

Application Notes

# hp StorageWorks Booting 32-bit Windows Systems from a Storage Area Network

Sixth Edition (December 2003)

**Part Number:** AA-RS2UF-TE

This document describes how to boot Microsoft Windows systems from StorageWorks Enterprise Virtual Arrays, Enterprise Modular Arrays, and Disk Array XP1024/128.

For the latest version of these Application Notes and other storage documentation, access the HP storage storage web site at: <http://www.hp.com/country/us/eng/prodserve/storage.html>.



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Booting 32-bit Windows Systems from a Storage Area Network Application Notes  
Sixth Edition (December 2003)  
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# Application Notes Contents

These Application Notes describe boot set up procedures for specific software solutions, Fibre Channel Host Bus Adapter (HBA) firmware versions, and boot BIOS versions.

## Intended Audience

This document is intended for customers who are familiar with:

- HSG80-based or Enterprise Virtual Array-based Fibre Channel RAID Array technology and the interconnections required to attach to an HBA in a Windows server. This information is described in the StorageWorks RAID Array and StorageWorks Software Solution kit documentation.
- XP 1024/128 Disk Arrays
- Windows operating systems
- HBAs
- Switch zoning

## Introduction

Traditionally, HP ProLiant servers boot operating systems from internal SCSI and IDE storage devices. With the support of external booting with StorageWorks fibre channel host bus adapters (HBA) and RAID Arrays, customers can optionally eliminate server-based internal boot devices. Booting from an external device provides decreased downtime through faster server replacement in the event of a server failure.

## Why Boot to a SAN?

Booting to the SAN provides:

- Redundant storage paths
- Disaster recovery
- Improved security
- Minimized server maintenance
- Reduced impact on production servers
- Reduced backup window

## Additional Information

For detailed information about HBAs, switches, storage arrays, and storage software, access the following HP websites:

Topic	HP Website
HBAs and switches	<a href="http://h18006.www1.hp.com/storage/saninfrastructure.html">http://h18006.www1.hp.com/storage/saninfrastructure.html</a>
Storage array systems	<a href="http://h18006.www1.hp.com/storage/arrayssystems.html">http://h18006.www1.hp.com/storage/arrayssystems.html</a>
Secure Path	<a href="http://h18006.www1.hp.com/products/sanworks/secure-path/index.html">http://h18006.www1.hp.com/products/sanworks/secure-path/index.html</a>
ProLiant servers	<a href="http://h18004.www1.hp.com/products/servers/platforms/storage.html">http://h18004.www1.hp.com/products/servers/platforms/storage.html</a>

## Supported Configurations

This document describes single server, cluster, and Secure Path-based configurations using:

- Enterprise Modular Array—transparent or multiple bus failover modes
- Enterprise Virtual Array—multiple bus failover mode or single path
- Disk Array XP 1024/128

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**Note:** For information about booting to a SAN on MSA1000 systems, go to the HP website at <http://h18006.www1.hp.com/products/msa1000/documentation.html>.

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## Restrictions

### Operating System Restrictions

Microsoft Windows operating systems require a unique, dedicated disk for booting. Therefore, each server connected to a RAID Array must have its own disk, or LUN (Logical Unit Number), dedicated solely for booting and operating system files. Data can be allocated across both the boot disk and the remaining disks. Booting from array-based disk partitions is possible.

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**Note:** The memory paging system requires fast access to the *pagefile.sys* file. In some cases, in SAN environments with heavy I/O loads, the access request for moving information to or from the paging file may be delayed. This can cause the operating system to halt, requiring a reboot to recover. Microsoft recommends that if paging errors occur, page files should be relocated to disks that are built into the server using its internal data paths. Microsoft has published a technical article with additional recommendations related to booting from a SAN at: <http://support.microsoft.com/default.aspx?scid=kb;EN-US;q305547>.

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### Clustered Server Restrictions

- Microsoft requires that clustered servers (MSCS) keep boot disks on data paths that are separate from shared-storage paths. This requires a dedicated HBA port for booting and another HBA port for shared disks.
- There is no MSCS failover clustering support for ProLiant BL20P servers (due to the 4 HBA requirement).

### Standalone Server Restrictions

In a standalone server environment, an HBA port can share boot and data paths.

### Server Replacement In The Event Of A Server Failure

You must retain the HBAs to ensure that the replacement server hardware components are identical in every way to the one you are replacing. Place each HBA into the PCI slots of the new server in the same order as they were placed in the old server.

If you are using an internal disk for your paging file system, you can move this disk to the replacement server. You can also use a new disk, but you must format it and manually reset the paging to that disk.

For BL20p servers, you must remap all the LUNS to the onboard Fibre Channel adapters.

## Required Hardware And Software

### RAID Arrays

- Enterprise Virtual Arrays (EVA5000 and EVA3000) V2.x and V3.x
- Enterprise Modular Arrays (MA6000, MA8000, EMA12000, EMA16000, ESA 12000 Fibre Channel)
- Disk Array XP1024/128

Refer to the array documentation for detailed information.

### Host Bus Adapters

- 64-bit PCI to Fibre Channel 1 GB Host Bus Adapter DS-KGPSA-CB, part number 176479-B21
- FCA2101 2 GB Host Bus Adapter, part number 245299-B21
- FCA2355DC 2 GB PCI-X Host Bus Adapter, part number 308540-B21
- FCA2214 2 GB PCI-X Host Bus Adapter, part number 281541-B21
- FCA2214DC 2 GB PCI-X Host Bus Adapter, part number 321835-B21
- FCA2404 2 GB PCI-X Host Bus Adapter, part number 305573-B21
- Dual Port Fibre Channel Mezzanine Card (2 Gb) for BL20Gp2 G2, no part number

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**Note:** Refer to each adapter's release notes for LUN limitations.

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### Fibre Channel Switches

Booting from the SAN is supported on B-Series, C-Series, and M-Series switch products. Refer to the *HP StorageWorks SAN Design Reference Guide* for the current list of supported switch models for these product lines. This guide is available at <http://h18006.www1.hp.com/products/storageworks/san/documentation.html>

### Servers

All HP ProLiant Servers, including BL20p and BL40p, are supported. For detailed information, refer to

<http://h18004.www1.hp.com/products/servers/platforms/storage.html>

### Operating Systems

The following Microsoft Windows systems are supported:

- Windows NT 4.0 Enterprise Edition SP6a
- Windows NT 4.0 Server SP6a
- Windows 2000 Server SP2, SP3, SP4
- Windows 2000 Advanced Server SP2, SP3, SP4
- Windows Server 2003, Standard Edition
- Windows Server 2003, Enterprise Edition

## Boot Setup Procedures for Specific Software Solutions

The following sections describe boot set up procedures for specific software solutions. [Table 1](#) shows the supported host bus adapter (HBA) firmware, boot BIOS, and driver versions.

**Table 1: Supported HBA Firmware, Boot BIOS, and Driver Versions**

Host Bus Adapter	Firmware	BIOS	Minimum Driver
64-bit PCI to Fibre Channel 1 GB Host Bus Adapter DS-KGPSA-CB	3.91a1	1.63a1	4.82a16
FCA2101 2 GB Host Bus Adapter	3.91a1	1.63a1	4.82a16
FCA2355 2 GB PCI-X Host Bus Adapter	3.91a1	1.63a1	4.82a16
FCA2404 2 GB PCI-X Host Bus Adapter	1.01a1	1.63a1	4.82a16
FCA2214 2GB PCI-X Host Bus Adapter	N/A	1.33	8.0.2.72
FCA2214DC 2GB PCI-X Host Bus Adapter	N/A	1.33	8.0.2.72
Dual Port Fibre Channel Mezzanine Card (2 Gb) for BL20Gp2 G2	N/A	1.33	8.0.2.72

**Note:** For FCA2214, FCA2214DC, and Mezzanine HBAs, firmware loads at driver load time.

The procedures include:

- Configuring ProLiant Essentials Rapid Deployment Pack (RDP) – If you are using RDP to provide automated server deployment and redeployment, refer to [Deploying Servers that Boot from a SAN with the Rapid Deployment Pack](#), page 18, before performing the Enterprise Modular Arrays or Enterprise Virtual Arrays procedures
- Enterprise Modular Arrays
  - [Windows Boot Setup Procedure for Modular Arrays Configured in Transparent Failover Mode](#), page 25
  - [Windows Boot Setup Procedure for Modular Arrays Configured in Multiple Bus Failover Mode](#), page 30
- Enterprise Virtual Arrays
  - [Windows Boot Setup Procedures for Enterprise Virtual Arrays](#), page 35
  - [Windows Boot Setup Procedures for Enterprise Virtual Arrays Single Path](#), page 40
- Disk Array XP1024/128
  - [Windows Boot Setup Procedures for Disk Array XP1024/128](#), page 44

### Prerequisites

To perform these procedures, you should be familiar with:

- HSG80-based, Enterprise Virtual Array-based, or XP1024/128-based Fibre Channel RAID Array technology (depending on your system configuration) and the interconnections required to attach to an HBA in a Windows-based server. This information is in the RAID Array and/or Software Solution kit documentation.

- Windows NT 4.0, Windows 2000, Windows Server 2003

The following procedures are not described in this document. However, they must be performed before performing this installation.

- MA8000/EMA12000/EMA16000, or MA6000
  - Set and/or verify the HSG80 controller port topology for your configuration.
  - Set and/or verify the controller SCSI Version. In SCSI-3 mode, LUN 0 is assigned to the Command Console. Therefore, the unit you assign as your boot disk must be LUN 1 or higher. **SCSI-3 mode is recommended.**
  - Verify that all existing storage units have the proper access.
  - Delete any unused connections.

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**Note:** Reference to the HSG80 are intended to cover all of the MA8000 RAID Array products.

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- Enterprise Virtual Arrays—Verify that all existing storage units (virtual disks) have the proper access settings.
- XP1024/128—Verify that all existing storage units (virtual disks) have the proper access settings.
- Switch-based configurations and zoning—If zoning is enabled, check the switch to ensure there are no zoning conflicts.

## Special Considerations For Boot Disk Partitions

- Before attempting to create a boot disk, you must ensure that you are starting with a clean, unpartitioned virtual disk.
- If you are planning to set up booting from a RAID Array that has other virtual disks attached to other servers, be aware of the following information note that when setting up booting for the new server, the installation program displays a list of partitions available for loading the operating system. The display contains a disk for every controller port accessible by the HBA. Although it appears that there are more than one virtual disk available for booting, there is really only one available virtual disk.

## Windows Boot Process

On Intel-based computers, the system BIOS controls the initial operating system boot process. After the initial Power On Self Test (POST) when hardware components are initialized, the system BIOS identifies the boot device. Typically, this is a floppy disk or a hard disk. In the case of the hard disk, the BIOS reads the first physical sector on the disk, called the Master Boot Sector, and loads an image of it into memory. The BIOS then transfers execution to that image of the Master Boot Sector.

The Master Boot Record contains the partition table and a small amount of executable code. The executable code examines the partition table and identifies the active (or bootable) partition. The Master Boot Record then finds the active partition's starting location on the disk and loads an image of its first sector, called the Boot Sector, into memory. The Master Boot Record then transfers execution to that Boot Sector image.

Whereas the Master Boot Record is generally operating system independent, the Boot Sector of the active partition is dependent on both the operating system and the file system. In the case of Windows, the Boot Sector is responsible for locating the executable file, *NTLDR*, which continues the boot process. The only disk services available to the Boot Sector code at

this stage of system boot up are provided by the BIOS INT 13 interface. The Boot Sector code must be able to find NTLDR and file system data structures such as the root directory, the File Allocation Table (FAT) in the case of an MS-DOS FAT volume or the Master File Table in the case of an NTFS volume. These must be present within the area of the disk addressable by the 24-bit side, cylinder, sector structure used by the BIOS INT 13 interface and the partition table. This limits the size of the system partition to 7.8 gigabytes regardless of which file system is used.

