

# Configuring redundant HP StorageWorks SAN infrastructure with VMware ESX Server 2.1



Overview .....	2
VMware ESX Server installation .....	3
HP StorageWorks MSA1000 configuration.....	4
Hardware.....	4
Firmware .....	5
Supported configurations.....	6
MSA1000 configuration notes .....	8
HP StorageWorks EVA3000/EVA5000 SAN configuration .....	9
Hardware.....	9
Firmware .....	10
Supported configurations.....	12
EVA3000/EVA5000 configuration notes .....	13
Configuring new hosts.....	13
ESX Server configuration .....	14
Clear HBA cache .....	14
Set multipathing policy .....	14
DiskMaxLUN .....	14
Verifying connectivity.....	15
For more information .....	16

## Overview

This guide provides configuration guidelines and instructions for utilization of HP StorageWorks Storage Area Networks (SANs) with HP ProLiant servers running VMware ESX Server 2.1. The following StorageWorks products are covered in this guide:

- HP StorageWorks Modular Smart Array – MSA1000
- HP StorageWorks Enterprise Virtual Array 3000 – EVA3000
- HP StorageWorks Enterprise Virtual Array 5000 – EVA5000

The reader should have a working knowledge of HP StorageWorks products and VMware ESX Server. This guide is intended to supplement the VMware and HP StorageWorks documentation and should not be considered a replacement. Please consult those documents for basic installation and configuration of VMware ESX Server and HP StorageWorks products.

## VMware ESX Server installation

Before installing VMware ESX Server 2.1, please read the “Using Storage Area Networks with ESX Server” section of the ESX Server 2.1 Server Administration Guide. Some details from the guide are reiterated here for emphasis. Be sure to follow the recommendations to ensure successful configuration.

All Fibre Channel adapters must be detached from the SAN during ESX Server installation. If they are not disconnected, SAN disks are often displayed first in the list of drives displayed during installation. This may cause confusion when the service console is being installed.

Additionally all Fibre Channel (FC) adapters should be dedicated exclusively to the virtual machines. Even though these FC adapters are dedicated to virtual machines, the LUNs on the SANs are visible to system management agents on the service console.

# HP StorageWorks MSA1000 configuration

The following section details the supported hardware components, shows connection diagrams, and provides configuration details required to successfully connect an MSA1000 storage device to HP ProLiant servers running VMware ESX Server.

## Hardware

Table 1 lists the HP hardware that has been tested and certified to work with VMware ESX Server.

Table 1. Tested hardware StorageWorks MSA1000 SAN

Description
MSA1000 (dual controller)
MSA SAN Switch 2/8 (integrated)
FCA2214 Host Adapter
FCA2214DC Host Adapter

The following B-Series switches are supported:

- HP StorageWorks SAN Switch 2/8-EL
- HP StorageWorks SAN Switch 2/16
- HP StorageWorks SAN Switch 2/16-EL
- HP StorageWorks SAN Switch 2/32
- HP StorageWorks Core Switch 2/64

## Firmware

Before configuring the MSA1000 storage area network and ESX Server, HP recommends upgrading hardware to the required firmware versions. Table 2 lists the hardware components that should be upgraded along with the location to download the required firmware.

Table 2. Hardware components to upgrade and location of downloads for StorageWorks MSA1000 SAN

Product	Required Firmware
MSA1000 Controller	4.24 <a href="ftp://ftp.compaq.com/pub/products/servers/supportsoftware/ISO/MSAFW/MSAFW_A.130/iso/us/MSA1000FLASH_290FW_424.iso">ftp://ftp.compaq.com/pub/products/servers/supportsoftware/ISO/MSAFW/MSAFW_A.130/iso/us/MSA1000FLASH_290FW_424.iso</a>
FCA2214/ FCA2214DC Host Adapter	1.34 <a href="ftp://ftp.hp.com/pub/softlib/software2/COL4497/co-15258-1/FCA2214_FCA2210_Bios_134.zip">ftp://ftp.hp.com/pub/softlib/software2/COL4497/co-15258-1/FCA2214_FCA2210_Bios_134.zip</a>
ProLiant BL20p G2 Server Mezzanine Card	1.34 <a href="ftp://ftp.hp.com/pub/softlib/software2/COL4499/co-15254-2/BL20P_Bios_134.zip">ftp://ftp.hp.com/pub/softlib/software2/COL4499/co-15254-2/BL20P_Bios_134.zip</a>
MSA SAN Switch 2/8 StorageWorks SAN Switch 2/8-EL StorageWorks SAN Switch 2/16	
StorageWorks SAN Switch 2/16-EL	3.1.1 <a href="ftp://ftp.hp.com/pub/softlib/software2/COL3950/co-14697-1/v3.1.1.zip">ftp://ftp.hp.com/pub/softlib/software2/COL3950/co-14697-1/v3.1.1.zip</a>
StorageWorks SAN Switch 2/32 StorageWorks Core Switch 2/64	4.1.1 <a href="ftp://ftp.hp.com/pub/softlib/software2/COL3970/co-13073-3/v4.1.1.zip">ftp://ftp.hp.com/pub/softlib/software2/COL3970/co-13073-3/v4.1.1.zip</a>

