|---|
| 1. Isolated servers | 4. Converged network switches |
| 2. Datacenter servers with converged network adapters | 5. Management server running HP P6000 Command View with a converged network adapter |
| 3. Ethernet switches | 6. Cabling connections to disk enclosures |

Figure 67 P65x0 iSCSI/FCoE connections



- 1. Blade servers with converged network adapters
- 2. Pass-through or FIP snooping DCB switches
- 3. DCB Ethernet/FCoE switches
- 4. Ethernet network