HP StorageWorks Emulex fibre channel host bus adapters for ProLiant and Integrity servers using Linux and VMware operating systems release notes
Description

These release notes contain driver, firmware, and other supplemental information for the Emulex fibre channel host bus adapters (HBAs) for ProLiant and Integrity servers using Linux® and VMware® operating systems. See Product models for a list of supported HBAs.

What’s new?

- RHEL 5 U3 using in-box driver
- Multipath failover using Device Mapper Multipath
- HBAAnyware

Prerequisites

Before you perform HBA updates, you must:

- Ensure that the system is running one of the operating system versions listed in “Operating systems” on page 5.
- See the HP server PCI slot specifications to determine if your server is compatible with these HBAs.
- If you are installing the Linux operating system for the first time, load the operating system and then download and install the supported Linux HBA driver from the HP website: http://welcome.hp.com/country/us/en/support.html.
- Starting with RHEL 5 U3, fibre channel HBAs and mezzanine cards are supported by Red Hat in-box drivers (provided as part of the O/S distribution), and multipath failover is now handled by Device Mapper.

Please refer to the section below for a list of HBA and Mezzanine part numbers.

Product models

The following HBAs and Mezzanine cards support Linux on ProLiant servers:

- HP StorageWorks LPe12000 8Gb FC single channel HBA (product number AJ762A)
- HP StorageWorks LPe12002 8Gb FC dual channel HBA (product number AJ763A)
- HP StorageWorks LPe1105–HP 4Gb FC HBA for HP c-Class BladeSystem (product number 403621–B21)
- HP StorageWorks BL20p fibre channel Mezzanine HBA (product number 394757–B21)
- HP StorageWorks BL25/30/35/45p fibre channel Mezzanine HBA (product number 394588–B21)

The following HBAs support Linux on ProLiant and Integrity servers:

- HP StorageWorks FC2143 (product number AD167A)
- HP StorageWorks FC2243 (product number AD168A)
- HP StorageWorks FC2142SR (product number A8002A)
- HP StorageWorks FC2242SR (product number A8003A)
Devices supported

The Emulex HBAs for Linux are supported on HP servers that:

- Support the Linux operating systems described in “Operating systems” on page 5.
- Support the following storage arrays for Linux:
  - Modular Smart Array 1000
  - Modular Smart Array 1500
  - Modular Smart Array 2012fc/2212fc
  - Enterprise Virtual Array 3000/5000 GL
  - Enterprise Virtual Array 4000/6000/8000 XL
  - Enterprise Virtual Array 4400
  - Enterprise Virtual Array 4400 with embedded switch*
  - Enterprise Virtual Array 4100/6100/8100
  - XP1024/128, XP10000/12000, and XP20000/24000
For the latest supported array firmware, see the HP storage array website: http://h18006.www1.hp.com/storage/arraysystems.html.

**NOTE:**

For Modular Smart Arrays and Enterprise Virtual Array, active/passive storage arrays are supported in a single-path mode only.

*EVA 4400 with embedded switch is not currently supported with SLES 9 SP4.

**For MSA 2000 product family disk array only.**

- MSA 2000 minimum required firmware J200P24-01
- Creating Vdisks online or offline without volumes during the Vdisk creation process on MSA 2000 is not supported. It is required to create at least one volume on the storage during the Vdisk creation process.
- MultiPulse is not supported with MSA 2000, See the HP Device Mapper documentation for Multipathing support.
Operating systems

Linux on ProLiant servers

Table 1 This table lists software support with the following 2.6 versions of x86 and x64 Linux: RHEL5 U3 (2.6.18.128).