## Deployment Considerations

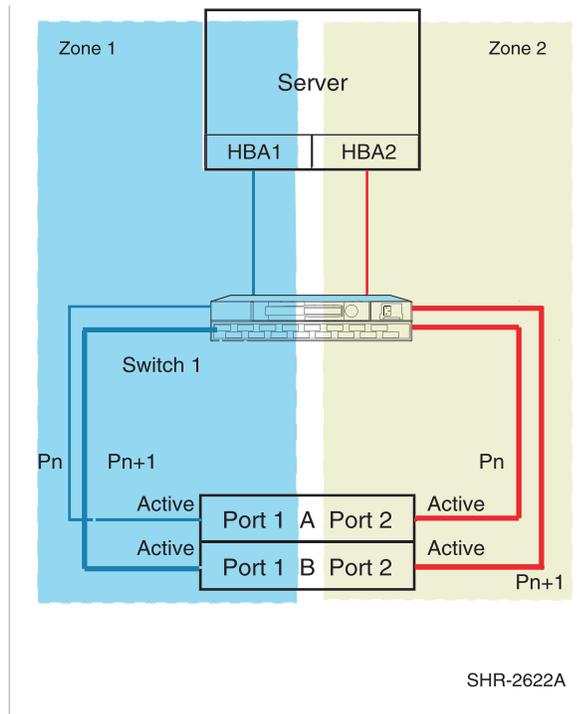
The ProLiant Essentials Rapid Deployment Pack (RDP) provides automated server deployment and redeployment through a central console using imaging and scripting technologies for ProLiant servers. The deployment console provides simple drag-and-drop functionality for deployment events. This is newly added support for installing the Windows operating system to a ProLiant server attached to a SAN. Refer to [Deploying Servers that Boot from a SAN with the Rapid Deployment Pack](#), page 18 for detailed information.

## Switch Based Zoning

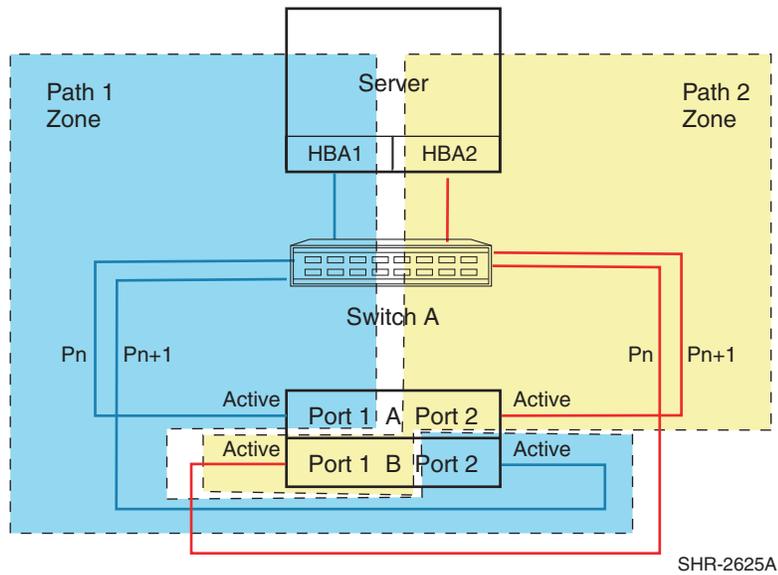
You must be familiar with switch-based zoning. For specific information about zoning for your environment, refer to your switch’s installation guide.

## Cabling Scheme Options for Single Channel HBAs

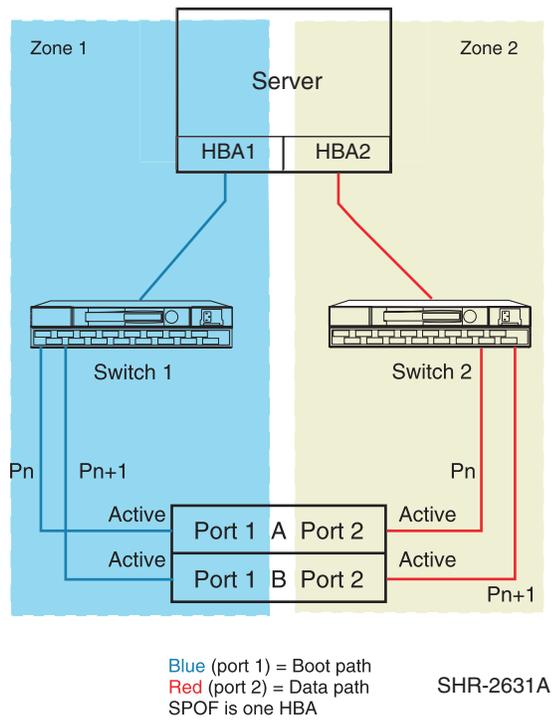
SAN boot is supported in the zoned single channel HBA configurations as shown in [Figure 2](#) through [Figure 6](#).



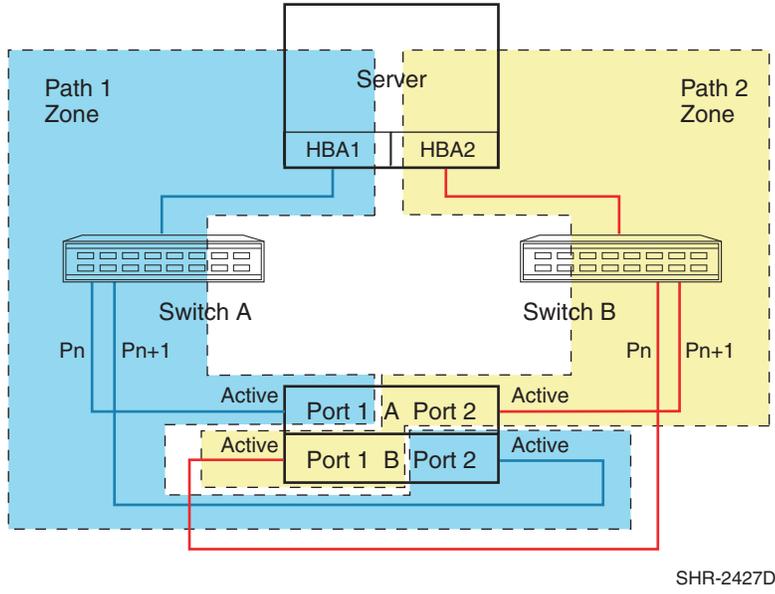
**Figure 1: Single server-two single channel HBAs, one switch straight-cable storage configuration**



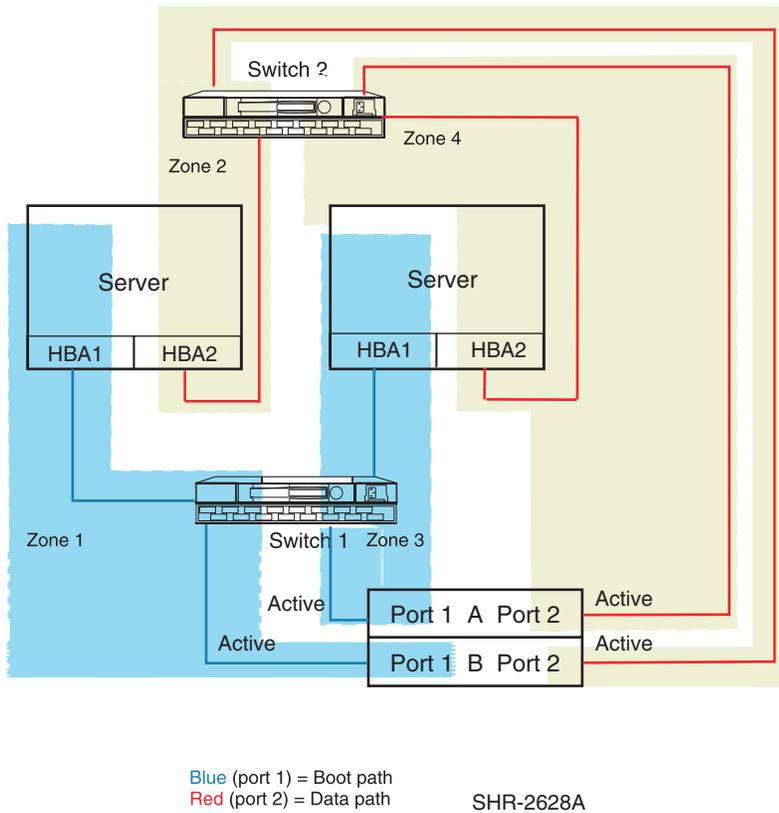
**Figure 2: Single server-two single channel HBAs, one switch cross-cable storage configuration**



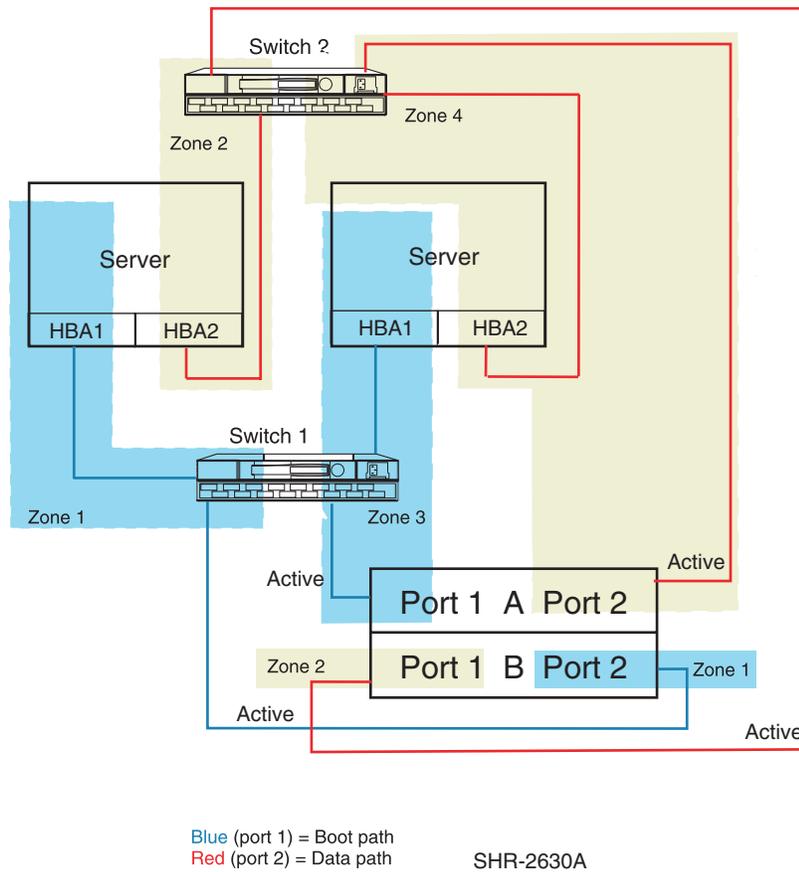
**Figure 3: Single server-two single channel HBAs, two switch straight-cable HA storage configuration**



**Figure 4: Single server-two single channel HBAs, two switch cross-cable HA storage configuration**



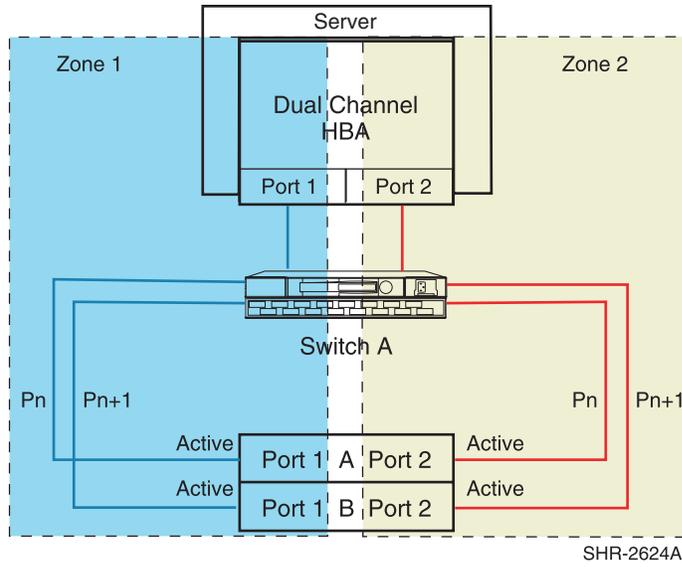
**Figure 5: Clustered servers-four single channel HBAs, two switch straight-cable HA storage configuration**