## Supported configurations

Figures 1 and 2 illustrate the tested and approved redundant configurations for the StorageWorks MSA1000 with VMware ESX Server. In both figures, the MSA storage device is configured with two (2) storage controllers and two (2) MSA SAN 2/8 fabric switches. In Figure 1, each server is directly connected to the MSA1000 via two (2) or more host bus adapters (HBAs) with at least one path to each switch. Additional HBAs may be used for added redundancy. Figure 2 illustrates the use of external switches in a multi-fabric configuration. Each external switch must have one or more connections to exactly one of the integrated MSA1000 switches. Do NOT connect a fabric switch to both MSA1000 switches. Each server must have one or more connections to each external fabric switch.

Figure 1. Direct Connection with Integrated 2/8 Fabric Switch

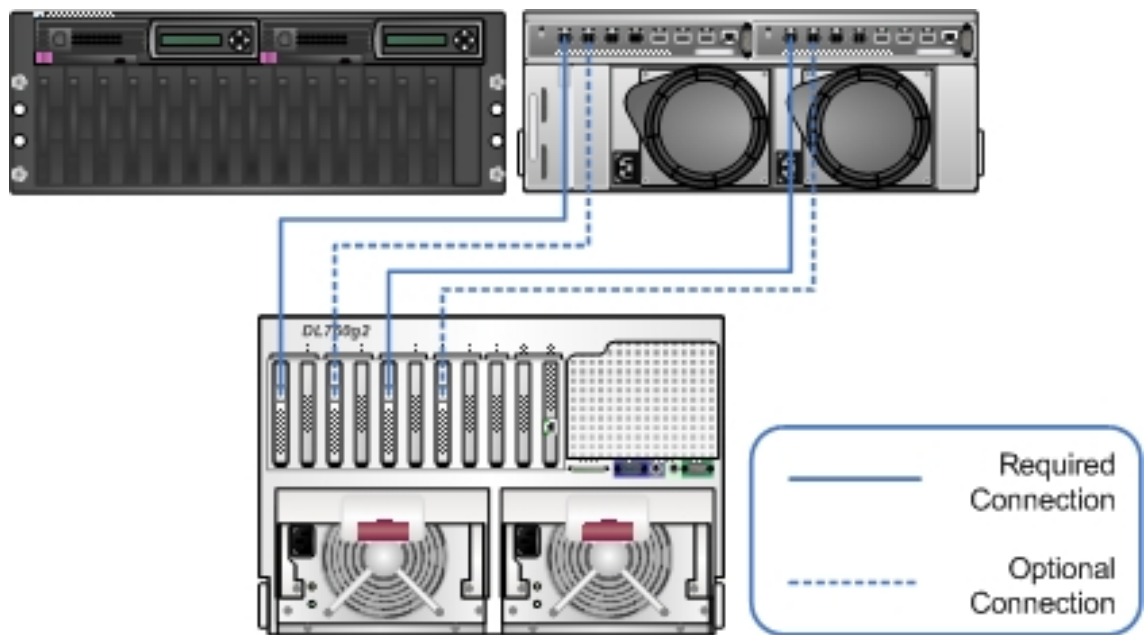
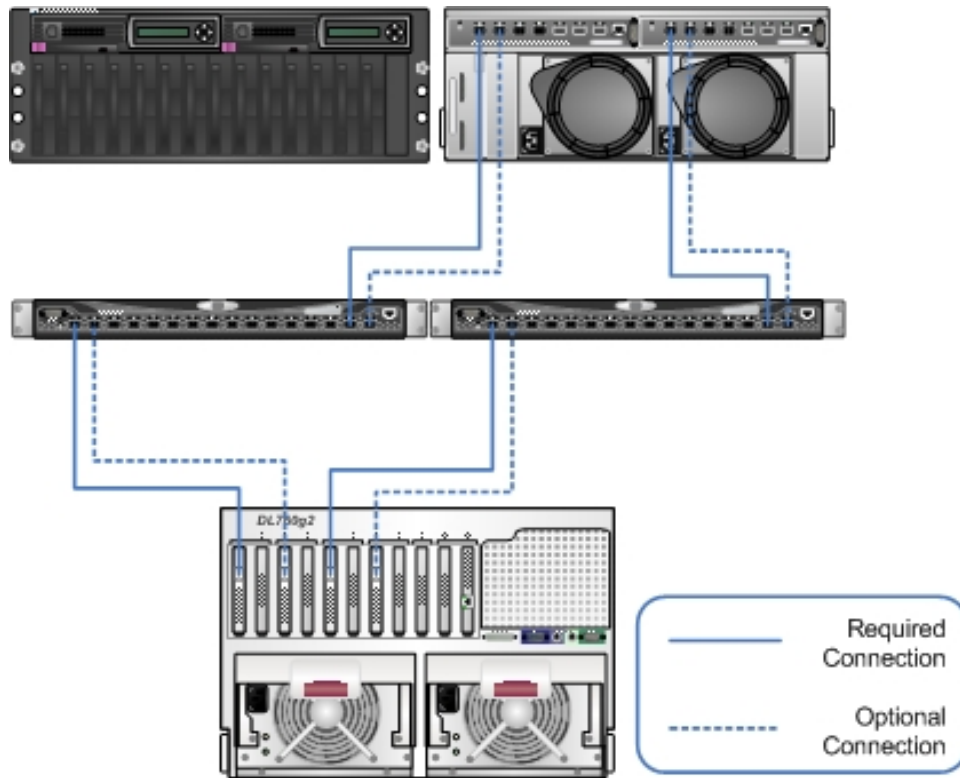


