Technical white paper

Upgrading to the HP MSA 1040 or HP MSA 2040

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Introduction

This document highlights methods of upgrading an existing P2000 G3 Modular Smart Array (MSA) storage system to the HP MSA 2040 SAN or HP MSA 2040 SAS storage system and also upgrading an existing P2000 G3 MSA array to the HP MSA 1040 storage system.

Storage systems can often be upgraded without any reformat to the vdisks and volumes, retaining data-in-place and saving time and effort. However in some circumstances, a backup and restore is required.

P2000 G3 MSA technical user documents can be found at: hp.com/go/p2000.

Additional information about the HP MSA 1040 may be found at hp.com/go/MSA1040.

Additional information about the HP MSA 2040 may be found at hp.com/go/MSA2040.

Note
In this document, "P2000 G3 MSA" will be used to refer to any one of the P2000 G3 FC MSA, P2000 G3 FC/iSCSI MSA, P2000 G3 SAS MSA, P2000 G3 10GbE iSCSI MSA, or P2000 G3 iSCSI MSA unless specifically noted otherwise.

Note
You cannot upgrade the MSA2000 G1 or MSA2000 G2 to the HP MSA 1040 or HP MSA 2040.

Intended audience

This document is intended for HP MSA administrators and requires previous SAN knowledge. This document offers common known MSA facts that can contribute to an MSA best customer experience during the upgrade.

Prerequisites

Prerequisites for using this product include knowledge of:

• Networking
• SAN management
• Connectivity methods such as Direct Attach Storage (DAS), Fibre Channel (FC), and Serial Attached SCSI (SAS)
• iSCSI and Ethernet protocols

Related documentation

In addition to this guide, please refer to other documents for this product:

• HP MSA System Racking Instructions
• HP MSA 1040 Installation Guide
• HP MSA 1040 System Cable Configuration Guide
• HP MSA 1040 Users Guide
• HP MSA 1040 CLI Reference Guide
• HP MSA 2040 Installation Guide
• HP MSA 2040 System Cable Configuration Guide
• HP MSA 2040 Users Guide
• HP MSA 2040 CLI Reference Guide

You can find these documents from the Manuals page of the HP Business Support Center:
hp.com/support/msa1040/manuals or hp.com/support/msa2040/manuals

Important
This white paper contains the information necessary to upgrade any of the P2000 G3 MSA controller-based systems to the HP MSA 1040 or 2040 array or convert protocols on the HP MSA 1040 or 2040 arrays. The bulk of the steps are the same regardless which storage system you are upgrading from. If an instruction applies to only one or two of the original host protocols, you'll see **[fc]**, **[i]**, or **[sa]** at the beginning of the instruction.

HP MSA 1040 controller hardware overview

The HP MSA 1040 can be purchased as either a 12-drive or 24-drive storage system.

Note
The HP MSA 1040 storage system supports 4 total enclosures, including the storage enclosure, for a maximum of 99 SFF drives or 48 LFF drives. Mixed LFF and SFF enclosures are supported; see the following table for the maximum LFF and SFF drive configurations for each controller. Note that mixing LFF and SFF expansion enclosures will give you values in between those shown.

Max disk configurations	LFF controller enclosure	SFF controller enclosure
LFF expansion enclosures	12 + (3 x 12) = 48	24 + (3 x 12) = 60
SFF expansion enclosures	12 + (3 x 25) = 87	24 + (3 x 25) = 99

HP MSA 1040 features
• New controller architecture with a new processor
• 4GB cache per controller
• 2 host ports per controller
• 4/8Gb FC connectivity
• 1/10Gbe iSCSI connectivity

HP MSA 2040 controller hardware overview

The HP MSA 2040 controller can support both 12-drive or 24-drive storage enclosures.

Note

The HP MSA 2040 storage systems support 8 total enclosures, including the storage enclosure, for a maximum of 199 SFF drives or 96 LFF drives. Mixed LFF and SFF enclosures are supported; see the following table for the maximum LFF and SFF drive configurations for each controller. Note that mixing LFF and SFF expansion enclosures will give you values in between those shown.

Max disk configurations	LFF controller enclosure	SFF controller enclosure
LFF expansion enclosures	12 + (7 x 12) = 96	24 + (7 x 12) = 108
SFF expansion enclosures	12 + (7 x 25) = 187	24 + (7 x 25) = 199

HP MSA 2040 features

- New controller architecture with a new processor
- 4GB cache per controller
- Support for solid state drives
- Full disk encryption
- 4 host ports per controller
- 4Gb/8Gb/16Gb FC connectivity
- 6Gb/12Gb SAS connectivity
- 1GbE/10GbE iSCSI connectivity
- Support for both FC and iSCSI in a single controller
- Increased support to seven D2700 SFF disk enclosures
- Increased I/O performance

Supported and unsupported configurations with the HP MSA 1040 and HP MSA 2040 controllers

Table 1 lists the supported storage enclosures and expansion enclosures after upgrading to the HP MSA 1040/2040 controllers.

Table 1. Supported/unsupported hardware configurations

Item	Supported with the MSA 1040	Supported with the MSA 2040
MSA2000 G1 Storage Enclosure	No	No
MSA2000 G2 Storage Enclosure	No	No
P2000 G3 MSA Storage Enclosure	No	Yes*
HP MSA 2040 Storage Enclosure**	Yes	Yes
MSA2000 Expansion Enclosures	No	No
MSA70 Expansion Enclosures	No	No
D2700 Expansion Enclosures	Yes	Yes
P2000 Expansion Enclosures	Yes	Yes

HP MSA 2040 Drive Enclosures	Yes	Yes
HP 3G SAS drives	No	No
SATA Drives	No	No
HP 6G Dual Port SAS drives	Yes	Yes
HP 6G SAS Midline (MDL)	Yes	Yes
SSD SFF Enterprise Mainstream Drives***	No	Yes
Self Encrypting Drives (SED)***	No	Yes

* When using the P2000 G3 Storage Enclosure with MSA 2040 controllers, you will not be able to use SSD drives or have some of the performance benefits of the MSA 2040 Storage Enclosure.

** The HP MSA 2040 Storage Enclosure is the recommended chassis over the P2000 G3 MSA Storage Enclosure as the MSA 2040 Storage Enclosure hardware design allows for the full performance of MSA 2040 controllers.

*** SFF SSDs and SEDs are only supported in the MSA 2040 Storage Enclosures and D2700 Disk Enclosures when using MSA 2040 controllers. SSDs and SEDs are not supported when using the MSA 1040 storage system.

Consult the HP MSA 1040 Quick Specs for the latest supported hard drive capacities.

Consult the HP MSA 2040 Quick Specs for the latest supported hard drive and SSD capacities.

Disk speed and enclosure link speeds

Special considerations must be noted about disk speed and enclosure link speeds after upgrading a P2000 G3 MSA to the HP MSA 1040 or HP MSA 2040.

See Table 2 for disk speeds and enclosure link speeds after upgrading.

Table 2. Disk speed and enclosure link speed matrix with MSA 1040 or MSA 2040 controller installed

Storage enclosure	SSD support	Storage enclosure disk link speed	Inter-controller interface speed	Expansion port link speed
P2000 G3 LFF	Not supported	3Gb	Gen 1	6Gb
P2000 G3 SFF	Not supported	3Gb	Gen 1	6Gb
HP MSA 2040 LFF/SFF	Supported	6Gb	Gen 2	6Gb

Moving between SAS, iSCSI, and FC topologies

The HP MSA 2040, like the P2000 G3 MSA, supports 'moving between topologies' by a controller replacement. For instance, if your P2000 G3 iSCSI MSA has reached its host connect or performance maximums, the array can be upgraded to HP MSA 2040 SAN controllers with FC small form-factor pluggable (SFPs). The HP MSA 2040 products can adapt to new infrastructures while keeping the virtual disk data in place by doing a hardware controller replacement to match the infrastructure needed.

The MSA 2040 also supports changing between storage protocols. For example, the HP MSA 2040 SAN with FC SFPs can be transformed to an MSA 2040 SAS with a controller replacement.

Another example might be changing an MSA 2040 SAN FC mode to an MSA 2040 SAN Combo mode (FC/iSCSI). This example would require the addition of iSCSI SFPs.

Supported upgrade paths for the HP MSA 1040/2040

Table 3 shows a list of the supported upgrade paths covered in this document.

Table 3. Supported upgrade paths

Description	From	To
Dual controller	P2000 G3 FC MSA * P2000 G3 FC/iSCSI MSA * P2000 G3 SAS MSA * P2000 G3 10GbE iSCSI MSA * P2000 G3 iSCSI MSA *	HP MSA 1040 2-port 10GbE iSCSI HP MSA 1040 2-port 1GbE iSCSI HP MSA 1040 2-port 8Gb FC
Single or dual controller	P2000 G3 FC MSA * P2000 G3 FC/iSCSI MSA * P2000 G3 SAS MSA * P2000 G3 10GbE iSCSI MSA * P2000 G3 iSCSI MSA *	HP MSA 2040 SAN ** HP MSA 2040 SAS
Single or dual controller	HP MSA 2040 SAN * HP MSA 2040 SAS *	HP MSA 2040 SAS HP MSA 2040 SAN
Dual controller	HP MSA 1040 2-port 10GbE iSCSI * HP MSA 1040 2-port 1GbE iSCSI * HP MSA 1040 2-port 8Gb FC *	HP MSA 2040 SAN ** HP MSA 2040 SAS
Dual controller	HP MSA 1040 2-port 10GbE iSCSI * HP MSA 1040 2-port 1GbE iSCSI * HP MSA 1040 2-port 8Gb FC *	HP MSA 1040 2-port 10GbE iSCSI HP MSA 1040 2-port 1GbE iSCSI HP MSA 1040 2-port 8Gb FC

*LUN mappings using a protocol that is different from the original controller (i.e., changing from iSCSI to FC) will be deleted during the upgrade and need to be remapped.

**The HP MSA 2040 SAN controller will support up to four host connections with options of 16Gb, 8Gb FC and 10Gb, 1Gb iSCSI per controller. See Table 4 below for valid configurations.

Note
This white paper examines single-to-single controller upgrades and dual-to-dual controller upgrades. This white paper does not examine single-to-dual or dual-to-single controller upgrades.

The MSA 2040 SAS controller supports up to four 6Gb SAS connections per controller (12G future) using mini-SAS HD connectors and upgrade from a P2000 G3 SAS storage system will require new host connect cables.