<table>
<thead>
<tr>
<th>HBA</th>
<th>Driver</th>
<th>Firmware</th>
<th>BIOS</th>
<th>Universal Boot</th>
<th>HBAnyware</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPe12000 (AJ762A)</td>
<td>8.2.0.33.3p</td>
<td>1.00a12</td>
<td>2.01a2</td>
<td>5.03a0</td>
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<td>4.0a31</td>
</tr>
<tr>
<td>FC2143 (AD167A)</td>
<td>8.2.0.33.3p</td>
<td>2.72a2</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>4.0a31</td>
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<tr>
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<td>2.72a2</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>4.0a31</td>
</tr>
<tr>
<td>FC2142SR (A8002A)</td>
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<td>2.72a2</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>4.0a31</td>
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<td>FC2242SR (A8003A)</td>
<td>8.2.0.33.3p</td>
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<td>2.01a2</td>
<td>5.03a0</td>
<td>4.0a31</td>
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<td>LPe1105 (403621-B21)</td>
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<td>BL20p (394757-B21)</td>
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<tr>
<td>BL25/30/35/45p (394588-B21)</td>
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<td>1.71a0</td>
<td>n/a</td>
<td>4.0a31</td>
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Table 2 This table lists software support with the following 2.6 versions of x86 and x64 Linux: RHEL5 U1 (2.6.18-53.el5), RHEL5 U2 (2.6.18–92), SLES10 SP1 (2.6.16.53–0.16) and SLES10 SP2 (2.6.16.60–0.21).

<table>
<thead>
<tr>
<th>HBA</th>
<th>Driver</th>
<th>Firmware</th>
<th>BIOS</th>
<th>Universal Boot</th>
<th>MultiPulse</th>
<th>HBAnyware</th>
</tr>
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<td>2.2.39</td>
<td>3.4a16</td>
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HP StorageWorks Emulex fibre channel host bus adapters for ProLiant and Integrity servers using Linux and VMware operating systems release notes
Table 3 This table lists software support with the following 2.6 versions of x86 and x86_64 Linux: RHEL4 U5 and U6, SLES9 SP3 and SP4

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<tr>
<th>HBA</th>
<th>Driver</th>
<th>Firmware</th>
<th>BIOS</th>
<th>Universal Boot</th>
<th>MultiPulse</th>
<th>HBAnyware</th>
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Table 4 This table lists software support with the following 2.6 kernel versions of x86 and x86_64 Linux: SLES10 initial release.

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Table 5 This table lists software support with the following 2.4 kernel versions of x86 and x86_64 Linux: RHEL3 U7 and U8.

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<th>HBAnyware</th>
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<td>5.02a1</td>
<td>2.1a24</td>
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<tr>
<td>FC2142SR (A8002A)</td>
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<td>2.70a5</td>
<td>1.71a0</td>
<td>5.02a1</td>
<td>2.1a24</td>
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<td>FC2242SR (A8003A)</td>
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<td>BL25/30/35/45p</td>
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<td>1.71a0</td>
<td>n/a</td>
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</table>

Linux on Integrity servers

The following versions of Linux are supported on Integrity servers.

Table 6 This table lists software support with the following 2.6 versions of Itanium Linux: SLES10 initial release.

<table>
<thead>
<tr>
<th>HBA</th>
<th>Driver</th>
<th>Firmware</th>
<th>EFI</th>
<th>Universal Boot</th>
<th>MultiPulse</th>
<th>HBAnyware</th>
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<td>3.11a5</td>
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<td>3.2a7</td>
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Table 7 This table lists software support with the following 2.6 versions of Itanium Linux: SLES10 SP 1 and RHEL5.1.

<table>
<thead>
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<th>EFI</th>
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<th>MultiPulse</th>
<th>HBAnyware</th>
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<tbody>
<tr>
<td>FC2143 (AD167A)</td>
<td>8.2.0.22_p1</td>
<td>2.72a2</td>
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Table 8 This table lists software support with the following 2.6 versions of Itanium Linux: RHEL4 U5 and U6, SLES9 SP3 and SP4.

<table>
<thead>
<tr>
<th>HBA</th>
<th>Driver</th>
<th>Firmware</th>
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<th>Universal Boot</th>
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<td>3.11a5</td>
<td>5.02a1</td>
<td>2.2.39</td>
<td>3.4a16</td>
</tr>
</tbody>
</table>

VMWare

HP fully supports the use of Windows and Linux as a guest on VMware ESX versions 2.5.x and 3.x. When running VMware, fibre channel HBAs are supported by in-box drivers supplied with ESX. Windows and Linux FC HBA drivers are not used on the Virtual O/S.