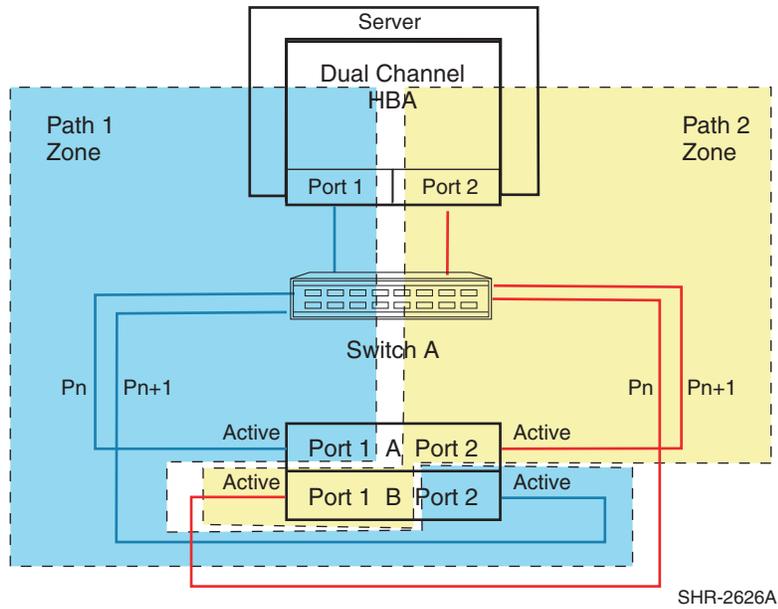
**Figure 6: Clustered servers-four single channel HBAs, two switch cross-cable HA storage configuration**

### Cabling Scheme Options for Dual Channel HBAs

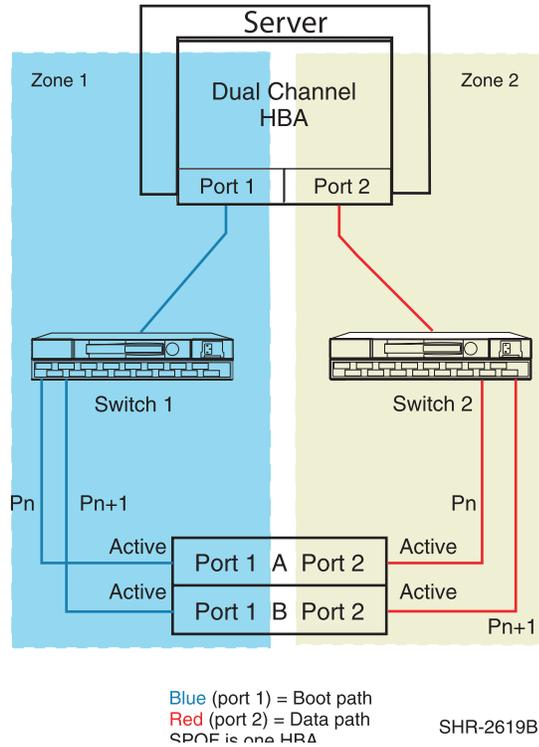
Dual channel HBAs are typically used in situations where the number of server PCI slots is limited. [Figure 7](#) through [Figure 12](#) show the cabling options for dual channel HBAs.



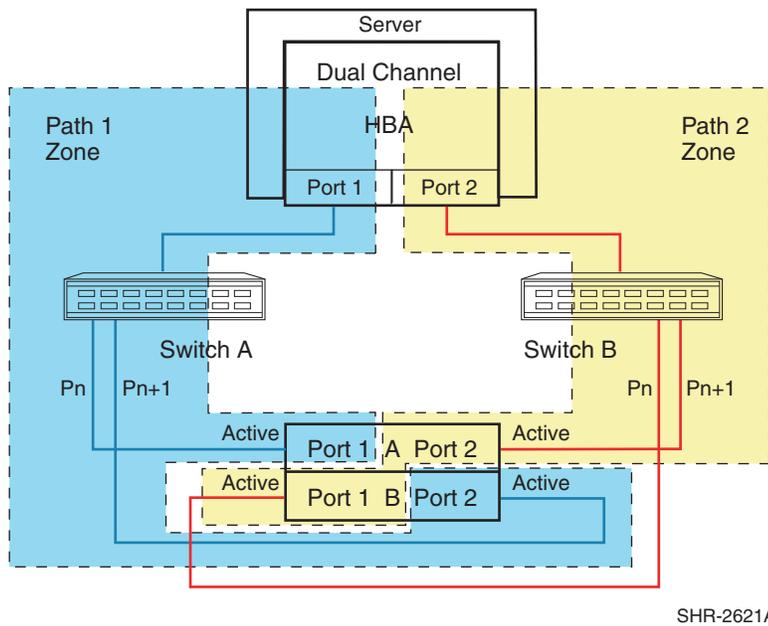
**Figure 7: Single server-one dual channel HBA, one switch straight-cable storage configuration**



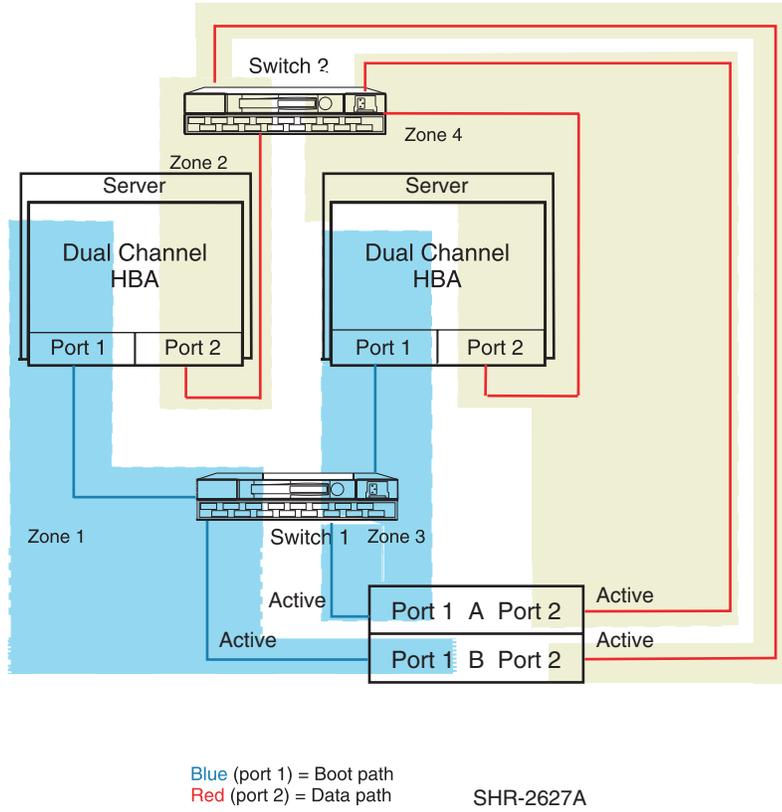
**Figure 8: Single server-one dual channel HBA, one switch cross-cable storage configuration**



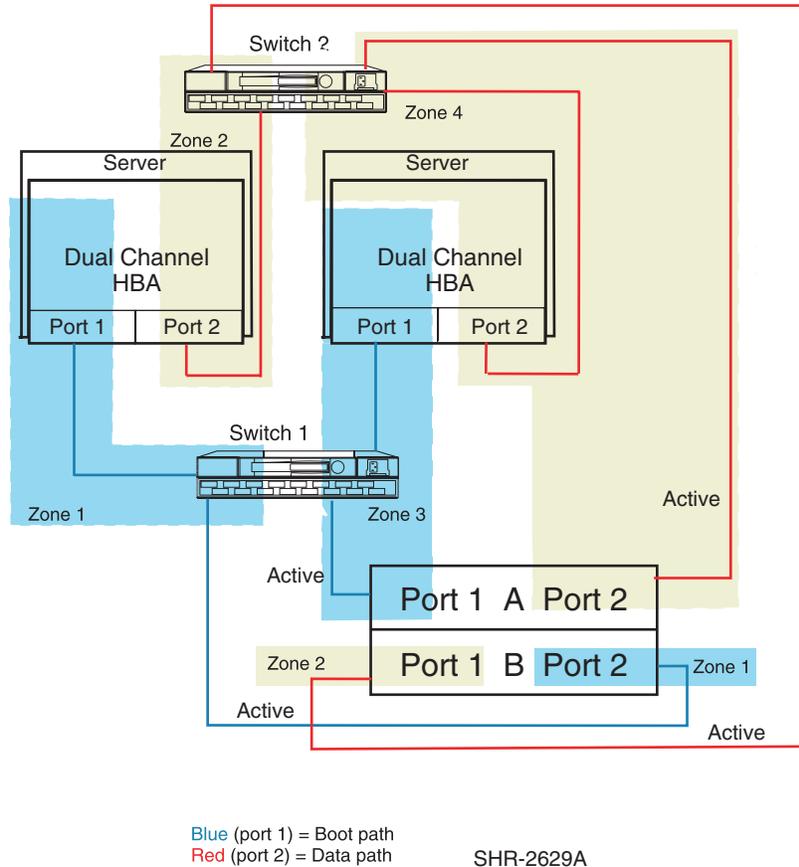
**Figure 9: Single server-one dual channel HBA, two switch straight-cable HA storage configuration**



**Figure 10: Single server-one dual channel HBA, two switch cross-cable HA storage configuration**



**Figure 11: Clustered servers-two dual channel HBAs, two switch straight-cable HA configuration**



**Figure 12: Clustered servers-two dual channel HBAs, two switch cross-cable HA configuration**

### Considerations For Booting Clusters

Windows operating systems require that an HBA used for booting is not the same HBA used for cluster shared storage. Because of this, you must use separate HBAs or HBA ports in each server when setting up for cluster booting. In general, the key steps for setting up booting include:

- Installing all HBAs but not connecting them
- Configuring each HBA that attaches to boot disks for booting (for cluster, a RAID Array needs two, separate boot disks)
- Connecting and setting up each HBA for booting, one at a time
- Setting up disk connectivity from each intended, unique boot disk to its server, using the command line interface (CLI) or GUI
- Installing the Windows operating system on a unique and dedicated disk in the RAID Array, one at a time
- Making sure the drive letters are the same for both servers' boot disks
- Booting the servers
- Installing cluster software

**Note:** Packaged Cluster configurations are not supported (such as ProLiant DL38 Generation 2 Packaged Cluster).

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## Considerations For Secure Path

Secure Path provides high availability computing through a redundant data path to the RAID Array. Especially in a cluster situation, because of Microsoft's requirement that the boot HBA is different from the shared data HBA, each server needs four HBAs (with a minimum of two for boot and two for data, bringing the total number to eight HBAs. This provides data path redundancy for boot and data. Secure Path is an application that loads after the operating system has booted and should be treated the same as any other application installation.

It is strongly suggested to use more than one HBA port for boot and more than one for data. This provides data path redundancy for boot and data. Secure Path is an application that loads after the operating system has booted and should be treated the same as any other application installation. See the Secure Path web site for specific version information at <http://h18006.www1.hp.com/products/sanworks/secure-path/index.html>.

## Deploying Servers that Boot from a SAN with the Rapid Deployment Pack

This section provides instructions for modifying the Windows-scripted install jobs provided with the Rapid Deployment Pack (RDP) to deploy servers that boot from SAN.

For information about supported servers or for RDP documentation, go to <http://www.hp.com/servers/rdp>.

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**Note:** HP strongly suggests that you make a backup copy of each file or deployment job before making any changes.