The table below lists the supported SFP locations on the MSA 2040 controller ports when using FC, iSCSI, and the combination of FC and iSCSI.

Table 4. Supported MSA 2040 SAN controller Host Ports and SFP locations

For dual controller systems, symmetrical SFP placement is required.

Host Port 1 SFP[1]	Host Port 2 SFP[1]	Host Port 3 SFP[2]	Host Port 4 SFP[2]
8/16 Gb FC	8/16 Gb FC	None	None
		8/16 Gb FC	8/16 Gb FC
		1/10 Gb iSCSI	1/10 Gb iSCSI
1/10 Gb FC	1/10 Gb FC	None	None
		1/10 Gb iSCSI	1/10 Gb iSCSI

[1] SFP in Host Port 1 must match SFP in Host Port 2

[2] SFP in Host Port 3 must match SFP in Host Port 4

Note
Customers must upgrade their MSA 2040 SAN controller firmware to GL101 or later for iSCSI functionality and set the host port mode using the CLI command `set host-port-mode.` See the CLI Online Help or the HP MSA CLI Reference Guide for more information on the command.

Instructions for upgrading to the HP MSA 1040 or HP MSA 2040

Overview

This section lists the methods to update an existing HP MSA storage system to the updated controllers of the HP MSA 2040.

This section examines the following:

- Upgrade considerations
- Known limitations
- Before you begin the upgrade
- Upgrade procedure

Upgrade considerations

The following is a list of upgrade considerations that need to be noted during the upgrade:

Important
- Before upgrading to the HP MSA 1040 or HP MSA 2040, you will need to copy data from any existing SATA virtual disks to SAS virtual disks as SATA drives are not supported with the HP MSA 1040 or MSA 2040 controllers.
- If an HP MSA 2040 storage enclosure is purchased for use with MSA 2040 controllers, existing drives will need to be removed from the P2000 G3 storage enclosure and placed into the new HP MSA 2040 storage enclosure in the same order as they were in the P2000 G3 storage enclosure.
- The MSA 1040 storage system comes standard with dual controllers and a storage enclosure. Drives from a P2000 G3 storage system must be moved to the MSA 1040 storage system enclosure during the upgrade process and placed in the same order as they were in the P2000 G3 storage enclosure.
- If an HP MSA 2040 Storage Enclosure is purchased and there was an existing Remote Snap replication or 512 Snapshot license on the P2000 G3 storage enclosure, new licenses will need to be obtained and applied to the upgraded system.
- If you have an existing VMware virtual infrastructure that utilizes the P2000 G3 MSA, refer the "VMware Virtual Infrastructure" section prior to upgrading.

- If multipath is used, multipath settings for the new controllers will need to be added before the upgrade to ensure consistent access to the array after the upgrade. Failure to properly update the multipath settings could result in data unavailability or data corruption.
- Hosts must be remapped after upgrading controllers.
- Allow a minimum of two hours to complete the upgrade process. Allow additional time for configurations that contain large host counts because volume-to-host mappings will need to be reconfigured.
- If your current environment is Boot from SAN, verify Boot from SAN settings after the upgrade using this document as a guide. From the following link, locate the "Boot from SAN" document that pertains to your corresponding operating system and review the "Setting up the HBAs" section.
  h18026.www1.hp.com/storage/networking/bootsan.html?jumpid=reg_r1002_usen_c-001_title_r0002
- During the upgrade, the storage system will be powered down and all HP MSA controllers and/or enclosures will be removed and replaced with HP MSA 1040 or HP MSA 2040 controllers and enclosures.
- IP addresses might not be retained during the upgrade. See the MSA user documentation for setting the initial IP addresses of the new controller management ports.
- The Storage Management Utility (SMU) for the HP MSA 1040 and MSA 2040 supports Firefox 11 and newer, Internet Explorer 9 and 10, Chrome 17 and newer, and Safari 5.1 and newer.
- If you are changing storage protocols with the upgrade, you will need to validate that you have the appropriate host bus adapters to support the new storage protocol.
- If changing protocols during the upgrade, new cables (FC, Direct Access Cables (DAC), mini-SAS HD, or Ethernet) will be needed to utilize the new protocol of the controller. Qualified cables can be found in the MSA 1040 or MSA 2040 Quick Specs and are available for purchase.
- The HP MSA 2040 SAN controllers do not include SFP transceivers. Qualified SFPs for the HP MSA 2040 can be found in the MSA 2040 Quick Specs and are available for purchase in four packs.
- The HP MSA 2040 SAN controllers have four ports for all protocols, so more cables (FC, Direct Access Cables (DAC) or Ethernet) might be needed to utilize the additional ports on the controller.
- If you are moving to MSA 2040 SAS controllers, you will need to purchase cables with HD mini-SAS (SFF 8644 connector) connectors for connection to the MSA 2040 SAS host ports. Qualified cables can be found in the MSA 2040 Quick Specs and are available for purchase.
- The HP MSA 1040 controllers come pre-installed with the appropriate transceivers (8Gb FC, 10Gb Optical iSCSI, or 1Gb RJ-45 iSCSI). Replacing the 10Gb optical transceivers with 10G DAC cables is supported. Qualified optical cables and 10G DAC cables are listed in the MSA 1040 Quick Specs.

Note
Only HP MSA 2040 SFPs and qualified DACs will be recognized and usable within the HP MSA 2040 controllers. SFPs from other sources: P2000 G3 MSA, HP switches, and HP FC HBAs will not be recognized and will not function within the HP MSA 2040 controllers. Qualified SFPs and 10G DAC cables are listed in the HP MSA 2040 QuickSpecs.

Known limitations

The following is the list of limitations that can be found with the upgrade.

- Mixing P2000 G3 and HP MSA 1040 or HP MSA 2040 controllers in the same chassis is not supported.
- Mixing two different protocol controllers (for example, HP MSA 2040 SAN and HP MSA 2040 SAS) in the same storage enclosure is not supported.

Before you begin the upgrade

Be sure to perform the following best practices to prepare for your upgrade:

Note
Appendix A contains a checklist of the necessary data that will help you gather and save the configuration information for the upgrade.

Note
Validate that all required hardware for the upgraded storage system is available before starting. This includes but is not limited to: FC or iSCSI SFPs, iSCSI DACs, HD mini-SAS cables, and optical cables.

Not all of the above are required for every upgrade.

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1. Back up all existing data on the existing storage system.
2. If the storage system has any problems, such as hardware warnings or virtual disks whose health is Degraded or Fault, resolve the problems before starting the upgrade.
3. Record the MSA storage system management IP address(es).
4. Download the latest HP MSA 1040 software from: hp.com/go/msa1040. If upgrading to the MSA 2040 controllers, locate the software at: hp.com/go/msa2040.
5. Download the latest HP MSA 1040 storage controller firmware from: hp.com/go/msa1040. If upgrading to the MSA 2040 controllers, go to: hp.com/go/msa2040.
6. **[fc]** Record the World Wide Names (WWNs) of the existing storage system controller's FC ports.

    This can be found from the HP SMU under **Physical** and then clicking **Enclosure 1 -> Rear Graphical** and then clicking the FC ports. (see Figure 1). The WWN of the ports are listed as 'Target ID' in the HP SMU.
7. **[fc]** Record FC WWN IDs, Names (nicknames), and profile settings of the FC HBAs you will be using to connect to the storage system, if any. The WWN IDs/Names are listed under the 'Host ID' property in the HP SMU.

    This can be found from the HP SMU by expanding Hosts from the Configuration View frame (see Figure 2).
8. **[fc]** Record FC link speeds and topology settings.

    This can be found from the HP SMU by choosing **Configuration -> System Settings -> Host Interfaces**. (see Figure 3).
9. **[i]** Record the IP addresses of the controller iSCSI ports.

    This can be found from the HP SMU by selecting **Configuration > System Settings > Host Interfaces**.
10. **[i]** Record any port IQN Host IDs and Names (nicknames) that were given for hosts (ensure that you capture all nicknames for all hosts).

    This can be found from the HP SMU by selecting **Hosts > View > Overview**.
11. **[sa]** Record any SAS host nicknames.

    This can be found from the HP SMU by selecting **Hosts** from the configuration view panel, then selecting **View > Overview**.
12. **[i]** Record iSNS information.

    This can be found from the HP SMU by selecting **Configuration > System Settings > Host Interfaces.**
13. **[i]** Record existing CHAP information.

    This information can be located from the HP SMU by selecting **Hosts > Provisioning > Configure CHAP**.

Note
IQN names will no longer be applicable if you are upgrading to the FC or SAS protocol controller. The IQN Host IDs and Names will be applicable if you choose to upgrade to the iSCSI protocol controller and choose to use the iSCSI targets of the new controller. Similarly, recording FC and SAS WWNs, nicknames, and speeds are only valid if you are moving to an MSA 1040 2-port 8Gb FC, MSA 2040 SAN (FC or mixed FC/iSCSI), or an MSA 2040 SAS.
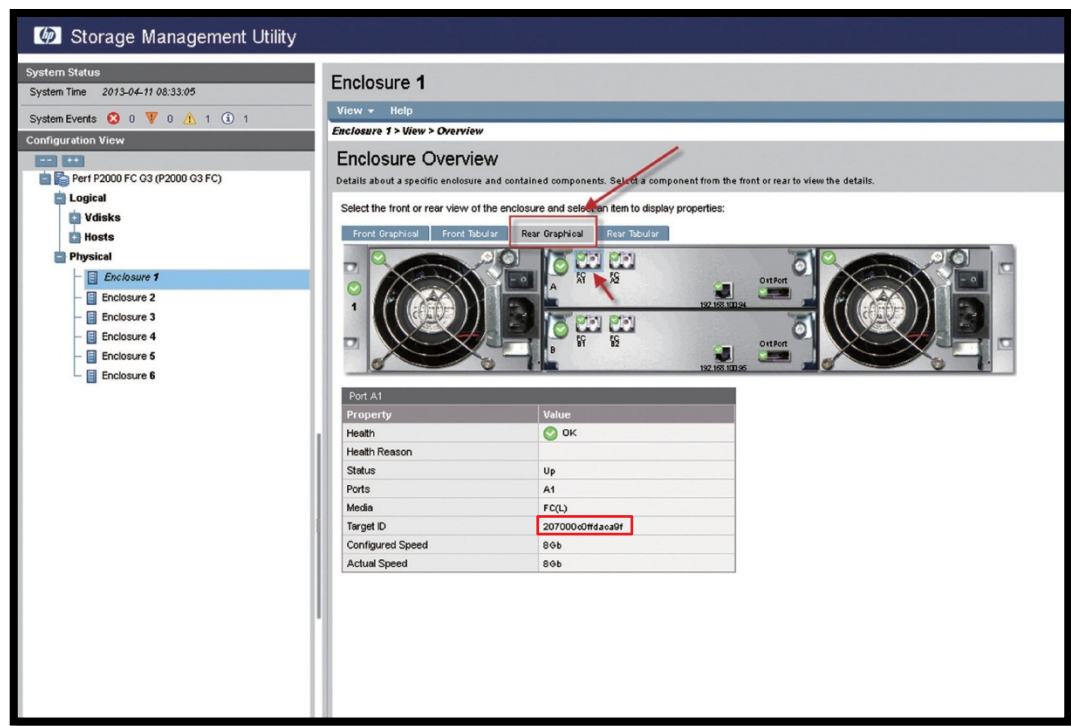

