hp StorageWorks Modular Smart Array 1000 (MSA1000)

Second Edition (November 2003)

Part Number: 339868-002

This document contains late-breaking and supplemental information for the HP StorageWorks Modular Smart Array 1000 (MSA1000).

For the latest version of these Release Notes and other MSA1000 documentation, access the **Technical Documentation** page of the MSA1000 website at http://www.hp.com/go/msa1000.

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Release Notes Contents

These Release Notes cover the following major topics:

Other MSA1000 and SAN-related Documentation

The following MSA1000-related documents, as well as compatibilty information, whitepapers and release notes, are available on the **Technical Documents** page of the MSA1000 website at http://www.hp.com/go/msa1000.

■   *MSA1000 Compatibility Guide*

This guide provides up-to-date information about the MSA1000 and its supported components.

■   HP StorageWorks MSA1000 Configuration Overview (printed)

The poster is a companion piece to the Installation Guide.

■   *HP StorageWorks Modular Smart Array 1000 Installation Guide*

This printed guide details the procedures for installing your MSA1000.

■   *HP StorageWorks Modular Smart Array 1000 Reference Guide*

This guide contains basic information about using and managing the MSA1000.

■   *HP StorageWorks Modular Smart Array 1000 Command Line Interface Reference Guide*

This guide contains information about using the CLI.

■   *HP Array Configuration Utility User Guide*

This guide contains information about using the ACU.

Note: The ACU is supported for use in Windows, NetWare, and Linux operating environments.

Access the ACU website to obtain the latest version of the guide at http://h18000.www1.hp.com/products/servers/proliantstorage/software-management/acumatrix/index.html.

■   *HP StorageWorks Modular Smart Array 1000 Controller Reference Guide*

This guide defines MSA1000 controller display messages and discusses other controller reference information.

■   *HP StorageWorks SAN Design Guide*

This guide provides information on designing and building large Storage Area Networks, including design considerations and rules, common topologies, security considerations, and best practices.

Access the SAN Infrastructure website to obtain the latest version of this guide at http://www.hp.com/go/san.

Notes for all MSA1000 Environments

The following notes apply to all deployments of the MSA1000.

MSA1000 Controller Firmware Version 4.24 Support

Organized by Operating System, the following table lists the support offered by **version 4.24** of MSA1000 controller firmware.

Note: For up-to-date information about the MSA1000 and its supported components, read the *MSA1000 Compatibility Guide* on the **Technical Documentation** page of the MSA1000 website at http://www.hp.com/go/msa1000.

Table 1: MSA1000 Supported Operating Systems and Components

Operating System	OS Version / kernel	HBAs	Servers	Switches
Microsoft® Windows®	Server 2003 (64-bit)	AB232A (64-bit)	RX2600 RX5670	HP StorageWorks B-Series Fabric Switches HP StorageWorks C-Series Fabric Switches (Windows only) HP StorageWorks M-Series Fabric Switches Brocade 1 Gbps and 2 Gbps Fibre Channel switches McData 2 Gbps Fibre Channel switches Cisco Fibre Channel switches
	Server2003 (32-bit) Enterprise Edition	FCA2101 FCA2404 FCA2404DC FCA2214 FCA2214DC	ProLiant BL20p G2 BL40p DL360 DL380 DL580 DL740 DL750 DL760 ML350 ML370 ML530 ML570 ML750 PL1850R PL3000 PL6000 PL6400 PL7000 PL8000 PL8500	
	Windows 2000, with SP3, SP4			
	Windows NT® 4.0, with SP6A			
Linux	Red Hat Linux Advanced Server 2.1 with kernels: 2.4.9-e3smp 2.4.9-e12smp 2.4.9-e25smp	A6826A (64-bit) FCA2214 FCA2214DC		
	SuSE Linux Enterprise Server 8 (SLES 8) with kernels: 2.4.19-64-GB-SMP (k_smp-2.4.19-304)			
NetWare	6.5	FCA2210		
	6.0, with SP6			
	5.1, with SP3			

Note: Go to www.hp.com/go/san for complete Fibre Channel Switch information.