Figure 2. Connection through external cascaded fabric switches



## MSA1000 configuration notes

Set Host Mode. For proper communication between the MSA1000 and ESX Server, the Host Mode needs to be set to Linux for each connection to the MSA1000. To set the Host Mode, first determine the World Wide Port Name (WWPN) for each host bus adapter (HBA) port that will have a connection to the MSA1000.

---

Note: The WWPN can be found by looking at the files in the /proc/scsi/qla2300 directory on the ESX Server console. There is a numbered file for each HBA in the server containing configuration settings, including the WWPN, and other status information. The WWPN is listed in the SCSI Device Information section as scsi-qla<n>-adapter-port.

---

Using the Command Line Interface (CLI), type the following command for each connection:

```
CLI> add connection <unique_name> wwpn=<wwpn> profile=Linux
```

To verify each connection has been set properly, type:

```
CLI> show connections
```

For each connection, verify that the profile is set to Linux and that its status is Online. If there are any problems, refer to the MSA1000 documentation for troubleshooting tips.



# HP StorageWorks EVA3000/EVA5000 SAN configuration

This section details the supported hardware components, shows connection diagrams, and provides configuration details required to successfully connect an HP StorageWorks EVA3000 or EVA5000 to HP ProLiant servers running VMware ESX Server.

## Hardware

Table 3 lists the hardware that has been tested and certified to work with VMware ESX Server:

Table 3. Tested hardware StorageWorks EVA3000/EVA5000 SAN

Description
EVA3000
EVA5000
FCA2214 Host Adapter
FCA2214DC Host Adapter

The following B-Series Fabric switches are supported:

- HP StorageWorks SAN Switch 2/8-EL
- HP StorageWorks SAN Switch 2/16
- HP StorageWorks SAN Switch 2/16-EL
- HP StorageWorks SAN Switch 2/32
- HP StorageWorks Core Switch 2/64

The following M-Series Fabric switches are supported:

- HP StorageWorks Edge Switch 2/24
- HP StorageWorks Edge Switch 2/32
- HP StorageWorks Director 2/64
- HP StorageWorks Director 2/140

## Firmware

Before configuring the EVA3000/EVA5000 and ESX Server, HP recommends upgrading hardware to the required firmware versions. Table 4 lists the hardware components that should be upgraded along with the location to download the required firmware.