**NOTE:**
You do not need to install the Emulex driver since it is shipped in-box with the ESX server.

To insure that your HBA is fully supported by HP and VMware, refer to one of the websites below:
For VMware ESX version 3.x, see the website:
For VMware ESX version 2.5.x, see the website:
http://www.vmware.com/support/pubs/esx_pubs.html

Table 9 This table lists minimum software support with the following 2.4 versions of x86 ESX server: 3.5 U2 build 110268

<table>
<thead>
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<th>HBA</th>
<th>Driver</th>
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<th>BIOS</th>
<th>Universal Boot</th>
<th>HBAnyware</th>
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### Table 10
This table lists minimum software support with the following 2.4 versions of x86 ESX server: 3.5 U3 build 123630

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<td>2.01a2</td>
<td>5.03a0</td>
<td>2.1a42</td>
</tr>
<tr>
<td>FC2243 (AD168A)</td>
<td>7.4.0.13-2</td>
<td>2.72a2</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>2.1a42</td>
</tr>
<tr>
<td>FC2143 (AD167A)</td>
<td>7.4.0.13-2</td>
<td>2.72a2</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>2.1a42</td>
</tr>
<tr>
<td>LPe1105 (403621-B21)</td>
<td>7.4.0.13-2</td>
<td>2.72a2</td>
<td>3.00a4</td>
<td>6.00a5</td>
<td>2.1a42</td>
</tr>
</tbody>
</table>

### Table 11
This table lists minimum software support with the following 2.4 versions of x86 ESX server: 3.5 U4.

<table>
<thead>
<tr>
<th>HBA</th>
<th>Driver</th>
<th>Firmware</th>
<th>BIOS</th>
<th>Universal Boot</th>
<th>HBAAnyware</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPe12000 (AJ762A)</td>
<td>7.4.0.39</td>
<td>1.00a9</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>2.1a42</td>
</tr>
<tr>
<td>LPe12002 (AJ763A)</td>
<td>7.4.0.39</td>
<td>1.00a9</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>2.1a42</td>
</tr>
<tr>
<td>FC2242SR (A8003A)</td>
<td>7.4.0.39</td>
<td>2.72a2</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>2.1a42</td>
</tr>
<tr>
<td>FC2142SR (A8002A)</td>
<td>7.4.0.39</td>
<td>2.72a2</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>2.1a42</td>
</tr>
<tr>
<td>FC2243 (AD168A)</td>
<td>7.4.0.39</td>
<td>2.72a2</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>2.1a42</td>
</tr>
<tr>
<td>FC2143 (AD167A)</td>
<td>7.4.0.39</td>
<td>2.72a2</td>
<td>2.01a2</td>
<td>5.03a0</td>
<td>2.1a42</td>
</tr>
<tr>
<td>LPe1105 (403621-B21)</td>
<td>7.4.0.39</td>
<td>2.72a2</td>
<td>3.00a4</td>
<td>6.00a5</td>
<td>2.1a42</td>
</tr>
</tbody>
</table>

1The Emulex driver is shipped with the ESX server. The driver does not require installation.

### Boot from SAN on VMware

Installing the Linux device driver using Red Hat in-box driver

For instructions on how to install Linux while using the in-box drivers, see the HP website: http://www.hp.com, then search for device mapper + boot + san.

You will need to install the HP-supplied Device Mapper Multipath Kit, after installing the operating system, should a multiple path redundancy need exist. See the HP website: http://www.hp.com/go/deicemapper

You will also need to install the new hp-fc-enablement kit, after installing the operating system.