Table 1: MSA1000 Supported Operating Systems and Components

Operating System	OS Version / kernel	HBAs	Servers	Switches
OpenVMS **Note:** TIMA kits are available on the IT Resource Center website at www.itrc.hp.com.	7.3-2	FCA2384 (DS-KGPSA-EA) FCA2354 (DS-KGPSA-DA) DS-KGPSA-CA (1 Gb/s)	AS4X00 AS8X00 DS10 DS15 DS20L DS20E DS25	StorageWorks B-Series Fabric Switches HP StorageWorks M-Series Fabric Switches
	7.3-1 with TIMA kit VMS731_FIBRE_SCSI_V0400			
	7.3 with TIMA kit VMS73_FIBRE_SCSI_V0500			
	7.2-2 with TIMA kit VMS722_FIBRE_SCSI_V0400			
Tru64 UNIX® **Note:** Patch kits are available on the IT Resource Center website at www.itrc.hp.com.	5.1B with Patch Kit 2 (BL22) (recommended version)		ES40 ES45 ES47 (PCI-X), ES80 (PCI-X) GS80 GS160 GS320 GS1280 (PCI-X)	**Note:** Go to www.hp.com/go/san for complete Fibre Channel Switch information.
	5.1A with Patch Kit 5 (BL23) and NHD6 (recommended version)			

MSA1000 Updates

In between manufacturing cycles, new hardware and software features may be added to the MSA1000 controller firmware or drivers.

Occasionally visit the **Software, Firmware & Drivers** page of the MSA1000 website at http://www.hp.com/go/msa1000 to check for updates that may affect your environment.

MSA1000 Controller Firmware Upgrades

If you are upgrading an existing MSA1000 to the most recent version of controller firmware, do not use the instructions provided with the MSA1000 Support Software CD or included in the *HP StorageWorks MSA1000 Installation Guide*.

Go to the **Technical Documentation** page of the MSA1000 website at http://www.hp.com/go/msa1000 and use the instructions provided in the *Upgrading the MSA1000 for Enhanced Features* document.

MSA1000 Controller Replacement Procedures

The procedure for replacing an MSA1000 controller differs for dual-controller and single-controller configurations.

Refer to the *HP StorageWorks Modular Smart Array 1000 Controller Reference Guide* for the details of physically removing and installing an MSA1000 controller.

Dual-Controller Configuration

If an MSA1000 controller fails in a dual-controller configuration, you can remove and replace the failed controller at any time. If you remove the failed controller and a replacement controller is not immediately available, you must install a blanking panel to ensure proper airflow within the MSA1000. An empty controller bay causes increased operating temperatures in the MSA1000.

When you are ready to replace the failed controller, although not required, HP recommends performing the replacement during system or application downtime. After the new controller is installed, the LCD panel displays a readiness message.

Note: For Tru64 UNIX environments, when you are ready to replace a failed MSA1000 controller in a dual-controller configuration, you must first stop all I/O access to the MSA1000.

Single Controller Configuration

If an MSA1000 controller fails in a single-controller configuration, the MSA1000 is no longer usable and should be powered-down. (A dual-controller configuration reduces downtime when acontroller fails, because all processes are shifted to the redundant controller.)

Replace the controller as soon as possible so that the MSA1000 can be restarted.

Operating System Identification

Because the MSA1000 can operate in a variety of operating system environments, when installing the MSA1000, you must identify the operating system of each HBA that is presented to the MSA1000.

Depending on your operating system, you may set the host mode in either the Array Configuration Utility (ACU) or the Command Line Interface (CLI). See the *HP StorageWorks Modular Smart Array 1000 Command Line Interface Reference Guide* or the *HP Array Configuration Utility User Guide* for detailed instructions.

Note: HP recommends identifying the host mode in the same utility that you will use to configure your storage.

Cable Management

For optimal performance and reliability of the SCSI connections to additional storage enclosures, use the shortest cable possible when connecting the MSA1000 to the enclosures. 3-foot SCSI cables are included in the shipping carton with the MSA1000.

Storage Configuration

Whether you use the ACU or the CLI to configure your storage, HP recommends selecting one utility and using it exclusively. Use either the ACU or the CLI but not both.

Multi-Path (Redundant) Configurations

MSA1000 path redundancy requires two isolated Fibre Channel fabrics and the associated hardware and software components in the configuration.

Requirements

Requirements include:

■ (2) MSA1000 controllers in the MSA1000

■ (2) embedded Fibre Channel interconnect devices in the MSA1000

■ (2) external Fibre Channel switches or hubs

(External switches or hubs are needed when the standard-shipped embedded MSA1000 Fibre Channel I/O modules are used, but are not needed when the optional embedded MSA1000 SAN Switch 2/8 or MSA Hub 2/3 are used.)

■ (2) Fibre Channel HBA in the server

■ Multi-pathing software on the server

Installing Secure Path Software

Windows, Linux, and NetWare multi-path environments must install Secure Path multi-pathing software on their servers. When installing Secure Path, be sure to follow every server reboot prompt that is presented. Failure to acknowledge a server reboot prompt may result in your path redundancy not functioning properly.