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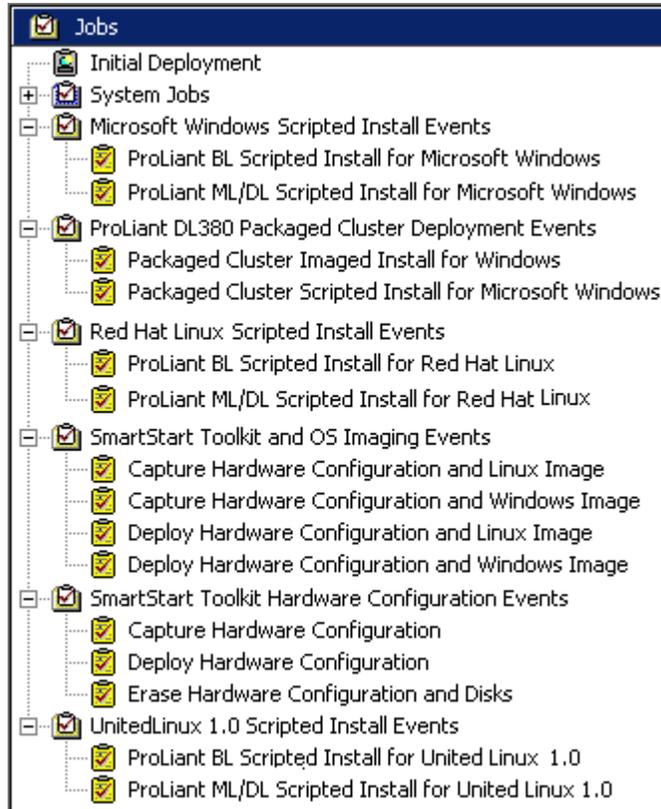
1. Install the Fibre Channel Driver Boot Support for Rapid Deployment Pack 1.40 software:
  - a. Obtain the Fibre Channel Driver Boot Support for Rapid Deployment Pack 1.40 software from <http://www.hp.com/servers/rdp> and install the files on your Deployment Server.

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**Note:** This software contains the Emulex 4.82a16 and the QLogic 8.2.0.72 drivers. If newer drivers are available, deploy them after the initial SAN Boot installation.

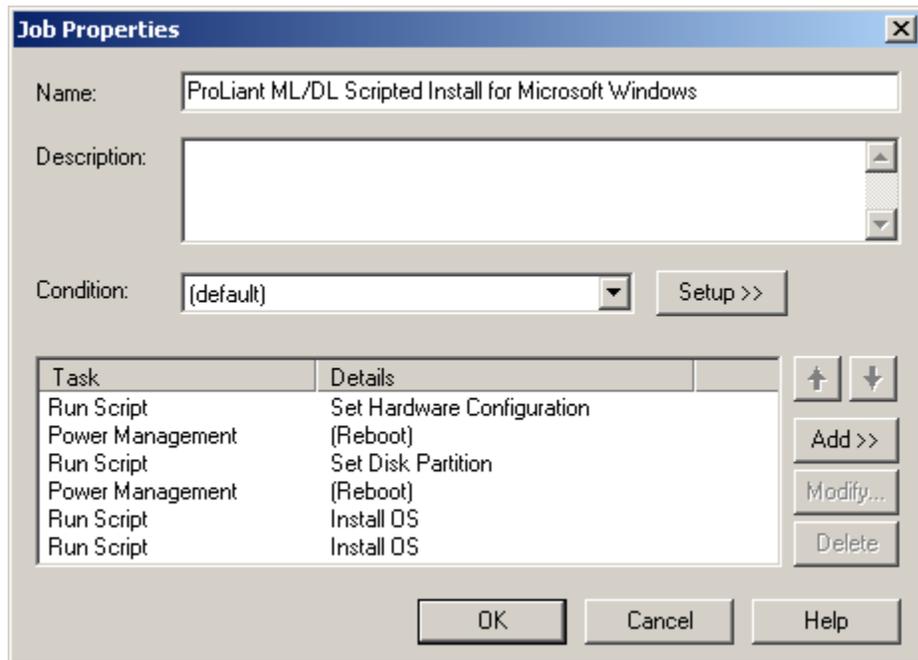
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- b. Extract the files in the SoftPak to a new folder on your deployment server.
    - c. From the Command Prompt, move to the folder containing the extracted files.
    - d. Enter the command `cscript install.wsf` to install the files to the appropriate location on the deployment server.
  2. Copy a scripted install job provided with the Rapid Deployment Pack to use for your Boot from SAN deployment job:
    - a. Right click on the title bar of the Jobs pane, and choose **create a new folder**.
    - b. Enter the desired name for your Boot from SAN jobs folder.
    - c. Select the either Microsoft Windows 2000 or Microsoft Windows 2003 Scripted Install Job for your target system hardware (BL or ML/DL). Right-click the job and choose **Copy**.
    - d. Right-click the Boot from SAN folder, and choose **Paste** to copy the job into the folder.
    - e. To rename the job, right-click the job and choose **Rename**.
    - f. Enter a descriptive name for the job. [Figure 13](#) on page 19 shows a completed Deployment Server Console Jobs pane.



**Figure 13: Deployment Server Console Jobs pane**

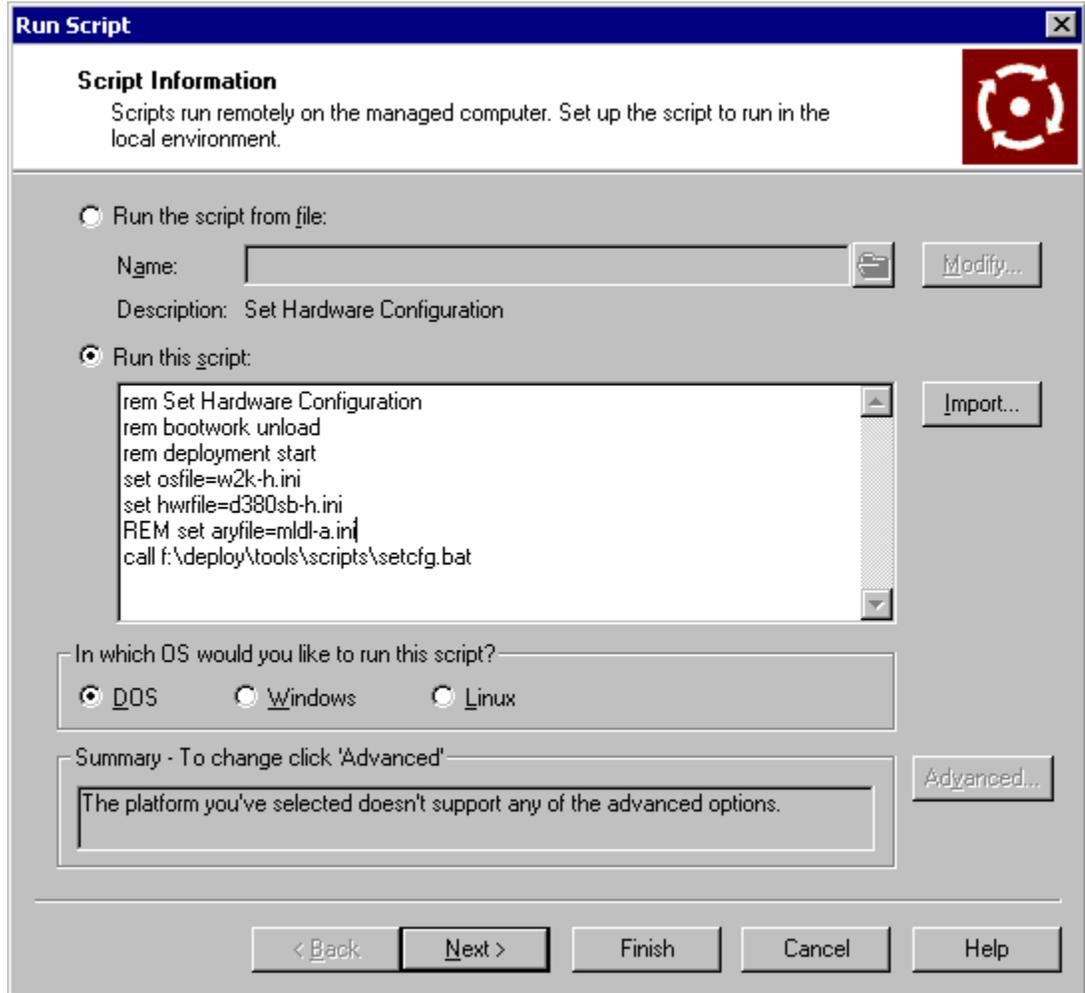
Figure 14 shows the Job Properties dialog box entry for installing the job with the RDP.



**Figure 14: Windows scripted install job as provided with Rapid Deployment Pack**

3. Edit the copied job to enable Boot from SAN deployment:
  - a. Select the newly created job.
  - b. Highlight the first task, **Run Script - Set Hardware Configuration** and click **Modify**.
  - c. Add **REM** to the beginning of the **set aryfile=** line
  - d. Click **Finish**.

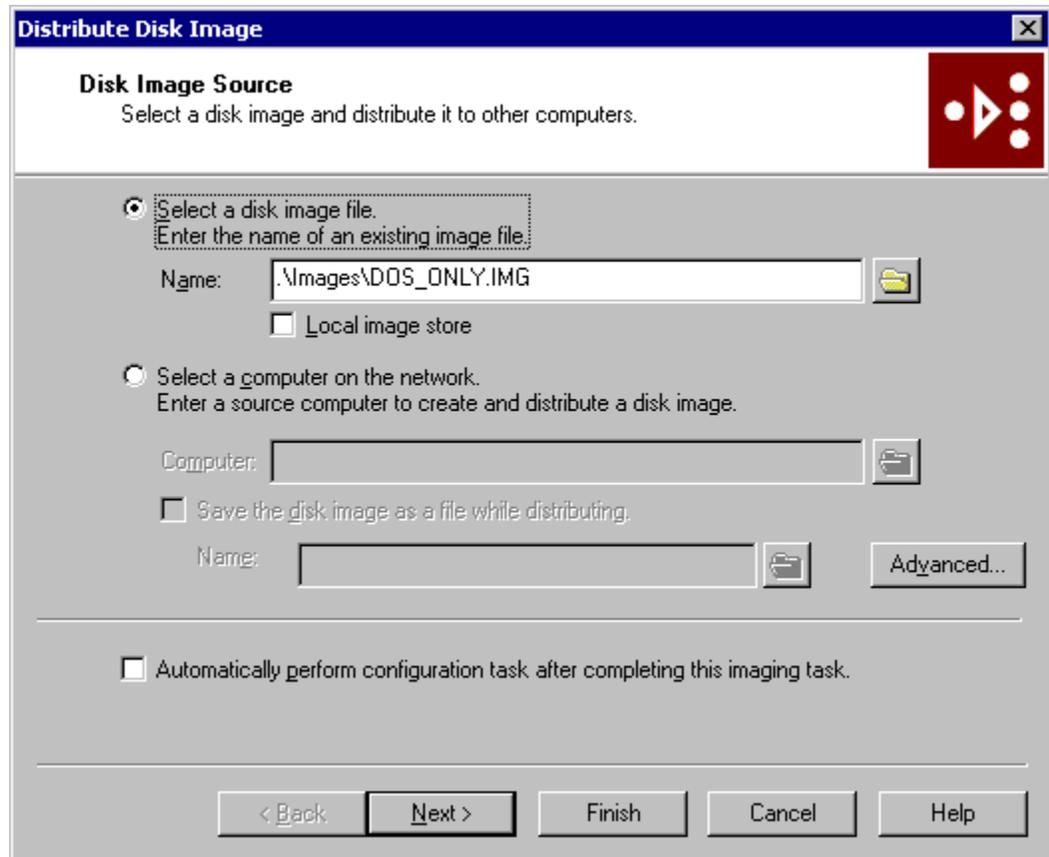
Figure 15 shows the Run Script dialog box with the modified script information.



**Figure 15: Run Script - Set Hardware Configuration task modified for boot from SAN Deployment**

4. Delete the **Run Script – Set Disk Partition** or the first **Run Script – (embedded)** task.
5. In place of the deleted **Run Script – Set Disk Partition** or the first **Run Script – (embedded)** task, add a **Distribute Disk Image** task.
  - a. Choose the **DOS\_ONLY.IMG** from the Images folder.
  - b. Deselect the **Automatically perform configuration task after completing this imaging task** check box.
  - c. Choose **Finish**.

Figure 16 shows the resulting Distribute Disk Image dialog box.