Table 4. Hardware components to upgrade and location of downloads for StorageWorks EVA3000/EVA5000 SAN

Product	Required Firmware/Software
EVA3000 StorageWorks Virtual Controller Software	3.010 VCS V3.01x is not available for download. Please contact your HP service representative for information and assistance with this upgrade program
EVA5000 StorageWorks Virtual Controller Software	3.010 VCS V3.01x is not available for download. Please contact your HP service representative for information and assistance with this upgrade program
FCA2214/ FCA2214DC Host Adapter	1.34 <a href="ftp://ftp.hp.com/pub/softlib/software2/COL4497/co-15258-1/FCA2214_FCA2210_Bios_134.zip">ftp://ftp.hp.com/pub/softlib/software2/COL4497/co-15258-1/FCA2214_FCA2210_Bios_134.zip</a>
ProLiant BL20p server G2 Mezzanine Card	1.34 <a href="ftp://ftp.hp.com/pub/softlib/software2/COL4499/co-15254-2/BL20P_Bios_134.zip">ftp://ftp.hp.com/pub/softlib/software2/COL4499/co-15254-2/BL20P_Bios_134.zip</a>
StorageWorks SAN Switch 2/8-EL  StorageWorks SAN Switch 2/16	   3.1.1
StorageWorks SAN Switch 2/16-EL	<a href="ftp://ftp.hp.com/pub/softlib/software2/COL3950/co-14697-1/v3.1.1.zip">ftp://ftp.hp.com/pub/softlib/software2/COL3950/co-14697-1/v3.1.1.zip</a>
StorageWorks SAN Switch 2/32  StorageWorks Core Switch 2/64	  4.1.1 <a href="ftp://ftp.hp.com/pub/softlib/software2/COL3970/co-13073-3/v4.1.1.zip">ftp://ftp.hp.com/pub/softlib/software2/COL3970/co-13073-3/v4.1.1.zip</a>

---

StorageWorks  
Edge Switch  
2/24

StorageWorks  
Edge Switch  
2/32

StorageWorks  
Director 2/64      5.01.00-24

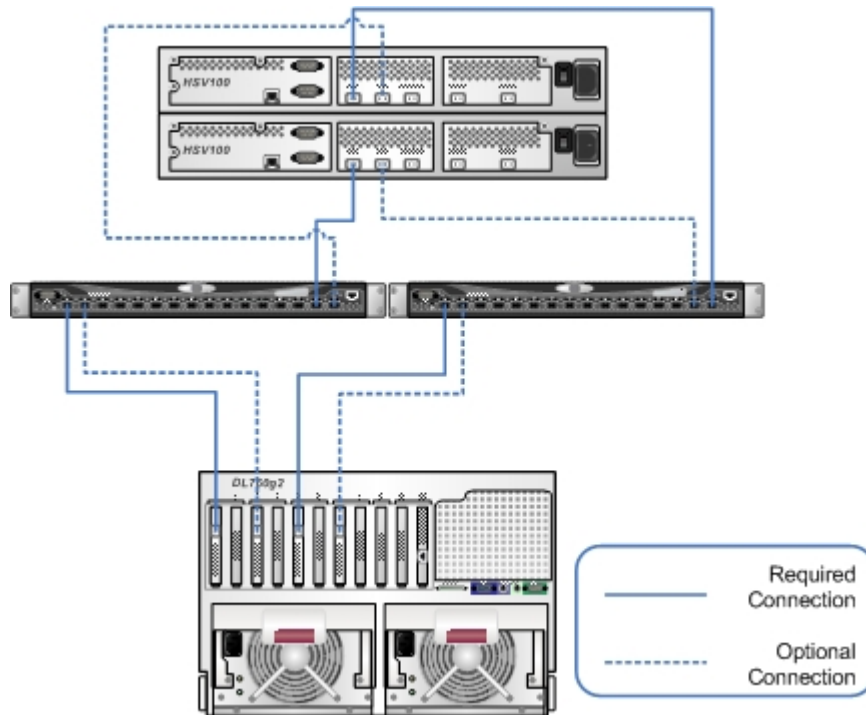
StorageWorks      [ftp://ftp.hp.com/pub/softlib/software2/COL4026/co-13275-1/HPO\\_HAF\\_v05.01.00-24.bin](ftp://ftp.hp.com/pub/softlib/software2/COL4026/co-13275-1/HPO_HAF_v05.01.00-24.bin)  
Director 2/140