Secure Path installation requires at least two reboots during installation:

■ Reboot after the file copy from the source media.

■ Reboot after the redundancy driver is attached to the configured LUNs.

If the operating system does not prompt for a second reboot within five minutes after logging in, manually reboot the server.

Deleting LUNs in Multi-Path Configurations with the ACU

In multi-path configurations, deleting LUNs through the ACU may cause a path failover or cause ACU to display an error message that a hardware failure has occurred.

Use the following steps to delete a LUN in multi-path environments:

1. Using the Disk Management utility, delete the partition that corresponds to the LUN that you want to delete.

2. Using Device Manager, uninstall the corresponding disk drive.

3. Using the ACU, delete the LUN.

Notes for Windows Environments

The following notes apply to Windows deployments of the MSA1000.

Host Bus Adapter (HBA) Driver Installation

When installing or updating HBA drivers, you must use the driver installers that are provided on the MSA1000 Support Software CD or on the MSA1000 website.

If you install a driver provided from the manufacturer or use the "Upgrade Driver" option of Device Manager, your MSA1000 will not perform as intended.

The MSA1000 Support Software CD is included in the shipping carton with the MSA1000, and a copy of the MSA1000 Support Software CD can also be downloaded from **Software, Firmware & Drivers** page of the MSA1000 website at http://www.hp.com/go/msa1000.

Using the Automatic Installation Utility

When installing or updating HBA drivers in a Windows environment, HP recommends using the automatic driver installation utility on the MSA1000 Support Software CD or on the MSA1000 website.

Installing the HBA Driver Manually

HP recommends using the automatic driver installation utility on the MSA1000 Support Software CD or the MSA1000 website to install the drivers for the HBA on your server, but if you do need to install an HBA driver manually:

1. Determine the component package for your HBA.

    a. Insert the MSA1000 Support Software CD into the CD-ROM drive of the server.

    b. Navigate to the *rdp**windows* directory on the CD.

    c. View the directory for the file for your HBA.

       Currently, the component package filenames are:

       For HBA FCA2101 and FCA2402, the component package name is cp003937.exe

       For HBA FCA2214, the component package name is cp003973.exe

2. Execute the following command from the command console:

    ```
    CPXXXXXX/M/F
    ```

    where:

    XXXXXX = the component package filename, such as cp003937

    `/M` = install the additional MSA1000 support files of cpqfcac.sys and cpqc8sw.inf

    `/F` = install the drivers, even if the an MSA1000 is not detected

Boot from SAN Support

If you are implementing a boot from SAN configuration on your MSA1000, HP and Microsoft recommend creating a pagefile that is located on disks internal to the server.

For more information, see the Microsoft support website at http://support.microsoft.com/default.aspx?scid=kb;en-us;305547.

ProLiant B-class Blade and Intel 64-bit Intel Itanium 2 Server Support

Before connecting the MSA1000 to a ProLiant B-class blade or an Intel® Itanium® 64-bit server, read the release notes for the latest support and configuration information.

These release notes are available on the **Technical Documentation** page of the MSA1000 website at http://www.hp.com/go/msa1000.

Windows Server 2003 Support

Migrating from Windows 2000 to Windows Server 2003

For information on migrating your operating system environment from Windows 2000 to Windows Server 2003, visit http://www.hp.com/go/windowsserver2003.

For information on migrating Windows 2000 clusters to Windows Server 2003, visit http://h18000.www1.hp.com/solutions/enterprise/highavailability/microsoft/win2003.html.

Managing Windows Server 2003 Cluster Volumes

Unlike Windows 2003 cluster behavior, the Windows Server 2003 disk management utility displays both owned and unowned cluster volumes.

Initially, unowned cluster volumes that reside on the MSA1000 will have a disk status of "Not-Initialized."

When a disk has a status of "Not-Initialized," the Disk Initialization wizard will display each time you open the Disk Management applet.

Note: Do not use the Disk Initialization wizard to initialize newly added LUNs.

When the Disk Initialization wizard is displayed in Disk Manager:

1. Cancel out of the Disk Initialization wizard.
2. Right-click the disk number and manually initialize the LUN.

SanWorks Virtual Replicator Support

Use of SanWorks Virtual Replicator to manage your storage is supported.

However, prior to upgrading any of the MSA1000 software or hardware components, please read the whitepapers on the **Technical Documentatio**n page of the MSA1000 website at http://www.hp.com/go/msa1000.