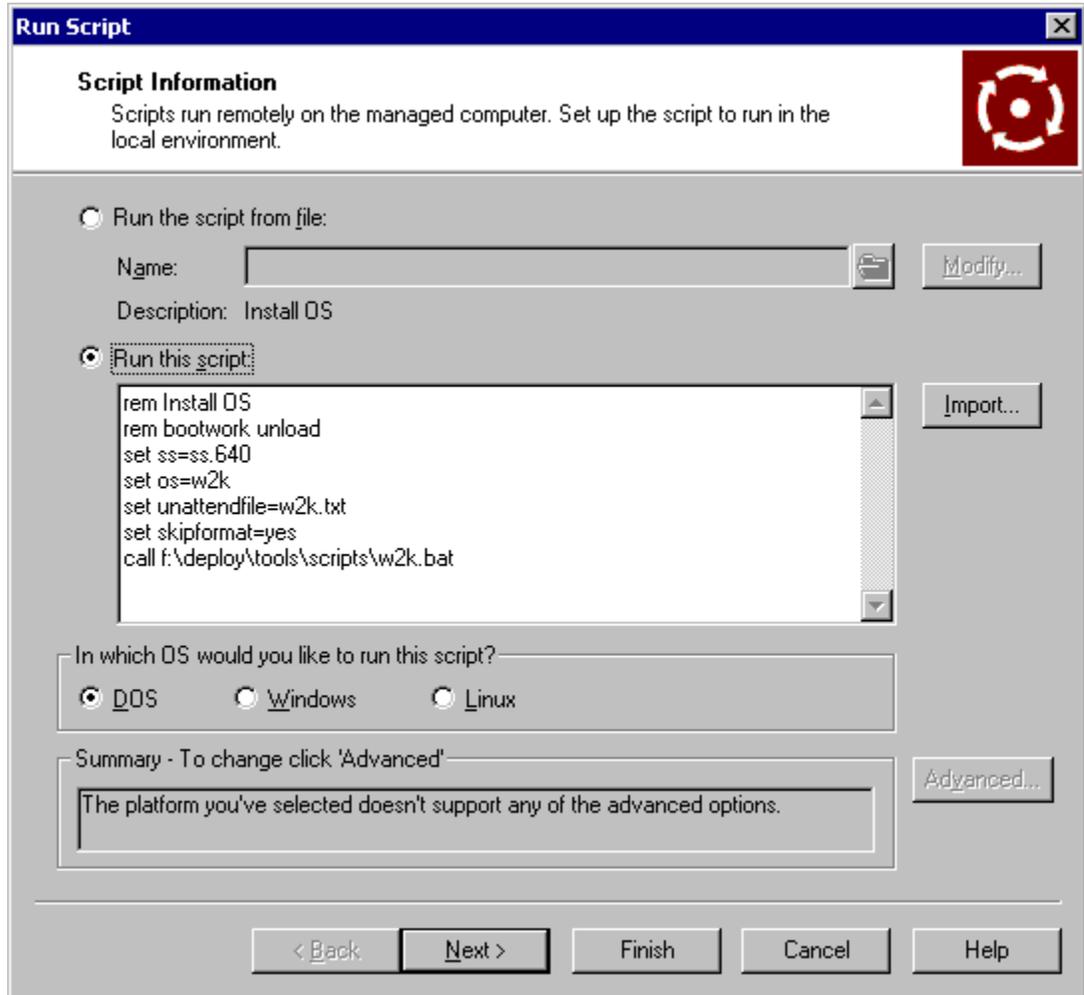


**Figure 16: Deploy Image task created for boot from SAN deployment**

- d. Select the **Deploy Image - .\Images\DOS\_ONLY.IMG** task and press the UP arrow three times to place it between the two **Power Management – (Reboot)** tasks. This places the Deploy Image task in the location of the deleted **Run Script – Set Disk Partition** task as shown in [Figure 16](#).
6. Edit the first **Run Script - Install OS** task.
7. Add the following text as a new line before the call to *w2k.bat* (for Microsoft Windows 2000 jobs) or *wnet.bat* (for Microsoft Windows 2003 jobs):
 

```
set skipformat=yes
```

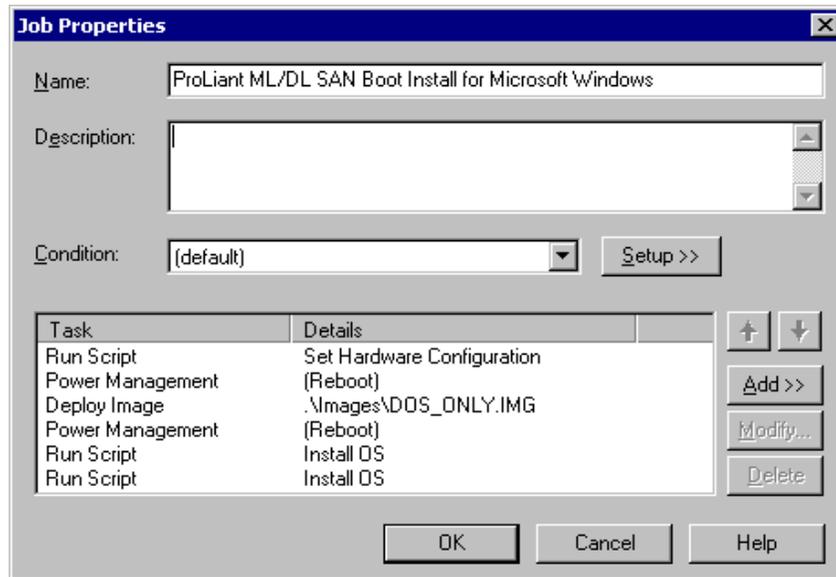
Figure 17 shows a completed **Run Script – Install OS** task.



**Figure 17: Run Script – Install OS task modified for boot form SAN deployment**

8. Choose **Finish** to save the changes to the **Run Script – Install OS** task.
9. Click the modified job, as shown in [Figure 13](#) on page 19 for task verification.

Figure 18 shows the Job Properties dialog box for the modified job.



**Figure 18: Windows scripted install job, modified for Boot from SAN deployment**

10. Edit the Microsoft Windows unattended install file(s) as follows:

**For Microsoft Windows 2000:**

- a. From the extracted files folder, open the `\w2k\unattend.txt` file (source file).
- b. Open the `eXpress\deploy\configs\w2k.txt` file (target file).
- c. Copy the driver descriptions from the [MassStorageDrivers] section from the source and paste them into the same section in the target file.
- d. Copy the driver names from the [OEMBootFiles] section of the source and paste them into the same section in the target file.

**For Microsoft Windows 2003:**

- a. From the extracted files folder, open the `\wnet\unattend.txt` file (source file).
- b. Open the `eXpress\deploy\configs\wnet.txt` file (target file).
- c. Copy the driver descriptions from the [MassStorageDrivers] section from the source to the target file.
- d. Copy the driver names from the [OEMBootFiles] section of the source to the target file.

11. Manually configure a reference server of the type you plan to deploy:

- a. Disable the Integrated SmartArray Controller (if present). Use the ROM Based System Configuration Utility's PCI settings to do so.
- b. Set the Controller Boot Order to place the desired HBA as the first controller to boot.

12. Capture the Hardware Configuration of the reference server:
  - a. Boot the reference server from the PXE or Bootworks diskette so it is available in the Rapid Deployment Pack console.
  - b. Drag the **Capture Hardware Configuration** job from the **SmartStart Hardware Configuration Events** folder to the reference server.
  - c. When the job completes, it creates the file *CPQCAP-H.INI* in the `\eXpress\deploy\configs\` directory.
  - d. Rename the *CPQCAP-H.INI* file to the name specified on the **set hwrfile=** line in the **Run Script – Set Hardware Configuration** in [step 3](#), on page 20. This automatically sets your hardware configuration on each server deployed with your Boot from SAN job.

The customized job is now ready to deploy servers that boot from SAN.

# Windows Boot Setup Procedure for Modular Arrays Configured in Transparent Failover Mode

This section describes boot setup for transparent failover mode configurations for Enterprise Modular Arrays. The example shows the for BIOS menus for the HBAs.

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**Note:** This configuration does not support Windows Server 2003.

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Before you begin, make sure you have reviewed the information and tasks in the sections [Restrictions](#), page 5, [Required Hardware And Software](#), page 6, and [Prerequisites](#), page 7.

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**Note:** Start with only one HBA in the server. If you require additional HBAs for data, add the additional HBA after you have set up booting.

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## Set Up the Server

ProLiant servers are available in two configurations. Newer models use ROM Based Setup Utility (RBSU), while older models do not. For servers with RBSU, refer to the section [Setup for RBSU Servers](#), page 25. For those without this utility, refer to the section [Setup for Servers without RBSU](#), page 30. Select one of the following procedures based on your ProLiant server configuration.

### Setup for RBSU Servers

1. Boot the server from the ProLiant Smart Start CD-ROM version 5.3 or higher. You can alternatively download the latest ROM BIOS from the HP website <http://www.hp.com>.
2. Install the latest ROM from the Smart Start CD-ROM or the downloaded version.
3. Set the boot order:
  - a. While the system is booting, Press **F9** to start the ROM Setup Utility.
  - b. Choose **Boot Controller Order**.
  - c. Select the primary HBA and move it to **Controller Order 1**.
4. Disable the Smart Array.
5. Exit the utility.

### Setup for Servers without RBSU

If your server does not have RBSU, perform the following steps:

1. Download and install the latest system ROM from the HP website <http://www.hp.com>.
2. Download SOFTPAQ SP21860.
3. Run the SOFTPAQ program to create an upgrade diskette.
4. Boot from the ProLiant Smart Start CD-ROM and run the program to clear the configuration.
5. Reboot from the new upgrade diskette. The ORD . EXE program should start automatically.
6. Set the Primary HBA to **Position 1**. If any additional HBAs are required, set the additional HBAs now.

**Note:** The SmartArray should be in a higher numbered position than the HBAs.

---

7. Reboot the server.

## Set Up the Host Bus Adapter

### Emulex HBAs

1. Record the IEEE number for all HBAs.
2. You can install all adapters at this time. Install each adapter and record the PCI slot it occupies.
3. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
4. Configure the adapter:
  - a. While the server is booting, press **Alt E** when the following message displays:  
Press <Alt E> To Go To Emulex BIOS Utility.
  - b. At the **Enter a Selection** prompt, choose the first adapter.
  - c. Choose **Option 2, Configure This Adapter's Parameters**.
  - d. Choose **Option 1, Enable or Disable BIOS**. Press **1** to enable BIOS. (These steps are repeated for the other adapters after the Windows operating system has been installed).
  - e. Choose **Option 4, Topology Selection, <Advanced Option>**.
  - f. Choose **Point to Point**. Press **Page Up**.
  - g. Choose **Option 8, Enable Start Unit Command, <Advanced Option>**. Press **1** to enable.
  - h. Press **X** to exit and reboot the server.
5. Configure the boot devices:
  - a. While the server is booting, press **Alt E** when the following message displays:  
Press <Alt E> To Go To Emulex BIOS Utility.
  - b. Choose the first HBA.
  - c. Choose **Option 1, Configure Boot Devices**.
  - d. In the list of Saved Boot Devices, choose **1** as the primary boot path or **2** as the secondary boot path.
  - e. Choose the WWPN for the desired storage system.
6. Use a terminal emulator or a terminal connected to the storage subsystem to enter the following CLI commands:
  - a. Configure a device with no access allowed, as follows:

```
HSG> initialize disk10000
HSG> add unit d1 disk10000 disable_access_path=all
HSG> show d1
```
7. Note to which LUN the controller is online.
8. Verify that the HBA is online by entering the following command:

```
HSG> show connections
```

9. Optionally rename the connection.
10. Allow the HBA to access the LUN as follows:

```
HSG> set dl enable_access_path=!newcon01
```

---

**Note:** If your MA8000/ESA12000 is configured to operate in SCSI-3 mode, the Command Console displays as LUN 0. If the system is configured to operate in SCSI-2 mode, the connection you just created displays.

---

11. On the server, at the **Select Two Digit Number of the Desired Boot Device** prompt, enter the LUN number that you created.

---

**Note:** Each controller port has an WWPN. The WWPN should be identical for all ports except for the last number. Use the last number to determine the controller port from which you are booting. The Top Controller is considered to be “this controller” because of its serial line connection. If the LUN is online to “this controller,” then you must choose the line with the WWPN from this controller for booting.