Figure 1. Recording FC ports WWNs

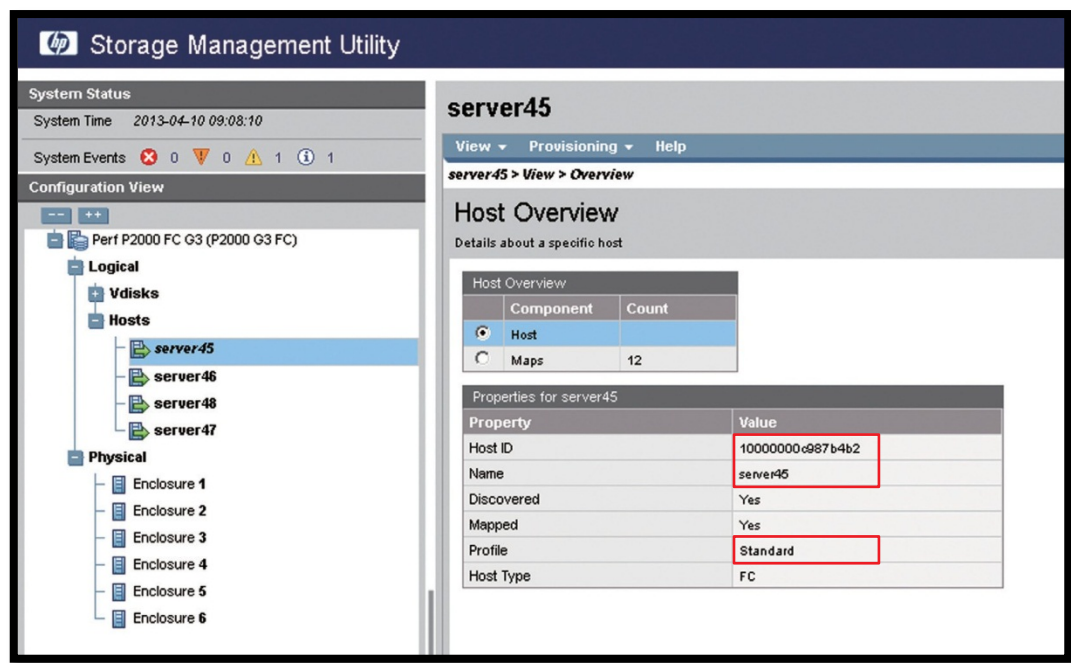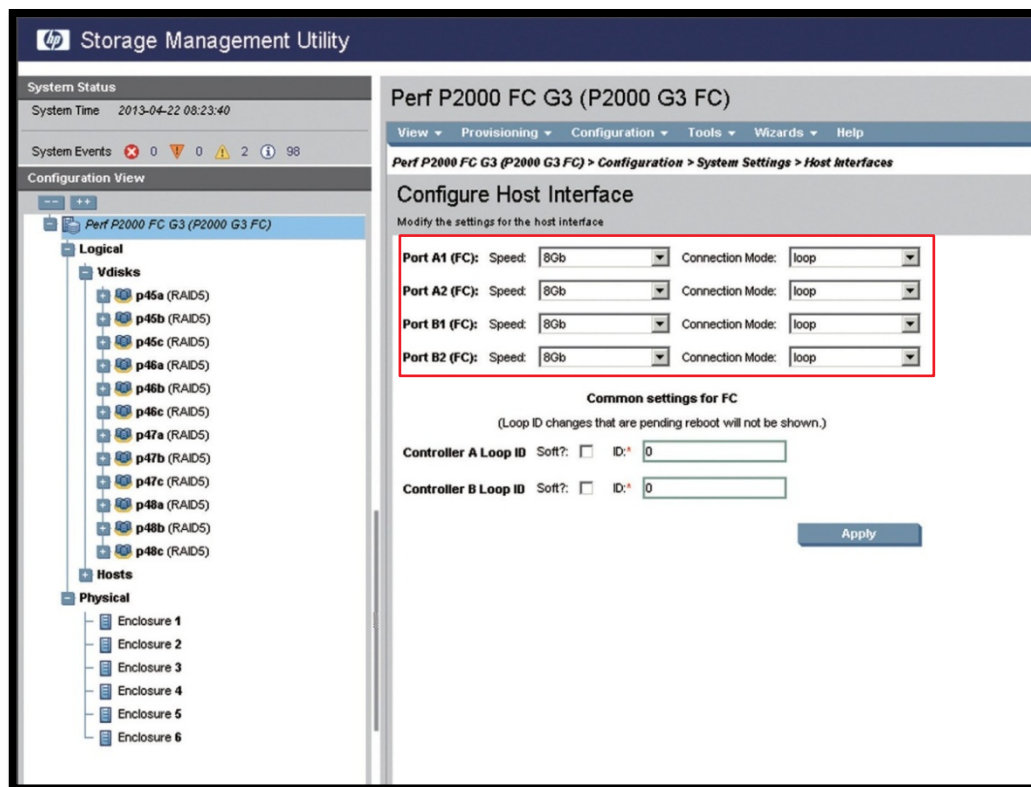**Figure 2.** Recording WWN nicknames

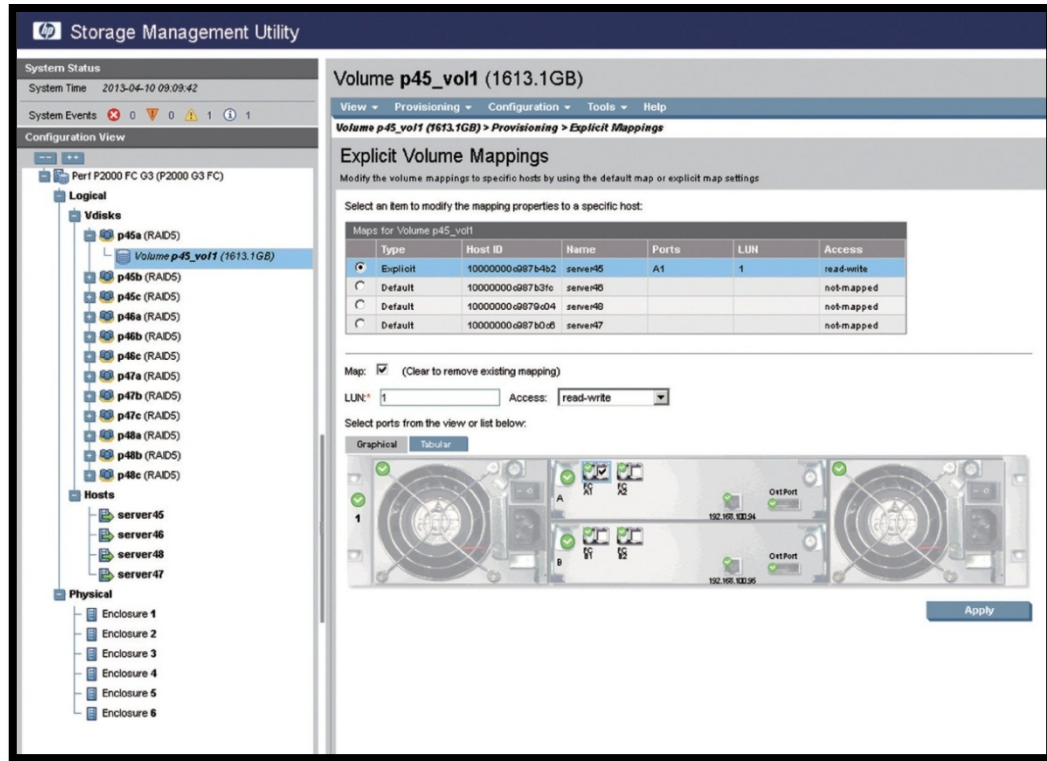**Figure 3.** Host interface screen for the P2000 G3 MSA

14. Record existing volume mapping information (see Figure 4). This can be found from the HP SMU by selecting the volume and then under **Provisioning | Explicit Mappings**.

You might want to take a screenshot of the explicit mappings if you have a substantial amount of mappings. You can also use the Command Line Interface (CLI) command 'show volume-maps' to record mappings.

If you are changing host interfaces (for example, from iSCSI to FC), any host-specific mapping will no longer be valid. If you have host-specific mappings and are changing host interfaces, you need to record mappings. Later, during the upgrade process, you will remap the hosts.

Figure 4. Volume mapping screen for the P2000 G3 MSA

15. Record all system user names, passwords, and the user types for users that can log on to the storage system. This can be found from the HP SMU under **Configuration | Users | Modify Users**.

Note
Do not delete user names; simply record existing username and user information. Passwords will show up as blank on the screen.

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16. Record the system information.
     This can be found from the HP SMU under **Configuration | System Settings | System Information**.
17. Record the email notification information.
     This can be found from the HP SMU under **Configuration | Services | Email Notification**.
18. Record the SNMP notification information.
     This can be found from the HP SMU under **Configuration | Services | SNMP Notification**.
19. Record the date and time information.
     This can be found from the HP SMU under **Configuration | System Settings | Date, Time**.
20. Record network management services information.
     This can be found from the HP SMU under **Configuration | Services | Management**.
21. Record advanced disk settings information.
     This can be found from the HP SMU under **Configuration | Advanced Settings | Disk**.