Known Issues and Solutions

Issue: Instead of displaying `StorageWorks MSA1000` for each MSA1000 controller detected, Windows Device Manager reports the following messages:

```
?Unknown devices "MSA1000 SCSI Array Device"
System Devices: "compaq MSA1000"
```

Cause: The MSA1000 Windows Device Manager entry was not installed correctly.

Solution: Run the driver installation again.

Issue: A warning icon that virtual memory is low is displayed in the system tray in the lower-right portion of the screen.

Solution: If this icon is displayed when installing the HBA drivers on Intel Itanium 64-bit 2 servers, you may safely ignore the warning. The warning icon should not have been displayed.

Issue: Event Logs and Insight Manager may incorrectly report that the HBA is installed in PCI slot 65535 or 255.

Solution: You may safely ignore this message.

Issue: The CLI may incorrectly report that the World Wide Node Name has the same value as the World Wide Port Name, if the MSA1000 was originally configured using the ACU.

Solution: Because the MSA1000 bases LUN access restrictions on the WWPN only, you may safely ignore this issue.

Issue: The "Save Report" function of the Array Diagnostics Utility (ADU) is obscured from view.

Solution: Use the scroll bar to shift the screen display and show the Save Report option.

Issue: After a failover event in redundant configurations, old status events that were displayed on the primary MSA1000 controller are displayed as new events on the now active standby MSA1000 controller.

Solution: Because the Event Logs and Insight Manager will not duplicate these events, verify the accuracy of the message in the Event Logs and Insight Manager. If the event is not duplicated in the Event Log or in Insight Manager, you may safely ignore these messages.

Notes for Linux Environments

The following notes apply to Linux deployments of the MSA1000.

Host Bus Adapter (HBA) Driver Installation

Determining which RPM File to Use

When you are ready to install your HBA drivers, insert the MSA1000 Support Software CD in the server, mount the CD-ROM, and navigate to the /LINUX directory on the CD. List the contents of the directory and identify the RPM file for your distribution of Linux.

The current RPM installers are:

Red Hat Linux Advanced Server 2.1:

```
qla2x00-6.0.4-21.redhat-AS-2-1.i386.rpm
```

SuSe Linux Enterprise Server 8:

```
qla2x00-6.0.4-12.SuSE-SLES-8.i386.rpm
```

Creating the .config File in Red Hat Linux Environments

Prior to running the RPM installer in a Red Hat Linux environment, a .config file must be created.

For new server installations:

1. Navigate to the */usr/src/linux* directory.
2. Run the `make oldconfig` command.

For existing server installations or upgrades:

1. Navigate to the */usr/src/linux* directory.
2. Run the `make mrproper` command.
3. Run the `make oldconfig` command.

Insight Manager Storage Agent Support

Insight Manager storage agent (CMASTOR) version 6.00 and newer are not supported on Red Hat Advanced Sever 2.1 and SuSE Linux Enterprise Server 8. Use of this storage agent may cause the server to become unstable.

Until further notice, use the storage agents from the 5.50 version of the Management CD.

Multi-path (Redundant) Configurations

After adding additional LUNs, you must reboot the server to correctly address the new storage and have Secure Path protection applied to them.

Notes for both OpenVMS and Tru64 UNIX Environments

The following notes apply to OpenVMS and Tru64 UNIX deployments of the MSA1000.

OpenVMS and Tru64 UNIX Storage Configuration Utility Options

The browser-based Array Configuration Utility (ACU) is not available for OpenVMS or Tru64 UNIX environments.

OpenVMS and Tru64 UNIX environments must use the controller-based Command Line Interface (CLI) to configure and manage attached storage.

OpenVMS and Tru64 UNIX CLI Display

Manually assigned controller IDs may be displayed incorrectly in the MSA1000 Command Line Interface (CLI.)

This is a display error only; the controller has the ID that was assigned to it.

To verify that the correct identifier is assigned:

■ *From OpenVMS,* enter the `$ SHOW DEVICE GG` DCL command.

   The controller and its assigned ID number is displayed as a `Generic Fibre Channel Device`.

   View the display and verify that the controller ID is correct.

■ *From Tru64 UNIX,* enter the `HWMGR view device` command.

   View the display and verify that the controller ID is correct.

OpenVMS and Tru64 UNIX LUN Migrations

Online LUN migrations of RAID level and stripe size are not supported.