---

12. Reboot the server.

## QLogic HBAs

1. Install all adapters.
2. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
3. Configure the adapter:
  - a. While the server is booting, press **Ctrl Q** to enter *Fast/UTIL*.
  - b. Perform the steps in the “[Initial Zoning Setup](#)” on page 28 then go to [step c](#).
  - c. In the Select Host Adapter Menu, choose the adapter you want to boot, then press **Enter**.
  - d. In the *Fast/UTIL* Options Menu, choose **Configuration Settings**, then press **Enter**.
  - e. In the Configuration Settings menu, choose **Host Adapter Settings**, then press **Enter**.
  - f. In the Host Adapter Settings menu, change the **Host Adapter BIOS** to **Enabled** by pressing **Enter**.
  - g. Press **ESC** to go back to the Configuration Settings menu, Choose **Selectable Boot Settings**, then press **Enter**.
  - h. In the Selectable Boot Settings menu, enable the **Selectable Boot** option, then move the cursor to the **Primary Boot Port Name, Lun:**, then press **Enter**.
  - i. In the Select Fibre Channel Device menu, Choose the device to boot from, then press **Enter**.
  - j. Use a terminal emulator or a terminal connected to the storage subsystem to enter the CLI commands to identify the connections.

```
HSG> show connections
```

4. After locating the connection, optionally rename the connection and make note of the name.
5. Create the LUN and assign one connection.

6. Go back to the HBA BIOS.
7. In the Select LUN menu, choose the supported LUN.
8. Save the changes by pressing **ESC** twice.

### Setting Up Switch Zoning

You must set up switch zoning as part of your configuration. Refer to the figures in [Cabling Scheme Options for Single Channel HBAs](#), page 9 and [Cabling Scheme Options for Dual Channel HBAs](#), page 12.

### Initial Zoning Setup

1. Create a zone that includes the boot HBA port and the one controller port using the WWN or switch port number.
2. Enable the zone.
3. Configure your adapter as follows:
  - For Emulex HBAs, go to [step 4](#) on page 26.
  - For QLogic HBAs, go to [step 3](#) on page 27.

### Finalize Zoning

1. Modify the initial zone to include the second controller port
2. Create a zone in the second fabric to include the secondary boot HBA port and the two remaining controller ports.

## Install the Operating System

### Installing from the Rapid Deployment Pack

If you are using ProLiant Essentials Rapid Deployment Pack (RDP), use the deployment jobs modified for Boot from SAN Deployment to install the operating system as described in the Rapid Deployment Pack User's Guide available at <http://www.hp.com/servers/rdp>.

### Installing from the CD-ROM

To install the operating system on all other servers:

1. Insert the Windows operating system CD-ROM.
2. Reboot the server.
3. For Windows 2000 press **F6** when prompted. For Windows NT, press **F6** as soon as the text setup starts.
4. When the setup program prompts you to specify an additional device, choose **S=Specify Additional Device**.
5. Insert the driver diskette for the HBA. It contains the HBA driver required for booting. Press **Enter**.

---

**Note:** For Emulex HBAs, *lputilnt.exe* (LightPulse Utility) is not installed. The drivers need to be reinstalled as described in [step 10](#) on page 29.

---

6. A list of devices displays. Select the appropriate HBA from the list.

**Note:** If this adapter does not display in the list, recheck the setup procedures for the HSG80 MA8000, hubs, switch, HBA, or server.

---

7. Complete the installation.

---

**Note:** For Windows NT, do not install networking until after the operating system installation finishes. You must install networking after the operating system installation completes. Windows 2000 does not have this setup restriction; networking can be installed during setup.

---

8. For Windows NT, if you are using the 4.82a16 driver, you must install the Adjunct driver (for persistent binding) after the operating system has finished its installation.
9. After the operating system installation completes, reboot.
10. Update the driver:
  - a. For Windows 2000, the Found New Hardware Wizard displays **Emulex Utility IFC Dev. SCSI ASCIT8 device** after the first reboot. Choose **Cancel** at this point and for any other prompts for new hardware. This device is automatically installed with the Software Solution kit.
  - b. For Windows NT, run the driver update utility from the Software Solution kit to install the Adjunct driver.
11. Run the Fibre Channel Software setup from the Software Solution kit.
12. Using the Smart Start CD-ROM, update the system drivers.
13. Install the operating system's latest service pack.

## Set Up the Other Servers

Repeat all of the setup steps described in the previous sections for the other servers before you begin the Cluster installation, including:

- [Set Up the Server](#), page 25
- [Set Up the Host Bus Adapter](#), page 26
- [Install the Operating System](#), page 28

**Note:** In HA/F500 configurations, MSCS failover clusters on Windows 2000 and Windows Server 2003 systems are no longer supported in transparent mode failover (single path) configurations.

---

## Windows Boot Setup Procedure for Modular Arrays Configured in Multiple Bus Failover Mode

This section describes boot setup for multiple bus failover mode configurations for Enterprise Modular Arrays. The example shows the for BIOS menus for the HBAs.

Before you begin, make sure you have reviewed the information and tasks in the sections [Restrictions](#), page 5, [Required Hardware And Software](#), page 6, and [Prerequisites](#), page 7.

### Set Up the Server

ProLiant servers are available in two configurations. Newer models use ROM Based Setup Utility (RBSU), while older models do not. For servers with RBSU, refer to the section [Setup for RBSU Servers](#), page 25. For those without this utility, refer to the section [Setup for Servers without RBSU](#), page 30. Select one of the following procedures based on your ProLiant server configuration.

#### Setup for RBSU Servers

1. Boot the server from the ProLiant Smart Start CD-ROM version 5.3 or higher. You can alternatively download the latest ROM BIOS from <http://www.hp.com>.
2. Install the latest ROM from the Smart Start CD-ROM or the downloaded version.
3. Set the boot order:
  - a. While the system is booting, Press **F9** to start the ROM Setup Utility.
  - b. Choose **Boot Controller Order**.
  - c. Select the primary HBA and move it to **Controller Order 1**.
4. Disable the Smart Array Controller.
5. Exit the utility.

#### Setup for Servers without RBSU

If your server does not have RUBSU, perform the following steps:

1. Download and install the latest system ROM from the HP website: <http://www.hp.com>.
2. Download SOFTPAQ SP21860.
3. Run the SOFTPAQ program to create an upgrade diskette.
4. Boot from the ProLiant Smart Start CD-ROM and run the program to clear the configuration.
5. Reboot from the new upgrade diskette. The ORD . EXE program should start automatically.
6. Set the Primary HBA to **Position 1**. If any additional HBAs are required, set the additional HBAs now.

---

**Note:** The SmartArray should be in a higher numbered position than the HBAs.

---

7. Reboot the server.

## Set Up the Host Bus Adapter

### Emulex HBAs

1. Record the IEEE number for all HBAs.
2. You can install all adapters at this time. Install each adapter and record the PCI slot it occupies.
3. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
4. Configure the adapter:
  - a. While the server is booting, press **Alt E** when the following message displays:  
Press <Alt E> To Go To Emulex BIOS Utility.
  - b. At the **Enter a Selection** prompt, choose the first adapter.
  - c. Choose **Option 2, Configure This Adapter's Parameters**.
  - d. Choose **Option 1, Enable or Disable BIOS**. Press **1** to enable BIOS. (These steps are repeated for the other adapters after the Windows operating system has been installed).
  - e. Choose **Option 4, Topology Selection, <Advanced Option>**.
  - f. Choose **Point to Point**. Press **Page Up**.
  - g. Choose **Option 8, Enable Start Unit Command, <Advanced Option>**. Press **1** to enable.
  - h. Press **X** to exit and reboot the server.
5. Configure the boot devices:
  - a. While the server is booting, press **Alt E** when the following message displays:  
Press <Alt E> To Go To Emulex BIOS Utility.
  - b. Choose the first HBA.
  - c. Choose **Option 1, Configure Boot Devices**.
  - d. In the list of Saved Boot Devices, choose **1** as the primary boot path or **2** as the secondary boot path.
  - e. Choose the WWPN for the desired storage system.
6. Use a terminal emulator or a terminal connected to the storage subsystem to enter the following CLI commands:
  - a. Configure a device with no access allowed, as follows:  

```
HSG> initialize disk10000
HSG> add unit d1 disk10000 disable_access_path=all
HSG> show d1
```
7. Note to which LUN the controller is online.
8. Verify that the HBA is online by entering the following command:  

```
HSG> show connections
```
9. Optionally rename the connection.
10. Allow the HBA to access the LUN as follows:  

```
HSG> set d1 enable_access_path=!newcon01
```

**Note:** If your MA8000/ESA12000 is configured to operate in SCSI-3 mode, the Command Console displays as LUN 0. If the system is configured to operate in SCSI-2 mode, the connection you just created displays.

---

11. On the server, at the **Select Two Digit Number of the Desired Boot Device** prompt, enter the LUN number that you created.

**Note:** Each controller port has an WWPN. The WWPN should be identical for all ports except for the last number. Use the last number to determine the controller port from which you are booting. The Top Controller is considered to be “this controller” because of its serial line connection. If the LUN is online to “this controller,” then you must choose the line with the WWPN from this controller for booting.

---

12. Reboot the server.

## QLogic HBAs

1. Install all adapters.
2. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
3. Configure the adapter:
  - a. While the server is booting, press **Ctrl Q** to enter *Fast!/UTIL*.
  - b. Perform the steps in “[Initial Zoning Setup](#)” on page 28, then go to [step c](#).
  - c. In the Select Host Adapter Menu, choose the adapter you want to boot, then press **Enter**.
  - d. In the *Fast!/UTIL* Options Menu, choose **Configuration Settings**, then press **Enter**.
  - e. In the Configuration Settings menu, choose **Host Adapter Settings**, then press **Enter**.
  - f. In the Host Adapter Settings menu, change the **Host Adapter BIOS** to **Enabled** by pressing **Enter**.
  - g. Press **ESC** to go back to the Configuration Settings menu, Choose **Selectable Boot Settings**, then press **Enter**.
  - h. In the Selectable Boot Settings menu, enable the **Selectable Boot** option, then move the cursor to the **Primary Boot Port Name, Lun:**, then press **Enter**.
  - i. In the Select Fibre Channel Device menu, Choose the device to boot from, then press **Enter**.
  - j. Use a terminal emulator or a terminal connected to the storage subsystem to enter the CLI commands to identify the connections  

```
HSG> show connections
```
4. After locating the connection, optionally rename the connection and make note of the name.
5. Create the LUN and assign one connection.
6. Go back to the HBA BIOS.
7. In the Select LUN menu, choose the supported LUN.
8. Save the changes by pressing **ESC** twice.

## Set Up the Remaining Adapters

1. Connect the two remaining HBAs that you did not use for booting to the switches (No BIOS changes are necessary). Connect one HBA to one fabric and the other HBA to the other fabric.
2. Finalize the zoning as described in “[Finalize Zoning](#)” on page 28.
3. Using CLI, rename the new connections and create LUNs to use with these connections.

## Install the Operating System

### Installing from the Rapid Deployment Pack

If you are using ProLiant Essentials Rapid Deployment Pack (RDP), use the deployment jobs modified for Boot from SAN Deployment to install the operating system as described in the Rapid Deployment Pack User’s Guide available at <http://www.hp.com/servers/rdp>.

### Installing from the CD-ROM

1. Insert the Windows operating system CD-ROM.
2. Reboot the server.
3. For Windows 2000 and Windows Server 2003, press **F6** when prompted. For Windows NT, press **F6** as soon as the text setup starts.
4. When the setup program prompts you to specify an additional device, choose **S=Specify Additional Device**.
5. Insert the driver diskette for the HBA. It contains the HBA driver required for booting. Press **Enter**.

---

**Note:** For Emulex HBAs, */putilnt.exe* (LightPulse Utility) is not installed. The drivers need to be reinstalled as described in [step 11](#).

---

6. A list of devices displays. Select the appropriate HBA.
7. Press **Enter** to continue the installation. The **Specify Additional Device** screen displays.

---

**Note:** If this adapter does not display in the list, recheck the setup procedures for the HSG80 MA6000 and MA8000/ESA12000, hubs, switch, HBA, or server.

---

8. Complete the installation.

---

**Note:** For Windows NT, do not install networking until after the operating system installation finishes. You must install networking after the operating system installation completes. Windows 2000 does not have this setup restriction; networking can be installed during setup.

---

9. For Windows NT, if you are using the 4.82a16 driver, you must install the Adjunct driver (for persistent binding) after the operating system has finished its installation.
10. After the operating system installation completes, reboot.