22. Record advanced cache settings information.

    This can be found from the HP SMU under **Configuration | Advanced Settings | Cache**.

23. Record the snapshot scheduling information.

    This can be found from the HP SMU under **Provisioning | Modify Schedule**.

Note

Do not modify the schedule; simply record the existing schedule information.

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24. If applicable, record remote storage system(s) used for Remote Snap.

    This can be found from the HP SMU under **Configuration | Remote Systems**.

Capturing controller parameters

To capture all existing controller parameters, such as the network address, before the upgrade, save the existing controller logs to your management PC. This can be done by using the FTP utility and running the `get logs` command. The data contained in these logs will prove helpful in the event of a support issue after the upgrade. This step could take three to five minutes to complete.

1. In HP SMU, prepare to use FTP:
    – Determine the network-port IP addresses of the system's controllers.
    – Verify that the system's FTP service is enabled.
    – Verify that the HP MSA storage system login account has the correct permissions to use the FTP interface.
2. Open a Command Prompt (Windows®) or a terminal window (UNIX®) and navigate to the destination directory for the log file.
3. Enter the ftp controller-network-address (for example: ftp10.1.0.9)
4. Log in as an FTP user.
5. Enter the following command:

    `get logs filename.zip`

Filename is recommended to be in the format yyyymmdd_ftp_system-name_controller-ID.

Note

For example: `get logs 20140124_ftp_Storage2_A.zip`

Record the filename and path for future reference.

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6. Wait for the Transfer complete message to appear.
7. Quit the FTP session.

Update host software

Update the host software on each connected server using the latest drivers available for the MSA 1040 or MSA 2040. Support software for the MSA 1040 can be found at: hp.com/go/msa1040 and the support for the MSA 2040 can be found at: hp.com/go/msa2040.

Verify that the software is supported using the SPOCK webpage: hp.com/storage/spock.

To ensure that the multipath software will be able to use the new controller after it is installed, update the multipath software to correctly identify the new controller. This may require a reboot of the operating system.

Finishing up

1. Shut down all hosts connected to the array.
2. Label existing host connect cables if they are to be used in the upgraded system. All SAS host connect cables will need to be replaced due to the change in the SAS connector type.
3. Label all management network cables with the controller ID before disconnecting from the existing controllers.

Upgrading to the HP MSA 1040 or HP MSA 2040

The upgrade procedure is listed here for the single and dual controller upgrades with and without attached expansion enclosures.

Upgrade procedure
The upgrade procedure for the MSA includes the following steps:

- Shut down each controller
- Remove and replace the controllers/enclosures
- Determine and set the IP address of the new controller(s)
- Update the MSA 1040 or MSA 2040 controller firmware to the latest available version
- Re-enter controller information
- Reconnect host connect cables and verify infrastructure
- Re-establish Remote Snap communication, if necessary
- Complete the upgrade

Shut down each controller
Shut down the MSA controller(s) using the HP SMU. This procedure helps ensure that data from cache will be flushed to disk.

1. Select **Tools | Shut down or Restart Controller**.
2. In the **Operation** section, select **Shut down**.
3. In the Controller type section, choose Storage and in the Controller section, choose one of the following:

System type	Selection
Single controller	Shut down RAID Controller A
Dual controller	Shut down both RAID controllers

4. Click Shut Down Now.

Note
A SMU warning message might appear. This is an informational message that requires no action.

5. Click Yes to confirm the operation.
6. Log off from the HP System Management Utility.
7. Verify that the 'OK to Remove' blue light on the back of the controller(s) is lit.

Note
Verify that the Cache Status LED on the back of the controller is not blinking after the 'OK to Remove' blue LED is illuminated. A blinking cache status LED means that cache has not been flushed to disk. If the cache light is blinking after the 'OK to Remove' blue LED is illuminated, call HP support. See figures 5, 6, 7, 8, or 9 for your controller.

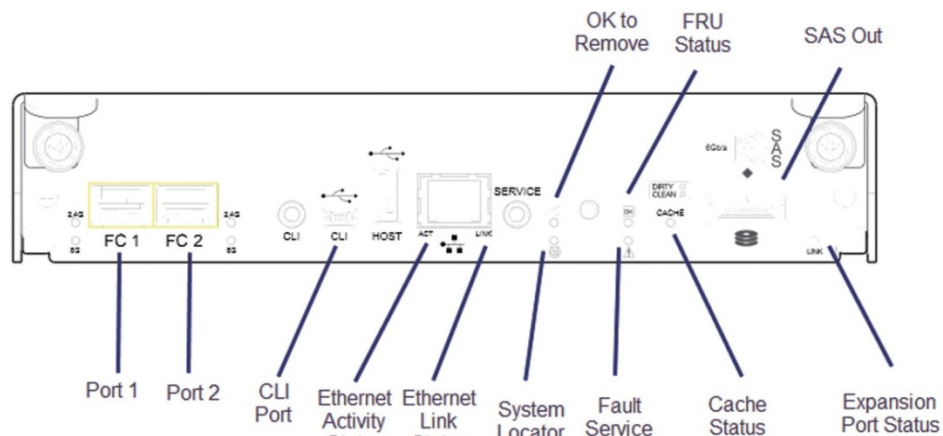**Figure 5.** P2000 G3 FC MSA controller status

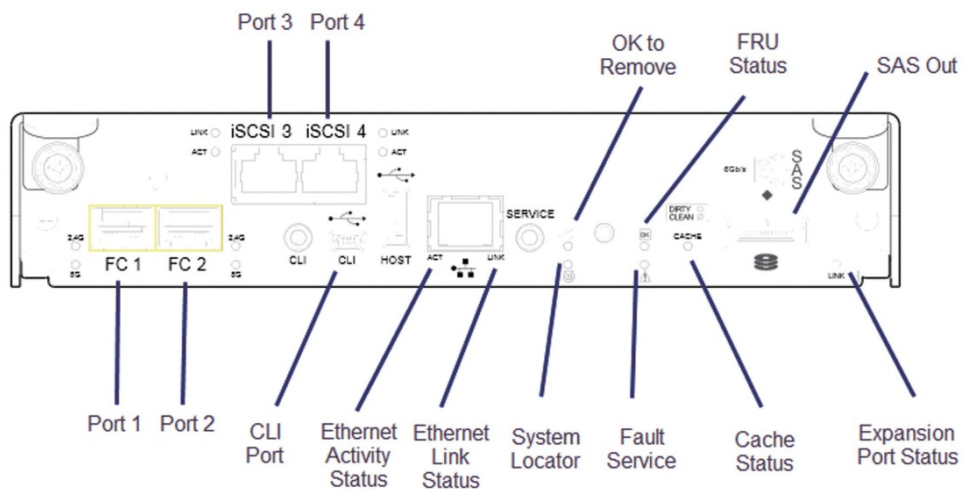**Figure 6.** P2000 G3 FC/iSCSI MSA controller status

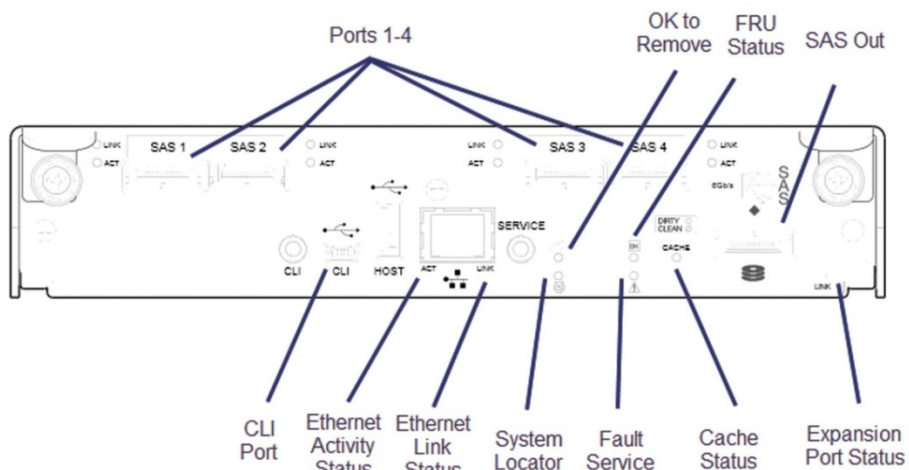**Figure 7.** P2000 G3 SAS MSA controller status

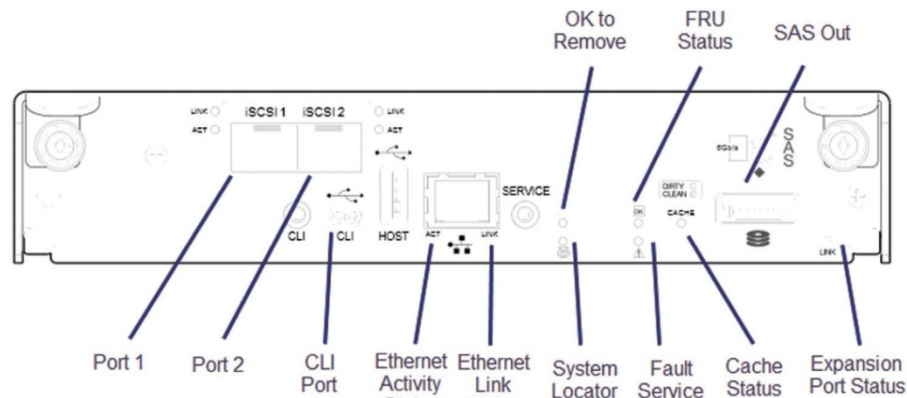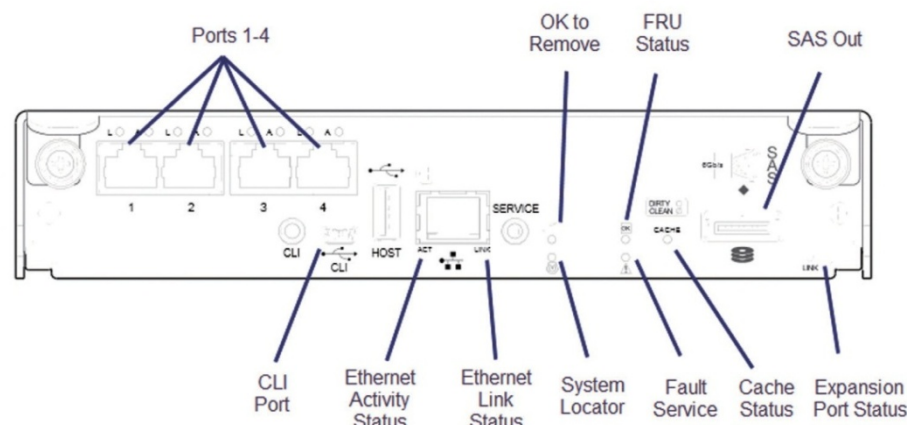**Figure 8.** P2000 G3 10 GbE iSCSI MSA controller status

Figure 9. P2000 G3 iSCSI MSA controller status

8. Completely power down the MSA array by removing the power cords on the back of the controller enclosure.

9. If you have expansion drive enclosure(s) that are connected to the MSA controller enclosure, power them down by pressing the power switches at the back of each drive enclosure to the Off (O) position.