To migrate a LUN to a different RAID level or striping configuration, do the following:

1. Stop all read/write activity on the MSA1000.

2. Verify that the hard drives are ready for the migration.

3. Issue the CLI `migrate unit` command, using the following format:

   `MIGRATE UNIT X RAID_LEVEL=Y STRIPE_SIZE=Z`

   where X = unit number (1-31)

        Y = RAID level (1, 5, or ADG)

        Z = new stripe size

Notes for OpenVMS Environments

Complete procedures for installing your MSA1000 are included in the
MSA1000 Installation Guide.

However, the indicated sections below include updated installation information and should be
used instead of the sections in the Installation Guide.

Deploying the MSA1000 in an OpenVMS environment involves:

■ Obtaining the Current Fibre SCSI ECO kit, *MSA1000 Installation Guide*

■ Obtaining the MSA1000 Firmware, *MSA1000 Installation Guide*

■ Obtaining World Wide Port Names, *MSA1000 Installation Guide*

■ Preparing for MSA1000 Firmware Updates, page 13

■ Updating the Firmware on your MSA1000, page 14

■ "Identifying the Server and Operating System to the MSA1000," *MSA1000 Installation Guide*

■ "Configuring the Storage Arrays and Logical Volumes," *MSA1000 Installation Guide*

Preparing for MSA1000 Firmware Updates

1. Obtain the Fibre SCSI ECO kit for your version of OpenVMS.

   The Fibre SCSI ECO kits needed for OpenVMS are the following (or later) versions:

OpenVMS Version	Fibre SCSI ECO Kit
OpenVMS 7.3-1	DEC-AXPVMS-VMS731_FIBRE_SCSI-V0400-4
OpenVMS 7.3	DEC-AXPVMS-VMS73_FIBRE_SCSI-V0500-4
OpenVMS 7.2-2	DEC-AXPVMS-VMS722_FIBRE_SCSI-V0400-4

   These kits are available at the IT Resource Center website at http://www.itrc.hp.com.

2. Locate the MSA1000 that requires the firmware upgrade.

   If the MSA1000 has a dual-controllers and any of the following conditions exist, you must
   remove the secondary (left) controller (controller 2).

   ■ The MSA1000 is running version 2.x firmware.

   ■ There is an OpenVMS system on the same SAN that does not have the current Fibre
   SCSI ECO kit installed.

   ■ You are doing a new install of OpenVMS prior to version 7.3-2 on an MSA1000
   volume.

   When you remove the secondary controller, the error light on the primary controller lights,
   and displays the following error message:

   ```
   REDUNDANCY FAILED, NO SECOND CONTROLLER.
   ```

   You can safely ignore the error message.

3. If you have an existing OpenVMS installation:

   a. Assign an identifier to each installed MSA1000 controller.

      See the *HP StorageWorks Modular Smart Array 1000 Command Line Interface User Guide* for instructions.

Note: The controller ID may not display correctly in the CLI. For more information, see "OpenVMS and Tru64 UNIX CLI Display" on page 12.

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   b. Install the Fibre SCSI ECO kit on all of the system disks and reboot the system.

      Refer to the documentation that comes with the Fibre SCSI ECO kit for installation instructions.

   c. If there are other OpenVMS systems in the SAN, make sure that they have the Fibre SCSI ECO kit installed and are rebooted before reinstalling the left controller.

   d. Connect the MSA1000 to the SAN and skip to Updating the Firmware on your MSA1000.

4. If you do not have an existing OpenVMS installation:

   a. Create a LUN on the MSA1000 and assign an identifier to the LUN.

      See the *HP StorageWorks Modular Smart Array 1000 Command Line Interface User Guide* for instructions.

   b. Assign an identifier to the MSA1000 controller.

      See the MSA1000 CLI User Guide for instructions.

   c. Install OpenVMS.

      See the *OpenVMS Alpha Version 7.3-1 Upgrade and Installation Manual* for instructions.

   d. Install the Fibre SCSI ECO kit on all system disks and restart the system.

      See the documentation that came with the Fibre SCSI ECO kit for installation instructions.

Updating the Firmware on your MSA1000

1. Acquire the latest MSA1000 firmware file from the MSA1000 website, as detailed in "Obtaining the MSA1000 Firmware" in the *MSA1000 Installation Guide*

Note: The firmware file must be copied to a local disk on the OpenVMS system. The MSA1000 cannot be flashed directly from the CD.

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2. Verify that each MSA1000 controller has been assigned a unique identifier.

   See the *HP StorageWorks MSA1000 Command Line Interface User Guide* for instructions.

Note: The controller ID may not display correctly in the CLI. For more information, see "OpenVMS and Tru64 UNIX CLI Display" on page 12.