11. Update the driver:
  - a. For Emulex HBAs on Windows 2000 and Windows Server 2003, the Found New Hardware Wizard displays Emulex Utility IFC Dev. SCSI ASCIT8 device after the first reboot. Choose Cancel at this point and for any other prompts for new hardware. This device is automatically installed with the Software Solution kit.
  - b. For Windows NT, run the driver update utility from the Software Solution kit to install the Adjunct driver.
12. Run the Fibre Channel Software setup from the Software Solution kit.
13. Install the Secure Path for Windows software.
14. Using the Smart Start CD-ROM, update the system drivers.
15. Install the operating system's latest service pack.

## Set Up the Remaining Adapters

1. Connect the two remaining HBAs that you did not use for booting to the switches (No BIOS changes are necessary). Connect one HBA to one fabric and the other HBA to the other fabric.
2. Finalize the zoning as described in “[Finalize Zoning](#)” on page 28.
3. Using CLI, rename the new connections and create LUNs to use with these connections.

## Set Up the Other Servers

Repeat all of the setup steps described in the previous sections for the other servers before you begin the Cluster installation, including:

- [Set Up the Server](#), page 25
- [Set Up the Host Bus Adapter](#), page 26
- [Install the Operating System](#), page 28

## Set Up the Cluster

1. Create a new LUN to be used with the cluster service. There should be eight connections four from each server. Use CLI, as shown in the following example:

```
HSG> initialize disk30100
HSG> add unit D5 disk30100 disable_access_path=all
HSG> show connections
HSG> set D5 enable_access_path=<all non-booting connection names>
```

<all non-booting connection names> are the names of all connections you do not use for booting.

2. Reboot the server.
3. Install the cluster service. Refer to Microsoft cluster installation documentation for complete instructions.

# Windows Boot Setup Procedures for Enterprise Virtual Arrays

## Set Up the Enterprise Virtual Array

1. Create A Virtual Disk (LUN).
2. Record the WWPN of each controller port. There should be four.

## Set Up the Server

ProLiant servers are available in two configurations. Newer models use ROM Based Setup Utility (RBSU), while older models do not. For servers with RBSU, refer to the section [Setup for RBSU Servers](#), page 25. For those without this utility, refer to the section [Setup for Servers without RBSU](#), page 30. Select one of the following procedures based on your ProLiant server configuration.

Select one of the following procedures based on your ProLiant server configuration.

### Setup for RBSU Servers

1. Boot the server from the ProLiant Smart Start CD-ROM version 5.3 or higher. You can alternatively download the latest ROM BIOS from <http://www.hp.com>.
2. Install the latest ROM from the Smart Start CD-ROM or the downloaded version.
3. Set the boot order:
  - a. While the system is booting, Press **F9** to start the ROM Setup Utility.
  - b. Choose **Boot Controller Order**.
  - c. Select the primary HBA and move it to **Controller Order 1**.
  - d. Move the secondary adapter to the next highest in the order.
4. Disable the Smart Array Controller.
5. Exit the utility.

### Setup for Servers without RBSU

If your server does not have RBSU, perform the following steps:

1. Download and install the latest system ROM from the HP website: <http://www.hp.com>.
2. Download SOFTPAQ SP21860.
3. Run the SOFTPAQ program to create an upgrade diskette.
4. Boot from the ProLiant Smart Start CD-ROM and run the program to clear the configuration.
5. Reboot from the new upgrade diskette. The ORD . EXE program should start automatically.
6. Set the Primary HBA to **Position 1**. If any additional HBAs are required, set the additional HBAs now.

---

**Note:** The SmartArray should be in a higher numbered position than the HBAs.

---

7. Reboot the server.

## Set Up the Host Bus Adapter

### Emulex HBAs

1. Record the IEEE number for all HBAs.
2. You may install all adapters at this time. Record the PCI slot each adapter occupies.
3. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
4. Configure the adapter:
  - a. While the server is booting, press **Alt E** when the following message displays:  

```
Press <Alt E> To Go To Emulex BIOS Utility.
```
  - b. At the **Enter a Selection** prompt, choose the first adapter.
  - c. Choose **Option 2, Configure This Adapter's Parameters**.
  - d. Choose **Option 1, Enable or Disable BIOS**. Press **1** to enable BIOS (Steps a through c are repeated for other adapters after the Windows operating system has been installed).
  - e. Choose **Option 4, Topology Selection**, then choose the **Advanced Option**.
  - f. Choose **Point to Point**. Press **Page Up**.
  - g. Choose **Option 8, Enable Start Unit Command**, then choose the **Advanced Option**. Press **1** to enable.
  - h. Press **X** to exit and reboot the server.
5. Configure the boot devices:
  - a. While the server is booting, press **Alt E** when the following message displays:  

```
Press <Alt E> To Go To Emulex BIOS Utility.
```
  - b. At the **Enter a Selection** prompt, choose the first adapter.
  - c. Choose **Option 1, Configure Boot Devices**.
  - d. Using a web browser, access Command View EVA or the HSV Element Manager to present the virtual disk to the host.
  - e. Choose **1** as the primary boot path.
  - f. Enter the number of the first desired port of the HSV device in the list.
  - g. At the prompt, enter the two digits of starting LUN (Hex). Use the LUN number you created earlier on the Enterprise Virtual Array.
  - h. Choose **1, Boot this device via WWPN**.
6. Create the LUN and assign a host:
  - a. Access Command View EVA or the HSV Element Manager through a web browser.
  - b. Create the LUN and assign a host. You must create a host if one does not exist.

7. On the server, at the **Select Two Digit Number of the Desired Boot Device** prompt, enter the LUN number that you created.

---

**Note:** Each controller port has an WWPN. The WWPN should be identical for all ports except for the last number. Use the last number to determine the controller port from which you are booting. The Top Controller is considered to be “this controller” because of its serial line connection. If the LUN is online to “this controller,” then you must choose the line with the WWPN from this controller for booting.

---

8. Reboot the server.

## QLogic HBAs

1. Install all adapters.
2. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
3. Configure the adapter:
  - a. While the server is booting, press **Ctrl Q** to enter *Fast!UTIL*.
  - b. Perform the steps in “[Initial Zoning Setup](#)” on page 28 then go to [step c](#).
  - c. In the Select Host Adapter Menu, choose the adapter you want to boot, then press **Enter**.
  - d. In the *Fast!UTIL* Options Menu, choose **Configuration Settings**, then press **Enter**.
  - e. In the Configuration Settings menu, choose **Host Adapter Settings**, then press **Enter**.
  - f. In the Host Adapter Settings menu, change the **Host Adapter BIOS** to **Enabled** by pressing **Enter**.
  - g. Press **ESC** to go back to the Configuration Settings menu, Choose **Selectable Boot Settings**, then press **Enter**.
  - h. In the Selectable Boot Settings menu, enable the **Selectable Boot** option, then move the cursor to the **Primary Boot Port Name, Lun:**, then press **Enter**.
  - i. In the Select Fibre Channel Device menu, Choose the device to boot from, then press **Enter**.
4. After locating the connection, optionally rename the connection and make note of the name.
5. Create the LUN and assign a host:
  - a. Access Command View EVA or the HSV Element Manager through a web browser.
  - b. Create the LUN and assign a host. You must create a host if one does not exist.
6. Go back to the HBA BIOS.
7. In the Select LUN menu, choose the supported LUN.
8. Save the changes by pressing **ESC** twice.

## Install the Operating System

### Installing from the Rapid Deployment Pack

If you are using ProLiant Essentials Rapid Deployment Pack (RDP), use the deployment jobs modified for Boot from SAN Deployment to install the operating system as described in the Rapid Deployment Pack User's Guide available at <http://www.hp.com/servers/rdp>.

### Installing from the CD-ROM

1. Insert the Windows operating system CD-ROM.
2. Reboot the server.
3. For Windows 2000 and Windows Server 2003, press **F6** when prompted. For Windows NT, press **F6** as soon as the text setup starts.
4. When the setup program prompts you to specify an additional device, choose **S=Specify Additional Device**.
5. Insert the diskette that came with the HBA. It contains the HBA driver required for booting. Press **Enter**.

---

**Note:** For Emulex HBAs, *lputilnt.exe* (LightPulse Utility) is not installed. The drivers need to be reinstalled as described in [step 11](#) on page 38.

---

6. A list of devices displays. Select the appropriate HBA.
7. Continue the operating system installation. While in text mode stage, two instances of the boot device are presented. Choose the **second instance** of the boot device.
8. Complete the installation.

---

**Note:** For Windows NT, do not install networking until after the operating system installation finishes. You must install networking after the operating system installation completes. Windows 2000 and Windows Server 2003 do not have this setup restriction; networking can be installed during setup.

---

9. For Windows NT, if you are using the 4.82a16 driver, you must install the Adjunct driver (for persistent binding) after the operating system has finished its installation.
10. After the operating system installation completes, reboot.
11. Update the driver:
  - a. For Emulex HBAs on Windows 2000 and Windows Server 2003, the Found New Hardware Wizard displays Emulex Utility IFC Dev. SCSI ASCIT8 device after the first reboot. Choose Cancel at this point and for any other prompts for new hardware. This device is automatically installed with the Software Solution kit.
  - b. For Windows NT, run the driver update utility from the Software Solution kit to install the Adjunct driver, or run the latest driver update (available on the web).
12. Run the Fibre Channel Software setup from the Software Solution kit.
13. Install the Secure Path for Windows software.
14. Using the Smart Start CD-ROM update the system drivers.
15. Install the latest operating system service pack.

## Set Up the Remaining HBA Ports

1. Connect the remaining HBAs.
2. Finalize the zoning as described in [Finalize Zoning](#), page 28.
3. Using a web browser, access Command View EVA and add the HBA WWNs to the appropriate host.

---

**Note:** You should put non-booting HBAs in a different host folder than the boot from SAN HBAs.

---

## Set Up the Other Server

Repeat all of the setup steps described in the previous sections for the other server before you begin the Cluster installation.

## Set Up the Cluster

1. Reboot the server.
2. Install the clustering service. Refer to Microsoft cluster installation documentation for complete instructions.

# Windows Boot Setup Procedures for Enterprise Virtual Arrays Single Path

## Set Up the Enterprise Virtual Array

1. Create A Virtual Disk (LUN),
2. Record the WWPN of each controller port.

## Set Up the Server

ProLiant servers are available in two configurations. Newer models use ROM Based Setup Utility (RBSU), while older models do not. For servers with RBSU, refer to the section [Setup for RBSU Servers](#), page 25. For those without this utility, refer to the section [Setup for Servers without RBSU](#), page 30. Select one of the following procedures based on your ProLiant server configuration.

Select one of the following procedures based on your ProLiant server configuration.

### Setup for RBSU Servers

1. Boot the server from the ProLiant Smart Start CD-ROM version 5.3 or higher. You can alternatively download the latest ROM BIOS from <http://www.hp.com>.
2. Install the latest ROM from the Smart Start CD-ROM or the downloaded version.
3. Set the boot order:
  - a. While the system is booting, Press **F9** to start the ROM Setup Utility.
  - b. Choose **Boot Controller Order**.
  - c. Select the primary HBA and move it to **Controller Order 1**.
  - d. Move the secondary adapter to the next highest in the order.
4. Disable the Smart Array Controller.
5. Exit the utility.

### Setup for Servers without RBSU

If your server does not have RBSU, perform the following steps:

1. Download and install the latest system ROM from the HP website: <http://www.hp.com>.
2. Download SOFTPAQ SP21860.
3. Run the SOFTPAQ program to create an upgrade diskette.
4. Boot from the ProLiant Smart Start CD-ROM and run the program to clear the configuration.
5. Reboot from the new upgrade diskette. The ORD . EXE program should start automatically.
6. Set the Primary HBA to **Position 1**. If any additional HBAs are required, set the additional HBAs now.

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**Note:** The SmartArray should be in a higher numbered position than the HBAs.

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7. Reboot the server.