Note
If power supplies do not have power switches, remove the power cord.

Remove and replace the controller(s) and enclosure

1. If expansion enclosures are connected to the controller enclosure, label and remove the mini-SAS expansion cable from each controller SAS OUT port (see figures 5, 6, 7, 8, or 9 for your controller). If more than one expansion enclosure is connected in series, the remaining SAS cables from these expansion enclosures can remain connected to each other.

2. Remove labeled host connect cables. SAS cables will need to be replaced due to the change of the SAS connector type on the MSA 2040 controllers.

3. Remove labeled Ethernet cables from the MSA management ports on each controller.

4. If you are replacing the P2000 G3 MSA Storage Enclosure, remove and label each drive from the existing enclosure for re-insertion in the new enclosure into the same slots. Replace the enclosure and re-insert the drives into the new MSA storage enclosure. Skip to step 7.

5. If you upgrading to the MSA 2040 controllers and not replacing the P2000 G3 MSA Storage Enclosure, remove the existing controller(s) from the array head.

    Follow the steps found on the HP Product Recycling page for proper disposal of controllers: hp.com/hpinfo/globalcitizenship/environment/recycle/index.html

6. Insert the new HP MSA 2040 controller(s) into the storage enclosure and tighten the thumb screws.

7. Insert SFPs into the HP MSA 2040 SAN controllers; if you are planning to use DAC cables for iSCSI then no SFPs are required. MSA 2040 SAS controllers do not require SFPs. MSA 1040 controllers have SFPs pre-installed; remove 10Gb iSCSI SFPs if you will be using DACs with the MSA 1040 controllers.

8. Reconnect or install new host connect cables. You must already have the correct SFPs or SAS cables for the MSA 2040 and DACs for either the MSA 1040 or MSA 2040 available for installation.

See Table 5 below.

Table 5. Connecting data path cables to new controllers

Existing MSA Storage system	New MSA 1040/2040 Storage system	Attaching host connect cables
P2000 G3 FC P2000 G3 FC/iSCSI P2000 G3 10G iSCSI P2000 G3 iSCSI P2000 G3 SAS MSA 2040 SAS HP MSA 1040 2-port 10GbE iSCSI HP MSA 1040 2-port 1GbE iSCSI HP MSA 1040 2-port 8Gb FC	HP MSA 2040 SAN FC mode HP MSA 1040 2-port 8Gb FC	Reconnect existing FC cables as labeled or Install new FC cables
	HP MSA 2040 SAN Combo mode	Reconnect existing FC cables as labeled or Install new FC cables in ports 1 and 2 Reconnect existing iSCSI cables as labeled in ports 3 and 4 or Install new Optical 10GbE/DAC/1GbE Ethernet cables in ports 3 and 4
	HP MSA 2040 SAN iSCSI mode HP MSA 1040 2-port 1GbE iSCSI HP MSA 1040 2-port 10GbE iSCSI	Reconnect existing iSCSI cables as labeled or Install new Optical 10GbE/DAC/1GbE Ethernet cables
	HP MSA 2040 SAS	Install new SAS cables

9. Reconnect the Ethernet cables removed from the management ports.

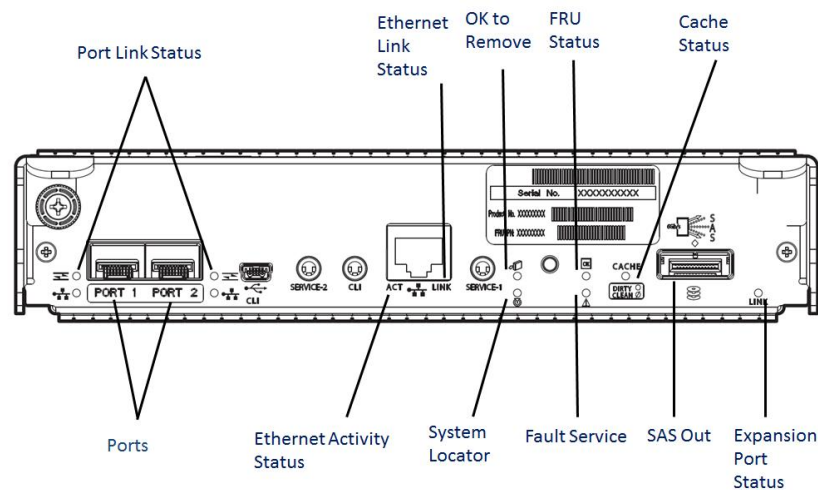**Figure 10.** HP MSA 1040 controller status

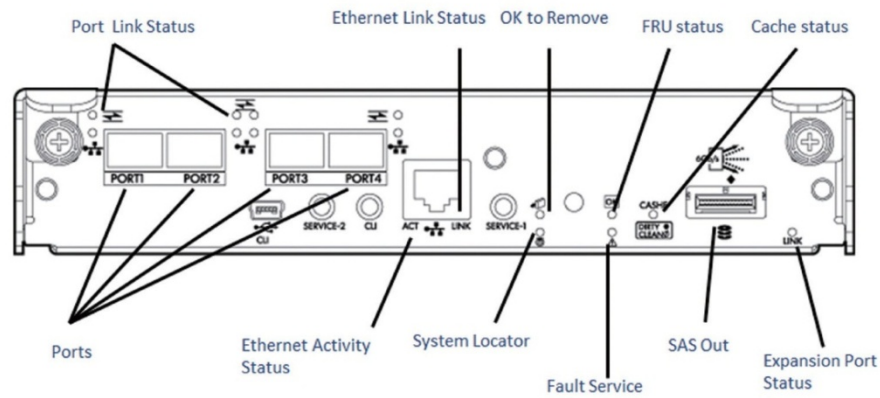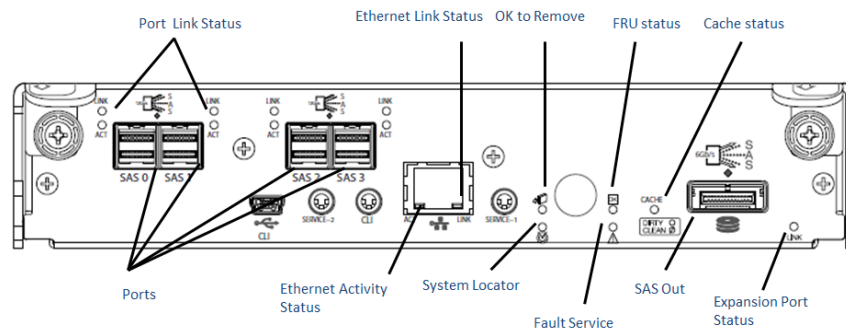**Figure 11.** HP MSA 2040 SAN controller status

Figure 12. HP MSA 2040 SAS controller status

10. If expansion enclosures were connected to the controller enclosure, reconnect the expansion SAS cable from the expansion enclosures to the MSA 1040 or MSA 2040 controller SAS OUT port (see Figures 10, 11, and 12).

11. Power up the expansion enclosures by pressing the power switches at the back of the expansion enclosure to the On (–) position or inserting the power cords. While enclosures power up, their LEDs blink. After the LEDs stop blinking, if no LEDs on the front and back of the enclosure are amber, the power-on sequence is complete and no faults have been detected.

12. Power on the HP MSA 1040 or HP MSA 2040 storage enclosure by pressing the power switches on the back of the controller enclosure to the On (–) position. If your HP MSA 1040 or HP MSA 2040 controller enclosure does not have power switches, plug power cords into the power supplies to power up the enclosure.

13. Verify the 'FRU status' light is lit solid green on the back of the controller(s) before continuing. See Figures 10, 11, and 12.

Determine and set the IP address of the new controller(s)

Before you can access the SMU GUI, you must determine the IP address of the new controllers. There are multiple methods to obtain the IP addresses for your HP MSA 1040 or HP MSA 2040 system:

- Use the supplied mini-USB serial cable to verify the management IP address using the 'show network-parameters' command.
- Find the two IP addresses assigned to an HP MSA 1040 or HP MSA 2040 System storage device in the DHCP server's address table. Record these addresses.
- Use a network management utility to discover HP MSA 1040 or HP MSA 2040 System storage devices on the local LAN through SNMP, for example, HP-SIM.
- Use a ping broadcast to identify the device through the host's ARP table.

Connect to the HP MSA 1040 or HP MSA 2040 using the mini-USB cable or to the SMU using the discovered IP address in your browser. If you are using DHCP, record the assigned IP addresses; otherwise set the IP address of the controller management ports to the previous values as saved in Appendix A.

Update the MSA 1040 or MSA 2040 controller firmware to the latest available version. See **Technical Support/Manuals** from hp.com/go/msa1040 or hp.com/go/msa2040.