---

## Supported configurations

Figure 3 illustrates the tested and approved configurations for the EVA3000 and EVA5000 with ESX Server. Each fabric switch is connected to both storage controllers on the EVA3000/EVA5000.

Figure 3. External switches each connected to storage controller



## EVA3000/EVA5000 configuration notes

### Configuring new hosts

Exactly one (1) host should be configured in Command View EVA for each physical ESX Server machine. When adding the ESX Server machine as a new host, Command View EVA may not populate all the HBAs in the WWPN drop down list. The WWPN can be entered manually if this occurs. The connection type must be set to Custom with a value of 000000002200282E.

For each additional HBA port in the server, add a port to the appropriate host defined in Command View EVA as above. Do NOT add additional host entries for servers with more than one HBA.

---

Note: The WWPN can be found by looking at the files in the `/proc/scsi/qla2300` directory on the ESX Server console. There is a numbered file for each HBA in the server containing configuration settings, including the WWPN, and other status information. The WWPN is listed in the *SCSI Device Information* section as *scsi-qla2-adapter-port*.

---

## ESX Server configuration

### Clear HBA cache

The FCA2214 and FCA2214DC can store configuration information in their NVRAM area. It is important that this be cleared before using with the HP StorageWorks products, especially if the HBA has been used with other storage products. This can be done using the following procedure at the ESX Server console. For each HBA in the server, type:

```
echo "scsi-qlascan" > /proc/scsi/qla2300/<number>
```

Then reload the QLogic driver module in the vmkernel by typing:

```
vmkload_mod -u qla2300_604.o
```

```
vmkload_mod /usr/lib/vmware/vmkmod/qla2300_604.o vmhba
```

---

Note: These commands must be executed in order to clear the NVRAM area. Performing a reboot will not accomplish this task.

---

### Set multipathing policy

The multipathing policy for each LUN or logical drive on the SAN must be set to Most Recently Use (MRU). Use the following example that sets the path for vmhba0:0:1 to set policy for all LUNs on the SAN:

```
vmkmultipath -s vmhba0:0:1 -p mru
```

---

Note: While both EVA storage controllers can be active at the same time, each LUN is only available through one controller at a given time. If the multipathing policy is set to Fixed, extreme care must be taken to ensure proper configuration of ESX Server and fabric switches. If multiple ESX Servers have a different preferred path to a LUN, storage processor thrashing may occur. Thus, it is recommended to set the policy to MRU.

---

The multipathing policy can also be set from the VMware Management User Interface (MUI) by going to the Failover Paths tab in the Storage Management section. Click on the Edit... link for each LUN to modify the policy.

### DiskMaxLUN

The DiskMaxLUN setting specifies the maximum number of LUNs ESX Server will scan for. By default, this value is 8. If more than 8 LUNs are presented, this setting must be

changed appropriately. To set DiskMaxLUN, click on Advanced Settings... under the Options tab in the Management User Interface.

## Verifying connectivity

Connectivity to the SAN and proper configuration can be verified typing the following:

```
vmkmultipath -q
```

For each LUN, verify that the policy is set to MRU and that each path is marked on. If any paths are marked dead or are not listed, check the cable connections and perform a rescan on the appropriate HBA(s):

```
vmkfstools -s vmhba0
```

If any paths or LUNs are still missing, consult the VMware or HP StorageWorks documentation for further troubleshooting information.

## For more information

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

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

VMware: <http://www.vmware.com>

VMware ESX Server documentation: <http://www.vmware.com/support/esx2/doc/>

© 2004 Hewlett-Packard Development Company, L.P. The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Linux is a U.S. registered trademark of Linus Torvalds

[04/2004] - 1