## Set Up the Host Bus Adapter

### Emulex HBAs

1. Record the IEEE number for all HBAs.
2. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
3. Configure the adapter:
  - a. While the server is booting, press **Alt E** when the following message displays:  
Press <Alt E> To Go To Emulex BIOS Utility.
  - b. At the **Enter a Selection** prompt, choose the first adapter.
  - c. Choose **Option 2, Configure This Adapter's Parameters**.
  - d. Choose **Option 1, Enable or Disable BIOS**. Press **1** to enable BIOS (Steps a through c are repeated for other adapters after the Windows operating system has been installed).
  - e. Choose **Option 4, Topology Selection**, then choose the **Advanced Option**.
  - f. Choose **Point to Point**. Press **Page Up**.
  - g. Choose **Option 8, Enable Start Unit Command**, then choose the **Advanced Option**. Press **1** to enable.
  - h. Press **X** to exit and reboot the server.
4. Configure the boot devices:
  - a. While the server is booting, press **Alt E** when the following message displays:  
Press <Alt E> To Go To Emulex BIOS Utility.
  - b. At the **Enter a Selection** prompt, choose the first adapter.
  - c. Choose **Option 1, Configure Boot Devices**.
  - d. Using a web browser, access Command View EVA or the HSV Element Manager to present the virtual disk to the host.
  - e. Choose **1** as the primary boot path.
  - f. Enter the number of the first desired port of the HSV device in the list.
  - g. At the prompt, enter the two digits of starting LUN (Hex). Use the LUN number you created earlier on the Enterprise Virtual Array.
  - h. Choose **1, Boot this device via WWPN**.
  - i. Press **X** to exit and reboot the server.

## QLogic HBAs

1. Install all adapters.
2. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
3. Configure the adapter:
  - a. While the server is booting, press **Ctrl Q** to enter *Fast/UTIL*.
  - b. Perform the steps in “[Initial Zoning Setup](#)” on page 28 then go to [step c](#).
  - c. In the Select Host Adapter Menu, choose the adapter you want to boot, then press **Enter**.
  - d. In the *Fast/UTIL* Options Menu, choose **Configuration Settings**, then press **Enter**.
  - e. In the Configuration Settings menu, choose **Host Adapter Settings**, then press **Enter**.
  - f. In the Host Adapter Settings menu, change the **Host Adapter BIOS** to **Enabled** by pressing **Enter**.
  - g. Press **ESC** to go back to the Configuration Settings menu, Choose **Selectable Boot Settings**, then press **Enter**.
  - h. In the Selectable Boot Settings menu, enable the **Selectable Boot** option, then move the cursor to the **Primary Boot Port Name, Lun:**, then press **Enter**.
  - i. In the Select Fibre Channel Device menu, Choose the device to boot from, then press **Enter**.
4. After locating the connection, optionally rename the connection and make note of the name.
5. Create the LUN and assign a host:
  - a. Access Command View EVA or the HSV Element Manager through a web browser.
  - b. Create the LUN and assign a host. You must create a host if one does not exist.
6. Go back to the HBA BIOS.
7. In the Select LUN menu, choose the supported LUN.
8. Save the changes by pressing **ESC** twice.

## Install the Operating System

### Installing from the Rapid Deployment Pack

If you are using ProLiant Essentials Rapid Deployment Pack (RDP), use the deployment jobs modified for Boot from SAN Deployment to install the operating system as described in the Rapid Deployment Pack User’s Guide available at <http://www.hp.com/servers/rdp>.

### Installing from the CD-ROM

1. Insert the Windows operating system CD-ROM.
2. Reboot the server.
3. For Windows 2000 and Windows Server 2003, press **F6** when prompted. For Windows NT, press **F6** as soon as the text setup starts.
4. When the setup program prompts you to specify an additional device, choose **S=Specify Additional Device**.

5. Insert the diskette that came with the HBA. It contains the HBA driver required for booting. Press **Enter**.
6. A list of devices displays. Select the appropriate HBA.
7. Continue the operating system installation. While in text mode stage, two instances of the boot device are presented. Choose the **second instance** of the boot device.
8. Complete the installation.

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**Note:** For Windows NT, do not install networking until after the operating system installation finishes. You must install networking after the operating system installation completes. Windows 2000 and Windows Server 2003 do not have this setup restriction; networking can be installed during setup.

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9. For Windows NT, if you are using the 4.82a16 driver, you must install the Adjunct driver (for persistent binding) after the operating system has finished its installation.
10. After the operating system installation completes, reboot.
11. Update the driver:
  - a. For Emulex HBAs on Windows 2000 and Windows Server 2003, the Found New Hardware Wizard displays Emulex Utility IFC Dev. SCSI ASCIT8 device after the first reboot. Choose Cancel at this point and for any other prompts for new hardware. This device is automatically installed with the Software Solution kit or Softpaq.
  - b. For Windows NT, run the driver update utility from the Software Solution kit to install the Adjunct driver.
12. Run the Fibre Channel Software setup from the Software Solution kit or, run the configurable HBA driver Smart Component.
13. Install the Secure Path for Windows software.
14. Using the Smart Start CD-ROM update the system drivers.
15. Install the latest operating system service pack.

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**Note:** In HA/F500 configurations, MSCS failover clusters on Windows 2000 and Windows Server 2003 systems are no longer supported in EVA single path configurations.

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## Windows Boot Setup Procedures for Disk Array XP1024/128

If one server is booting from a SAN, one host group is required for that HBA. If more than one server is booting from a SAN and accessing the same physical port, a unique host group is required for each HBA. Every host group must be assigned on a port with a unique LUN 0. If LUN security is turned off for this port (for example, port CL1-A) all the servers defined in the host groups are suddenly given access to all LUNs contained in the default host group.

For detailed information about Disk Array XP1024/128 host groups, LUN Security, and host modes, refer to the *HP StorageWorks Command View XP User Guide* available at

[http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&locale=en\\_US&docIndexId=179911&taskId=101&prodTypeId=12169&prodSeriesId=64820](http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&locale=en_US&docIndexId=179911&taskId=101&prodTypeId=12169&prodSeriesId=64820)

### Set Up the Server

ProLiant servers are available in two configurations. Newer models use ROM Based Setup Utility (RBSU), while older models do not. For servers with RBSU, refer to the section [Setup for RBSU Servers](#), page 25. For those without this utility, refer to the section [Setup for Servers without RBSU](#), page 30. Select one of the following procedures based on your ProLiant server configuration.

Select one of the following procedures based on your ProLiant server configuration.

#### Setup for RBSU Servers

1. Boot the server from the ProLiant Smart Start CD-ROM version 5.3 or higher. You can alternatively download the latest ROM BIOS from <http://www.hp.com>.
2. Install the latest ROM from the Smart Start CD-ROM or the downloaded version.
3. Set the boot order:
  - a. While the system is booting, Press **F9** to start the ROM Setup Utility.
  - b. Choose **Boot Controller Order**.
  - c. Select the primary HBA and move it to **Controller Order 1**.
  - d. Move the secondary adapter to the next highest in the order.
4. Disable the Smart Array Controller.
5. Exit the utility.

#### Setup for Servers without RBSU

If your server does not have RBSU, perform the following steps:

1. Download and install the latest system ROM from the HP website: <http://www.hp.com>.
2. Download SOFTPAQ SP21860.
3. Run the SOFTPAQ program to create an upgrade diskette.
4. Boot from the ProLiant Smart Start CD-ROM and run the program to clear the configuration.
5. Reboot from the new upgrade diskette. The ORD . EXE program should start automatically.

6. Set the Primary HBA to **Position 1**. If any additional HBAs are required, set the additional HBAs now.

---

**Note:** The SmartArray should be in a higher numbered position than the HBAs.

---

7. Reboot the server.

## Set Up the Host Bus Adapter

### Emulex HBAs

1. Record the IEEE number for all HBAs.
2. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
3. Configure the adapter:
  - a. While the server is booting, press **Alt E** when the following message displays:  
Press <Alt E> To Go To Emulex BIOS Utility.
  - b. At the **Enter a Selection** prompt, choose the first adapter.
  - c. Choose **Option 2, Configure This Adapter's Parameters**.
  - d. Choose **Option 1, Enable or Disable BIOS**. Press **1** to enable BIOS (Steps a through c are repeated for other adapters after the Windows operating system has been installed).
  - e. Choose **Option 4, Topology Selection**, then choose the **Advanced Option**.
  - f. Choose **Point to Point**. Press **Page Up**.
  - g. Choose **Option 8, Enable Start Unit Command**, then choose the **Advanced Option**. Press **1** to enable.
  - h. Press **X** to exit and reboot the server.
4. Configure the boot devices:
  - a. While the server is booting, press **Alt E** when the following message displays:  
Press <Alt E> To Go To Emulex BIOS Utility.
  - b. At the **Enter a Selection** prompt, choose the first adapter.
  - c. Choose **Option 1, Configure Boot Devices**.
  - d. Using a web browser, start Command View XP and perform the following steps:
    - Select a port (such as CL1-A).
    - Set LUN security for the controller port.
    - Create a Host Group with proper host mode (for windows host mode= 0xC).
    - Assign the first boot HBA port WWN to the newly created host group.
    - Assign a LUN 0 to that Host group.
  - e. In the Configuration Settings menu, choose **Host Adapter Settings**, then press **Enter**.
  - f. In the Host Adapter Settings menu, change the **Host Adapter BIOS** to **Enabled** by pressing **Enter**.

- g. Press **ESC** to go back to the Configuration Settings menu, Choose **Selectable Boot Settings**, then press **Enter**.
- h. In the Selectable Boot Settings menu, enable the **Selectable Boot** option, then move the cursor to the **Primary Boot Port Name, Lun:**, then press **Enter**.
- i. In the Select Fibre Channel Device menu, Choose the device to boot from, then press **Enter**.

For detailed information about using Command View XP, refer to the *HP StorageWorks Command View XP User Guide* available at

[http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&locale=en\\_US&docIndexId=179911&taskId=101&prodTypeId=12169&prodSeriesId=64820](http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&locale=en_US&docIndexId=179911&taskId=101&prodTypeId=12169&prodSeriesId=64820)

## QLogic HBAs

1. Install all adapters.
2. Perform the steps in “[Initial Zoning Setup](#)” on page 28.
3. Configure the adapter:
  - a. While the server is booting, press **Ctrl Q** to enter *Fast!/UTIL*.
  - b. Perform the steps in “[Initial Zoning Setup](#)” on page 28 then go to [step c](#).
  - c. In the Select Host Adapter Menu, choose the adapter you want to boot, then press **Enter**.
  - d. In the *Fast!/UTIL* Options Menu, choose **Configuration Settings**, then press **Enter**.
  - e. In the Configuration Settings menu, choose **Host Adapter Settings**, then press **Enter**.
  - f. In the Host Adapter Settings menu, change the **Host Adapter BIOS** to **Enabled** by pressing **Enter**.
  - g. Press **ESC** to go back to the Configuration Settings menu, Choose **Selectable Boot Settings**, then press **Enter**.
  - h. In the Selectable Boot Settings menu, enable the **Selectable Boot** option, then move the cursor to the **Primary Boot Port Name, Lun:**, then press **Enter**.
  - i. In the Select Fibre Channel Device menu, Choose the device to boot from, then press **Enter**.
4. After locating the connection, optionally rename the connection and make note of the name.
5. Using a web browser, start Command View XP and perform the following steps:
  - a. Select a port (such as CL1-A).
  - b. Set LUN security for the controller port.
  - c. Create a Host Group with proper host mode (for windows host mode= 0xC).
  - d. Assign the first boot HBA port WWN to the newly created host group.
  - e. Assign a LUN 0 to that Host group.

For detailed information about using Command View XP, refer to the *HP StorageWorks Command View XP User Guide* available at

[http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&locale=en\\_US&docIndexId=179911&taskId=101&prodTypeId=12169&prodSeriesId=64820](http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&locale=en_US&docIndexId=179911&taskId=101&prodTypeId=12169&prodSeriesId=64820)

6. Go back to the HBA BIOS.
7. In the Select LUN menu, choose the supported LUN.
8. Save the changes by pressing **ESC** twice.

## Set Up the Remaining HBA Ports

1. Connect the remaining HBAs:
  - a. A secondary HBA for booting should be set up in the same manner as the primary HBA.
  - b. Connect any additional (nonbooting) HBAs. You do not need to make any BIOS changes.
2. Finalize the zoning as described in [Finalize Zoning](#), page 28.
3. Using a web browser, access Command View XP and add the HBA WWNs to the appropriate host group.

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**Note:** Assign nonbooting HBAs to a different host group.

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