Re-entering controller information

Re-enter the following information stored in the controllers:

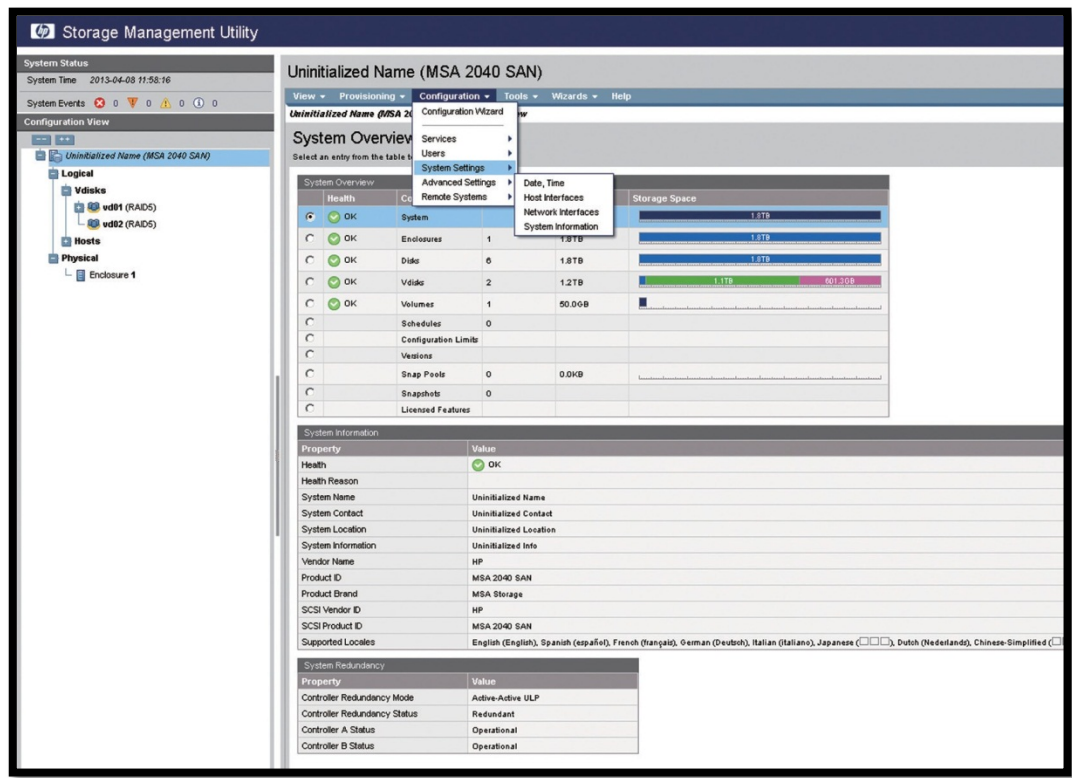| Item	Description
Host interfaces	This is where the FC topology (loop, point-to-point, auto) and port speed (4Gb, 8Gb, 16Gb*, or auto) are assigned. Set iSCSI port addresses and iSCSI settings if you upgrade and change protocols. Re-enter iSNS and CHAP information. • 16Gb FC is only on the HP MSA 2040
System information	This includes the system name, contact name, and system location information.
Host volume mapping	This is where volume host access is assigned.
User configuration	An example includes assigning user rights to users that are allowed to log on to the array. All custom user names will need to be re-entered.
Network management services	An example includes enabling FTP access to the array.
Email configuration	This is used for event notification.
SNMP trap address information	This is used for event notification.
Snapshot and Remote Snap licenses	Refer to upgrade considerations section.
Existing snapshot schedules	Schedules of when snapshots are taken or reset, or volume copy schedules.

Re-enter system settings
Re-enter system settings as follows:

1. Log in to the HP SMU, and highlight MSA 1040 SAN or MSA 2040 SAN from the Configuration View frame.
2. Click **Configuration | System Settings**.

Note
Use the user name 'manage' and the password '!manage' (without quotes) to log in to the HP SMU since the user name and password will return to defaults.

Figure 12. System settings configuration
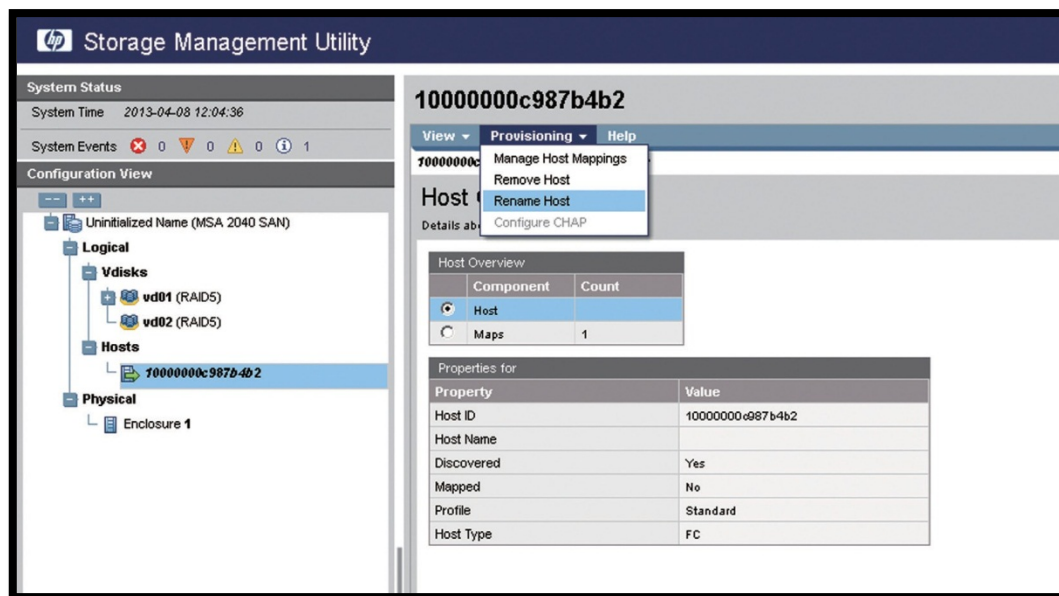

3. Enter the settings as follows:

Setting	Description
Date, time	Verify the time zone, date, and system time.
Host interfaces	The CLI 'set host-parameters' command is used to set FC and iSCSI parameters on host ports. FC settings can include connection type and speed. The iSCSI parameters include IP address, IP netmask, IP gateway, and IP version. The MSA 2040 SAS controller requires no SAS port configuration. See the HP MSA 1040 or HP MSA 2040 CLI Guides for more information. For MSA 2040 SAN controllers to use the iSCSI protocol, it is required to set the controller host port mode using the CLI set host-port-mode command. See the CLI Online Help or the HP MSA CLI Reference Guide for more information on the command. MSA 2040 SAN controller FW must be updated to GL101R001 or later to enable iSCSI capabilities. The manuals can be found at: hp.com/support/msa1040/manuals or hp.com/support/msa2040/manuals
System information	Re-enter the name, contact, location, and system information. This information was recorded in step 16 of the "Before you begin the upgrade" section.

Verify host names and update if necessary

Assign or re-enter host nicknames and profiles.

1. Log in to the HP SMU.
2. Expand Hosts from the Configuration View frame by clicking the + button next to Hosts.
3. Highlight the host and select **Provisioning | Rename Host**.
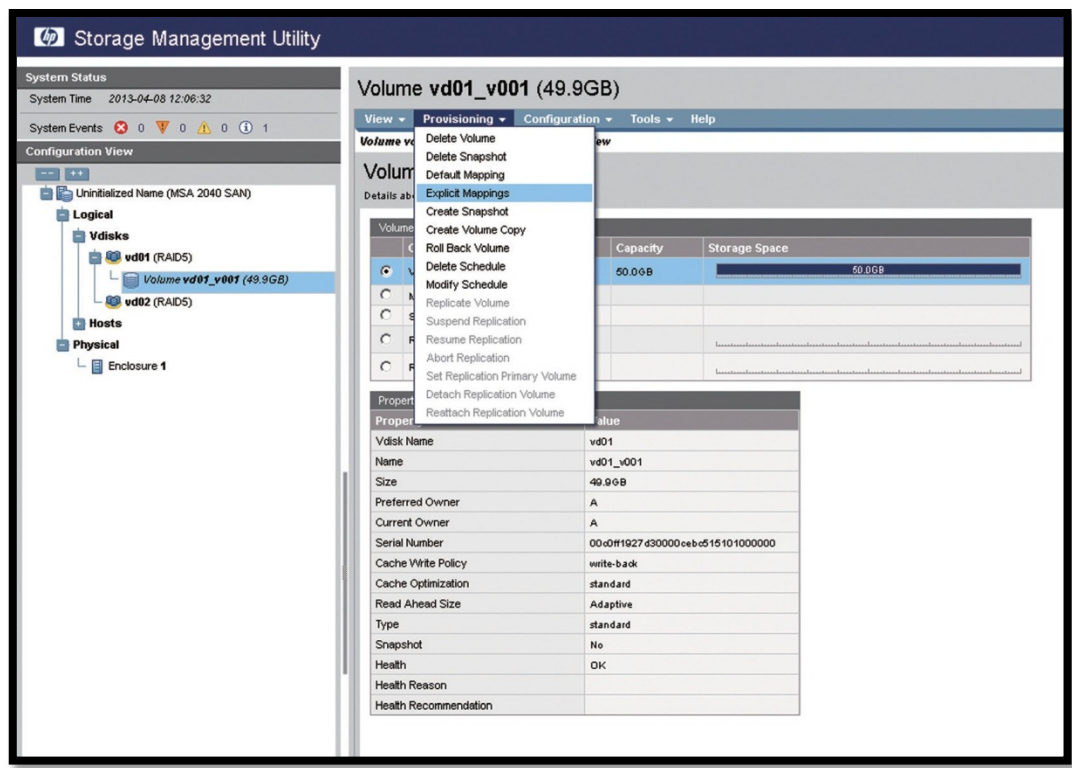
Figure 13. Renaming WWN hosts

Re-enter explicit volume mappings

Re-enter explicit volume mappings as follows:

1. Log in to the HP SMU and click on the specific volume name.
2. From the menu, select **Provisioning | Explicit Mappings**.

Figure 14. Renaming WWN hosts

3. Click the radio button next to the Type column for the corresponding host(s) that you want mapped and select **Map** to see the expanded view.