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3. Stop all Input/Output access from application programs to the MSA1000.

4. If the MSA1000 controller or the controller identifier for it was added to the SAN after OpenVMS was booted, issue the following commands:

```
$ RUN SYS$SYSTEM:SYSMAN
SYSMAN> IO AUTOCONFIGURE
SYSMAN> EXIT
```

5. Enter the following command to run the firmware flash program:

```
RUN SYS$ETC:MSA_UTIL
MSA>
```

6. Enter following command to see a list of MSA1000 controllers on the SAN:

```
MSA> SHOW CONTROLLER/BRIEF
```

The following is displayed:

```
A default controller is not set.  All matching controllers displayed

Controller: _$1$GGA40:
MSA1000          (c) COMPAQ P56350B9IMX025 Software 2.38
Controller Identifier: 40
NODE_ID = 500805f3-0001b290
Current Redundancy mode: Active/Standby
Current Role:          Active

Controller: _$1$GGA41:
MSA1000          (c) COMPAQ P56350B9IN20HW Software 2.38
Controller Identifier: 41
NODE_ID = 500805f3-0001b290
Current Redundancy mode: Active/Standby
Current Role:          Standby
```

7. Use the following command to indicate the controller to be flashed:

```
MSA> SET CONTROLLER <controller ID>
```

where *<controller ID>* is the unique ID of the controller that you obtained in step 6. For example: 1GGA40.

8. Use the following command to begin the firmware update:

```
MSA> FLASH FIRMWARE <firmware filename>
```

where *<firmware filename>* is the filename firmware image that you saved in step 1.

For example:

```
MSA> FLASH FIRMWARE MSAV224A.BIN

Sending Flash Command.  Please wait.
New firmware will be loaded when THIS_CONTROLLER is reset.
```

Note: The MSA1000 controller displays the message FIRMWARE FLASH STARTED when it starts the download, and FIRMWARE FLASH DONE when the download is complete.

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9. When the controller displays FIRMWARE FLASH DONE, if a redundant controller is installed, repeat steps 7 and 8 to update the firmware on that controller.

10. Enter the command to exit the MSA_UTIL.

```
MSA> EXIT
```

11. After all MSA1000 controllers have been updated and the controller displays FIRMWARE FLASH DONE, remove power from the MSA1000. After a few seconds, reapply power to the MSA1000, which causes a reboot of the installed controllers.

When the controllers completes the reboot, the following message is displayed:

COMPAQ MSA1000 STARTUP COMPLETE

Depending on the controller configuration, do one of the following:

■ If the MSA1000 has a single-controller or dual-controllers that were both updated in the previous steps, the firmware upgrade is complete. Go to step 13.

■ If the MSA1000 has dual-controllers, one of which was removed during the installation process, reinstall the left controller and continue with step 12.

12. After reinstalling the left controller, the following message is displayed:

CLONE FIRMWARE? '<' =NO, '>'=YES

Press the **>** button on the left controller display to begin the cloning process.

Note: If you take no action, the firmware clone starts automatically.

The message ROM CLONING STARTED is displayed, indicating that the firmware on the left controller is being cloned. Cloning takes approximately one minute.

After the firmware clone is complete, the left controller displays the message ROM CLONING DONE, followed by ARRAY CONTROLLER RESTARTING.

The controller will restart within 30 seconds. The left controller displays COMPAQ MSA1000 STARTUP COMPLETE when the startup routine is complete.

13. To verify the download open the MSA utility again and enter the following commands:

$ RUN SYS$ETC:MSA_UTIL

MSA> SHOW THIS_CONTROLLER (or SHOW OTHER_CONTROLLER)

Notes for Tru64 UNIX Environments

Complete procedures for installing your MSA1000 are included in the *MSA1000 Installation Guide*.

However, the indicated sections below include updated installation information and should be used instead of the sections in the Installation Guide.

Deploying the MSA1000 in a Tru64 UNIX environment involves:

1. Obtaining the Latest MSA1000 Controller Firmware, page 18
2. Determine Which MSA1000s Require a Firmware Upgrade, page 18
3. Obtaining Vital Information about the MSAs that Require a Firmware Upgrade, page 18
4. Updating the MSA1000 Firmware, page 19
5. "Identifying the Server and Operating System to the MSA1000," *MSA1000 Installation Guide*
6. "Configuring the Storage Arrays and Logical Volumes," *MSA1000 Installation Guide*

Prerequisites

■ All equipment must be connected correctly, as detailed in the previous sections in this document and the HP StorageWorks Modular SAN Array 1000 Configuration Overview poster, included in the shipping carton with the MSA1000.