Figure 15. Explicit volume mapping expanded view

4. Click the Map box to enable mapping, type in the LUN number, and select the access type from the drop-down menu.
5. On the graphic, click the corresponding ports that were mapped previously and click Apply.
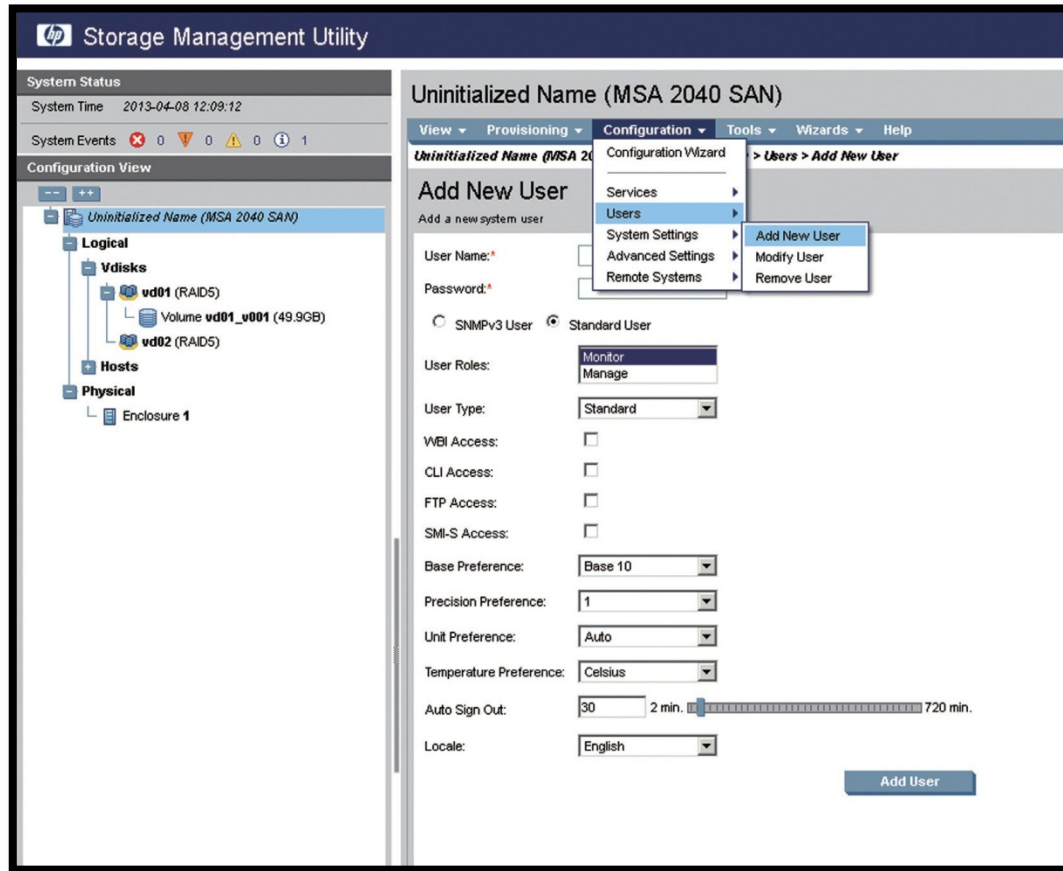
Re-enter user information

Re-enter the user configuration information, including 'user name' and 'user type' as follows:

Note

This information was recorded in step 16 of the "Before you begin the upgrade" section.
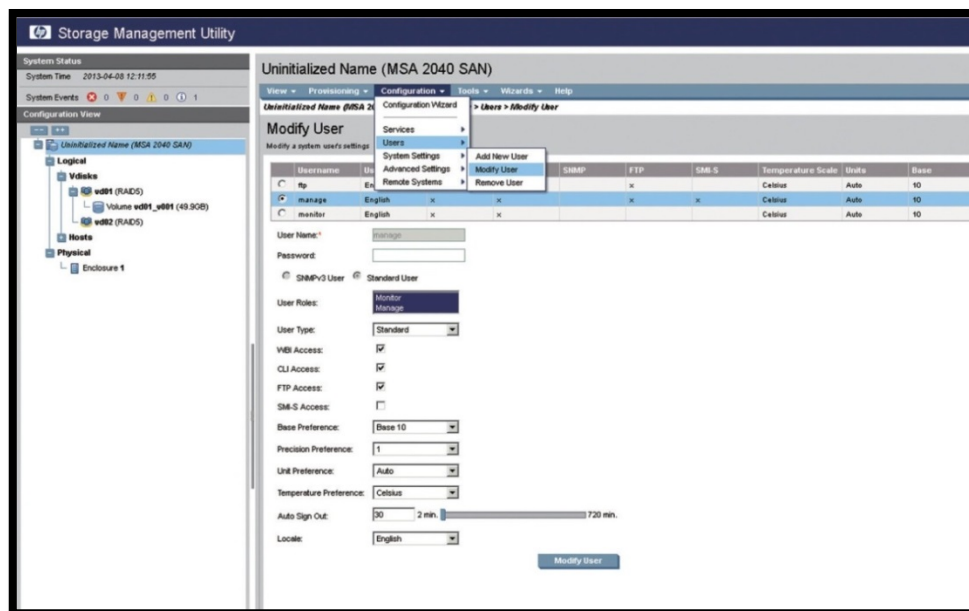
---

1. Log in to the HP SMU.
2. Highlight MSA 1040 SAN or MSA 2040 SAN from the Configuration View frame.
3. Click **Configuration | Users | Add New User**.

Figure 16. Add new users screen

4. Add any additional users that you had created on the previous MSA controller, set their passwords, and assign their user type.
5. Change the default user passwords or access type by logging into the HP SMU, highlighting MSA 1040 SAN ot MSA 2040 SAN from the Configuration View frame and then clicking on **Configuration | Users | Modify Users**.
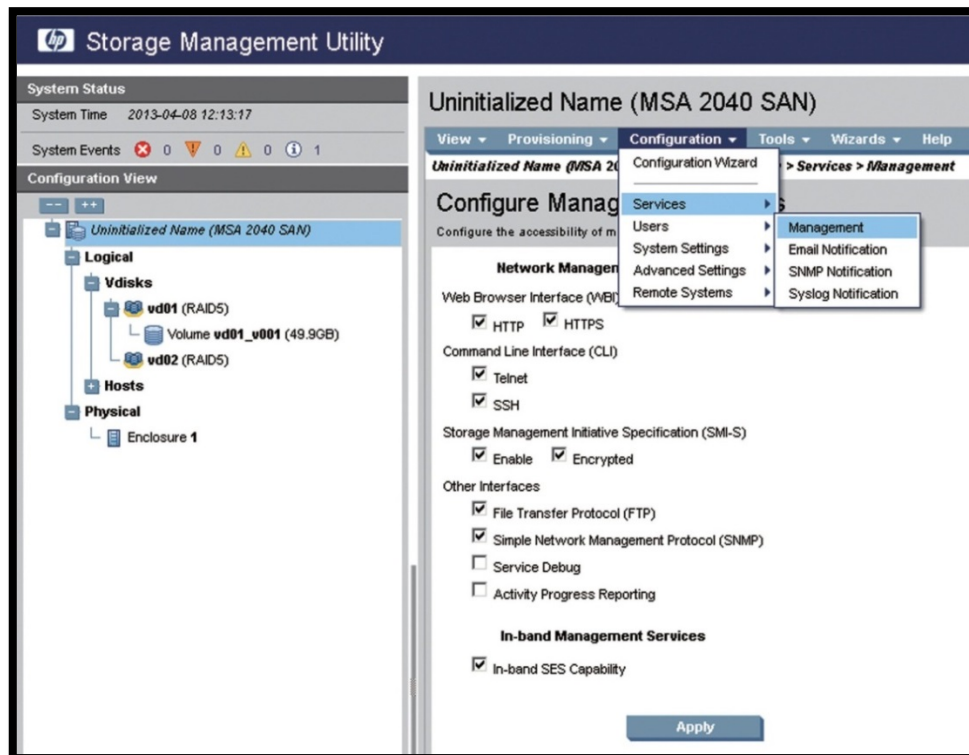
Figure 17. Modify user screen

6.   Select the default user(s) and re-assign passwords and other attributes.

Re-enter services information
1.   Log in to the HP SMU.
2.   Highlight MSA 1040 SAN or MSA 2040 SAN from the Configuration View.

Figure 18. Network management services screen

3. Select **Configuration | Services | Management** to re-enable the correct network management service.

4. Select **Configuration | Services | Email Notification** to re-enter email notification parameters.

5. Select **Configuration | Services | SNMP Notification** to re-enter SNMP information.

Note
The HP MSA 1040 and HP MSA 2040 allow the user to configure the syslog notification level.

---

6. Select **Configuration | Services | Syslog Notification**. In the main panel, set the options:
   – Notification Level. Select the minimum severity for which the system should send notifications: Critical (only); Error (and Critical); Warning (and Error and Critical); Informational (all); or none (Disabled), which disables syslog notification.
   – Syslog Server IP Address. IP address of the syslog host system.
   – Syslog Server Port Number. Number port of the syslog host system.

Snapshot and Remote Snap Licenses
1. Select **Tools | Install License**. Type in the path and license file or browse to the license file and then click Install License File to add the updated license.

   The new license is only needed if you have upgraded to the MSA 2040 storage enclosure.

Snapshot Schedules
1. Select **Provisioning | Modify Schedules**. Verify the existing snapshot schedules.

Verify FC switch configuration
1. When upgrading to a FC based controller, verify that the FC switch zoning configuration is updated with the new storage system port WWNs.

Re-establish iSCSI connectivity
1. If upgrading to an iSCSI based controller, re-establish iSCSI sessions from the hosts to the new storage system IQN.

Remote Snap communication
For Remote Snap, if the management controllers cannot communicate with each other, you will need to set the remote replication secondary addresses on the secondary array using the secondary storage system's addresses.

Complete the upgrade
1. Power up all hosts connected to the storage system.

2. From the hosts, verify that the MSA volumes are accessible. This will require a multipath reconfigure if multipath was used prior to upgrading and not updated prior to the upgrade.

Congratulations! You have successfully upgraded to the HP MSA 1040 or HP MSA 2040.

VMware vSphere

Upgrading the MSA controller(s) changes the signature on the storage system, which causes the ESX/ESXi host to detect the LUN as a snapshot. After the upgrade, you might experience missing datastores and virtual machines (VMs). You will need to add the missing datastores and VMs back into the vSphere inventory using the resignature process. For Raw Device Mapping (RDM) that are presented directly to VM from the MSA storage system, will need to be manually imported using CLI commands.

Since the MSA 1040 and MSA 2040 SAN storage systems are T10 compliant, there is no need for the VAAI plugin to be installed. If your ESX/ESXi server hosts both P2000 G3 MSA and HP MSA 1040/2040 SAN storage systems, it is recommended that you uninstall the VAAI plugin, remove claim rules, and then re-install VAAI after the controller upgrade. This ensures all claim rules are associated with the correct storage system.

Below are the steps for adding missing datastores, VMs, and deactivating the VAAI plugin. Refer to the VMware documentation and support before upgrading the controller(s).

Retrieving the disk information before upgrading the controller(s)
Refer to the following VMware Documentation links for specific details for steps 1 through 3.

CLI vmkfstools link: vmkfstools

Service console command **esxfg-scsidevs** link: esxcfg-scsidevs

Before performing the controller upgrade, collect all disk information related to Virtual Machine File System (VMFS) and RDM files.

1. Make sure the VM data is properly backed up.
2. From the ESX/ESXi console, run the following commands to collect the disk information:
   A. Enter the vmkfstools -P command to query the vmfs file system and save the disk information to file
      vmkfstools -P /vmfs/volumes/DATASTORE_NAME/VM_NAME/VM_NAME.vmdk
      # UUID: 518421ec-a2b768ec-1eed-001cc468d0c4 Partitions spanned (on "lvm"):
      # naa.600c0ff00011caddea9f835101000000:1
   B. Save the vmfs disk information to a file
   C. Enter the vmkfstools -q command to query the RDM file system
      vmkfstools -q /vmfs/volumes/DATASTORE_NAME/VM_NAME/VM_NAME_RDM.vmdk
      # Disk /vmfs/volumes/vmfs5/RDMVM/RDMVM.vmdk is a Non-passthrough Raw Device Mapping
      # Maps to: vml.0200560000600c0ff00011cadd1fa0835101000000503230303020
   D. Enter the esxcfg-scsidevs -u to list NAA ID with their primary name and use the vml number from step c for the input parameter
      esxcfg-scsidevs -u |grep   vml.0200010000600c0ff000db41bae7458151010000004d5341203230
      # naa.600c0ff000db41bae745815101000000
   E. Save the RDM disk information to a file.
3. Repeat steps 1 and 2 for additional VMs, and save all the disk information to a file for use after the controller upgrade.

Deactivating the MSA VAAI plugin and removing the claim rules before upgrading the controller(s)
1. Put the ESX server into maintenance mode for the host with the VAAI plugin installed.
2. Remove the VAAI plugin by running the following command from the ESX/ESXi console:
   esxcli software vib remove -n vmware-esx-hp_vaaip_p2000
3. Enter the esxcli storage core claimrule list command to confirm the claim rule numbers for the MSA VAAI Plug-in. Rule numbers are 5001, 5002, 5003 and 5004.
   esxcli storage core claimrule list --claimrule-class=Filter

# RuleClass	Rule Class	Type	Plugin	Matches
# Filter	5001 file	vendor	VAAI_FILTER	vendor=HP model=P2000 G3 FC
# Filter	5002 file	vendor	VAAI_FILTER	vendor=HP model=P2000 G3 FC/iSCSI
# Filter	5003 file	vendor	VAAI_FILTER	vendor=HP model=P2000 G3 iSCSI
# Filter	5004 file	vendor	VAAI_FILTER	vendor=HP model=P2000 G3 SAS

4. Deactivate all claimrules for the MSA VAAI Plug-in. For example, to delete the "5001" claim-rule enter the esxcli storage core claimrule remove command:
   esxcli storage core claimrule remove -r 5001 --claimrule-class=Filter
   esxcli storage core claimrule remove -r 5001 --claimrule-class=VAAI
5. Enter the esxcli storage core claimrule load command to load the new rules:
   esxcli storage core claimrule run --claimrule-class=Filter
6. Enter the esxcli storage core claimrule list command to confirm that the claim-rules of the MSA VAAI Plug-in are deleted:
   esxcli storage core claimrule list --claimrule-class=all

   The response should no longer include filter rules for P2000 models
7. Shutdown all VMs and the ESX/ESXi server(s) in preparation for the controller upgrade.
8. Proceed to "Upgrading to the HP MSA 1040 or HP MSA 2040" section to upgrade the controllers.

Post controller upgrade
Once the controller upgrade process outlined in this document has been completed and the ESX/ESXi servers are online, missing datastore(s) and inaccessible VMs may be listed in the vSphere inventory. To add them back into inventory, follow the steps below:

Inventory Datastore(s) and VMFS VM(s)
Refer to the following VMware documentation hyperlinks for details.

Entering and Exiting Maintenance Mode

Resignature a VMFS Datastore

Adding and Removing VMs

1. Take the ESX/ESXi host out of maintenance mode.
2. Remove all VMs that are listed as **inaccessible** in the vSphere inventory.
3. Assign a New Signature to the Disk/LUN by running the add storage wizard.
    A. Select the Disk/LUN based on the information saved before the controller upgrade. The new signature adds the datastore back into the inventory with a prefix name of snap. This is because the original name is still reserved by vSphere.
    B. Repeat the above steps for each Disk/LUN that needs to be re-inventoried.
4. Re-inventory the VMs from the signatured datastores (refer to Adding and Removing Virtual Machines.)

Note
To restore the original datastore names, remove all the VMs from the inventory again and then rename the datastores. Follow step 4 to re-inventory the VMs again.

Inventory RDM Virtual Machine(s)
Refer to the following VMware documentation hyperlinks for specific details.

VMware KB (1026256)

Adding and Removing Virtual Machines

For each RDM VM, use the appropriate command:

•   Creating a virtual RDM: Enter the **vmkfstools –r** command.
•   Creating a physical RDM: Enter the **vmkfstools –z** command.

These commands recreate the descriptor file (example.vmdk) and mapping file, (example-rdm.vmdk)

1. Refer to the RDM disk information that was saved before upgrading the controller.
2. For example, to create a pass-through raw disk mapping file for a physical RDM, run the following commands from the ESX/ESXi console:
    A. Change directory to VM directory:
        cd /vmfs/volumes/DATASTORE_NAME/VM_NAME/
    B. Enter the following command to generate a new descriptor and mapping file:
        vmkfstools –z /vmfs/devices/disks/naa.600c0ff00011cadd1fa0835101000000 VM_NAME.vmdk
    C. Repeat steps a through b for all RDM disks.
3. Add the VM back into inventory.

Appendix A

Before you power down your hosts and remove the existing MSA controllers, review this checklist and ensure you have all the necessary information.

Management IP configuration

	Controller A	Controller B
IP address	_____	_____
Netmask:	_____	_____
Gateway:	_____	_____

Controller FC World Wide Names

Controller A WWNs	A1: _____	A1: _____
Controller B WWNs	B1: _____	B2: _____

FC and SAS host nicknames

WWN	Nickname	Profile
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Controller iSCSI port addresses (listed under **Host Interface** in the SMU)

Controller A IP address:	Port 1: _____	Port 2: _____
Controller B IP address:	Port 1: _____	Port 2: _____

Port IQN host nicknames (iSCSI only)

Host ID	Nickname
_____	_____
_____	_____
_____	_____
_____	_____

Volume mappings

Volume name	Host name or Host ID	Ports	LUN	Access
_____	_____	_____	_____	No/R/RW
_____	_____	_____	_____	No/R/RW
_____	_____	_____	_____	No/R/RW
_____	_____	_____	_____	No/R/RW

Network Management Services
Web Browser Interface (WBI)

☐ HTTP   ☐ HTTPS

Command Line Interface

☐ (CLI) Telnet

☐ SSH

Storage Management Initiative Specification (SMI-S)

☐ Enable   ☐ Encrypted

Other Interfaces

☐ File Transfer Protocol (FTP)

☐ Simple Network Management Protocol (SNMP)

☐ Service Debug

☐ In-band Management Services In-band SES Capability

Email alerts configuration

Notification level	SMTP server address	Sender name	Sender domain
N / E / C / W / I	___.____.____.____ _	_____	_____

Email address 1: _____

Email address 2: _____

Email address 3: _____

Email address 4: _____

SNMP traps configuration
Notification level: N / E / C / W / I

SNMP read community: _____

SNMP write community: _____

Trap host IP address 1:   ____.____.____.____

Trap host IP address 2:   ____.____.____.____

Trap host IP address 3:   ____.____.____.____

Technical white paper | Upgrading to the HP MSA 1040 or HP MSA 2040

Advanced Disk Settings

SMART Configuration:

Dynamic Spare Capability: ☐

Available and Spare Drive Spin Down Capability: ☐

Drive Spin Down Delay (minutes):

Drive Spin Down Suspend Period: ☐

Time to Suspend ☐ (HH)

☐ (MM)

Time to Suspend ☐ (HH)

☐ (MM)

Exclude Weekend Days from Suspend Period: ☐

EMP Polling Rate:

Advanced Cache Settings

Sync Cache Mode:

○ Immediate

○ Flush to Disk

Missing LUN Response:

○ Not Ready

○ Illegal Request

Host Control of Write-Back Cache: ☐

Auto-Write Through Cache Trigger Conditions

_____

Controller Failure: ☐

Cache Power: ☐

CompactFlash: ☐

Power Supply Failure: ☐

Fan Failure: ☐

Over temperature Failure: ☐

Auto-Write Through Cache Behaviors ☐

_____

Revert when Trigger Condition Clears: ☐

Notify Other Controller: ☐

Remote Snap Remote System Information*

IP address:*

User Name:*

Password:*

*If applicable

System user names

Note
SNMP User Characteristics (User Access vs. Trap Target, Authentication Type, Privacy Type, Privacy Password, and Trap Host Address) only need to be set if the "SNMPv3 User Definition" is checked.

User Name (default users and their default settings are shown below)	Attribute	Value
	Password	!manage/!monitor/!ftp
	SNMPv3 User Definition Checked?	No/No/No
	User Roles	manage, monitor/monitor/manage, monitor
	User Type	standard/standard/standard
	WBI Access?	Yes/Yes/No
	CLI Access?	Yes/Yes/No
	FTP Access?	Yes/No/Yes
	SMI-S Access	Yes/No/No
	Base Preference	Base 10/Base 10/Base 10
manage/monitor/ftp	Precision Preference	1/1/1
	Unit Preference	Auto/Auto/Auto
	Temperature Preference	Celsius/ Celsius/ Celsius
	Auto Sign out	30/30/30
	Locale	English/English/English
	SNMP User Characteristics	N/A
	Authentication Type	N/A
	Privacy Type	N/A
	Privacy Password	N/A
	Trap Host Address	N/A

System information

System name: _____

System contact: _____

System location: _____

System information: _____

Date/time information

Network Time Protocol: Enabled/Disabled

NTP server address: _____._____._____._____

Time zone Offset: _____

Controller logs filenames

Controller A: _____

Controller B: _____

Learn more at
hp.com/go/MSA