■ An AlphaServer with a minimum of factory installed Tru64 UNIX software that supports the MSA1000, configured in a SAN switch zone with the MSA1000.

For a current listing of the supported versions, see the MSA1000 website at http://www.hp.com/go/msa1000.

Additional requirements when installing Tru64 UNIX to an MSA1000 volume with version 2.38 firmware:

■ If you are upgrading the firmware on your MSA1000 from version 2.38 to version 4.24 or later and you plan to install version 5.1A on your AlphaServer over the factory installed version 5.1B system disk, the following sequence is required:

    a. Upgrade the MSA100 firmware to version 4.24 or later using the factory installed version 5.1B system disk.

    b. Install version 5.1A on your AlphaServer.

■ If you are upgrading the firmware on your MSA1000 from version 2.38 to version 4.24 or later and your server has one CD-ROM drive and no diskette drive, use one of the following recommended processes:

    a. Install the Tru64 UNIX operating system on to a local disk.

    b. Upgrade the firmware on the MSA1000.

    c. Install the Tru64 UNIX operating system onto an MSA1000 logical unit.

       —OR—

    a. Connect to another AlphaServer that supports firmware upgrades.

    b. Upgrade the firmware on the MSA1000.

    c. Reconnect to the AlphaServer.

    d. Install the Tru64 UNIX operating sytem onto an MSA1000 logical unit.

Obtaining the Latest MSA1000 Controller Firmware

To obtain the latest version of MSA1000 controller firmware, go to the **Software, Firmware & Drivers** page of the MSA1000 website at http://www.hp.com/go/msa1000.

Download the firmware image onto your target system and be sure to record the location for future reference.

Determine Which MSA1000s Require a Firmware Upgrade

If the firmware on your MSA1000 controller is earlier than version 4.24, you must upgrade the firmware to a later version.

Use one of the following methods to determine the firmware version of your MSA1000s:

■ From the front of the MSA1000, scroll through the messages on the LCD panel.

With your MSA1000 powered-on, press the arrow buttons on the front of the MSA1000 controller to scroll through the display until the firmware version message is displayed:

```
00 Array controller Firmware ver <version>
```

■ From Tru64 UNIX, use commands in the HWMGR utility.

Use the SCU utility to determine the current firmware version.

```
scu show edt | grep MSA1000 | grep -v VOLUME

5    0    0    RAID        !ANSI  COMPAQ   MSA1000              3.36    N
8    1    0    RAID        !ANSI  COMPAQ   MSA1000              3.36    N
```

This example shows our MSA1000 with both controllers at firmware verion 3.36.

Obtaining Vital Information about the MSAs that Require a Firmware Upgrade

During the firmware upgrade procedure you must identify the specific bus/Target/LUN path for the controller that needs the upgrade.

To obtain the Bus/Target/LUN information for your MSAs that require a firmware upgrade

1. Enter the following command to determine how many MSA1000s are visible.

```
> hwmgr view dev | grep MSA1000 | grep -v VOLUME

208: /dev/cport/scp1              MSA1000            bus-5-targ-0-lun-0
```

This example shows one MSA1000 with a hardware ID (HWID) of 208.

2. Use the HWID obtained in the previous step with the HWMGR command to determine if the MSA has single or dual controllers.

If the previous step showed that you have multiple MSA1000s, execute this command for each HWID.

```
hwmgr -show scsi -full -id 208

      SCSI                 DEVICE   DEVICE  DRIVER NUM       DEVICE FIRST
HWID:  DEVICEID HOSTNAME   TYPE     SUBTYPE OWNER  PATH FILE  VALID PATH
-------------------------------------------------------------------------
 208:  26       es40b      raid     none    0      2    scp1  [5/0/0]
    WWID:02000008:5008-05f3-0004-d6c0

    BUS    TARGET  LUN    PATH STATE
    --------------------------------
      5       0      0    valid
      8       1      0    valid
```

This example shows that our MSA1000 has dual controllers. One controller is at Bus 5, Target 0, LUN 0 and the other controller is at Bus 8, Target 1, LUN 0.

Record this information; it will be used when upgrading the firmware.

Updating the MSA1000 Firmware

> **Note:** Tru64 UNIX requires a minimum firmware version of 3.36, to support an MSA1000 volume as the boot disk. If this is an upgrade of the 2.x firmware and you plan on installing the Operating System on an MSA1000 volume, the firmware must be available on either a CD or Diskette and the MSA1000 must be connected to a Tru64 UNIX system with access to the SCU utility.

In general, the steps required to install new firmware onto the MSA1000 include:

- Locate the MSA1000 that requires the firmware update.

- Flash the new MSA1000 firmware on the controller(s). *Do not yet power-cycle the MSA1000*.

- Shutdown the Operating System.

- Power-cycle the MSA1000.

- Reboot the system.

To upgrade the firmware on the MSA1000:

1. Retrieve the bus/target/LUN values from "Obtaining Vital Information about the MSAs that Require a Firmware Upgrade" on page 18.

> **Note:** If this is a dual-controller configuration, you must update the firmware on both controllers.

2. Use the SCSI CAM Utility program (SCU) to download the MSA1000 firmware to the controller.

    a. Use the SCU `sbtl` command to set the device nexus information.

    The SCU `sbtl` command is shorthand for setting the nexus.

    To start the SCU, enter the following command:

    ```
    /sbin/scu
    ```

    At the `scu>` prompt, enter one of the possible bus/target/LUN combinations recorded from "Obtaining Vital Information about the MSAs that Require a Firmware Upgrade" on page 18.

    ```
    scu> sbtl 5 0 0
    Device:MSA1000, Bus:5, Target:0, Lun:0, Type:Array Controller
    ```

    b. Use the SCU `tur` command to determine if that bus/target/LUN combination can be used. The SCU `tur` command is shorthand for test unit ready.

    At the `scu>` prompt, enter the following:

    ```
    scu> tur
    ```

    If an error message is displayed, go back and redo the steps in "Determine Which MSA1000s Require a Firmware Upgrade" on page 18.

    If the scu prompt is displayed with out an error message, proceed to the next step.

c. Download the firmware from the file you copied to your system during "Obtaining the Latest MSA1000 Controller Firmware" on page 18.

```
scu> download "firmware filename" save

Downloading File "firmware filename" of 1048576 bytes...

Download completed successfully...

Delaying for 120 seconds while firmware is saved, please be
patient... 120
```

The SCU utility counts down from 120 seconds, returning to the scu> prompt when the time delay is complete.

Note: Do not reboot the MSA1000 at this time.

d. When the scu> prompt is redisplayed, enter the command to exit the SCU.

Note: The MSA1000 LCD panel displays FIRMWARE FLASH STARTED when it starts the download and FIRMWARE FLASH DONE when the download is complete.

3. When the controller displays FIRMWARE FLASH DONE, do one of the following:
   - If you have one MSA1000 with a single controller, proceed to the next step.
   - If you have one MSA1000 with dual-controllers, you must update the firmware on both controllers. Repeat step 2 for the second controller.
   - If you have multiple MSA1000s, repeat step 2 for each controller in each MSA1000.

4. When the following message is displayed:

```
CLONE FIRMWARE? '<' = NO, '>' = YES
```

Press the < button.

Note: Do not use the MSA1000 Automatic Firmware Cloning Feature.

5. Shutdown the Operating System on each cluster node.

6. With the AlphaServer(s) at the console, power-cycle the MSA1000.

7. Reboot each AlphaServer(s). If this is a cluster, reboot each cluster member.

8. Verify the MSA1000 firmware has been updated on all controllers, by entering the following command:

```
scu show edt | grep MSA1000 | grep -v VOLUME

    5    0    0    RAID        !ANSI  COMPAQ    MSA1000              4.24    N
    8    1    0    RAID        !ANSI  COMPAQ    MSA1000              4,24    N
```

This example shows that both controllers are now at firmware version 4.24.

Tru64 UNIX Controller Failover Versus SAN/Fabric Failover

Tru64 UNIX support in dual-controller configurations is currently limited to SAN/fabric failover. This limitation applies to MSA1000 controllers only. HSG and EVA controllers are not affected by this limitation.

SAN or fabric failover enables the host operating system (or cluster) to detect the loss or interruption of a data path from the host system to the unit. This failover capability detects the failure of any component between the host and the MSA1000, including cables, switches, connectors, and other components. If a failure is detected, the system uses a different path, if one is available, to complete the I/O operations. Controller failover enables the host operating system to detect internal failures in the controller, and force the redundant controller to take over operations. Tru64 UNIX can detect and recover from only some controller failure conditions.

Tru64 UNIX plans in a future release to include the capability to detect all internal controller failures. This patch is planned for inclusion in a future Tru64 UNIX patch kit that includes the changes required to fully support MSA1000 controller failover operations.