HP Fibre Channel Enablement Kit

The HP Fibre Channel Enablement Kit provides additional libraries and configuration utilities to enable HP StorageWorks fibre channel storage arrays to work with Linux. The Fibre Channel Enablement Kit is not required to use the lpfc and qla2xxx kernel modules but it does provide configuration scripts to make sure that they the correct settings to work with HP StorageWorks fibre channel arrays. The Fibre Channel Enablement kit also sets the correct lpfc and qla2xxx kernel module setting that are used with Device Mapper Multipathing.

**NOTE:**

If you are using any HP management applications you will need the HBAAPI libraries that come with the hp-fc-enablement RPM.

Installing the HP Fibre Channel Enablement Kit

To install the HP Fibre Channel Enablement Kit, do the following:

1. Download the hp-fc-enablement-yyyy-mm-dd.tar.gz file for your operating system and copy it to the target server
2. Untar the enablement kit by executing the command to create the directory, hp-fc-enablement-yyyy-mm-dd.
   
   # tar zxf hp-fc-enablement-yyyy-mm-dd.tar.gz

3. Browse to the directory hp-fc-enablement-yyyy-mm-dd.
4. Do one of the following to execute the install.sh script.

   a. If you are not using Device Mapper multipathing execute the following command:
      
      # ./install.sh -s

   b. If you are using Device Mapper multipathing execute the following command:
      
      # ./install.sh -m

   The hp-fc-enablement and fibreutils RPMs should be installed once this install completes. To verify the installation, enter the following commands:

   # rpm -q hp-fc-enablement
   # rpm -q fibreutils
NOTE:
For use with the driver that comes with the kernel you will need fibreutils 3.x or greater.

Uninstall

To uninstall the Fibre Channel Enablement Kit, untar the kit as mentioned in the installation steps 1 through 3, then execute the `install.sh` script with the following flag:

```
# ./install.sh -u
```

To uninstall the RPMs in the enablement kit manually, enter the commands:

```
# rpm -e hp-fc-enablement
# rpm -e fibreutils
```

Installing the Linux device driver using the HP Kit (pre RHEL5 U3)

HP does not support building the `lpfc` driver from source code. The driver versions for kernel-based distributions are as follows:

- Driver 7.x.x for the 2.4 kernel
- Driver 8.x.x.x for the 2.6 kernel

To install the Linux driver:

- Download the appropriate driver kit for your distribution where the driver kit file will be in the form of `hp-lpfc-yyyy-mm-dd.tar.gz`.
- Copy the driver kit to the target system.
- Uncompress and untar the driver kit by using the command `# tar zxvf hp-lpfc-yyyy-mm-dd.tar.gz`.
- Change directory to the `hp-lpfc-yyyy-mm-dd` directory.
- The `INSTALL` command syntax will vary depending on your configuration. Use the `-h` option of the `INSTALL` script for a list of all supported arguments. If you have a previous driver kit installed, you can invoke the `INSTALL` command without any arguments as the script will use the currently loaded configuration:

```
# ./INSTALL
```

**For SLES 10 SP1 only:** `#./INSTALL -p`

If you want to force the installation to failover mode, use the `-m` flag:

**For SLES 10 SP1 only:** `#./INSTALL -mp`

- If you want to force the installation to single-path mode, use the `-s` flag:

```
# ./INSTALL -s
```

**For SLES 10 SP1 only:** `#./INSTALL -sp`

The `INSTALL` script will install the appropriate driver RPM for your configuration, as well as the appropriate fibreutils RPM. Once the `INSTALL` script is finished, you will either have to reload the Emulex driver modules (`lpfc`, `lpfcdfc` and `lpfcmpl`) or reboot your server. To unload the driver, enter the following command:

```
```
# modprobe –r lpfcmpl

**NOTE:**
modprobe –r lpfcmpl is for MultiPulse configuration only.

# modprobe –r lpfcdfc

**NOTE:**
modprobe –r lpfcdfc is for RHEL 4 Ux and SLES 9SPx.

# modprobe –r lpfc
The commands to load the driver are:
# modprobe lpfc
# modprobe lpfcdfc

**NOTE:**
modprobe lpfcdfc is for RHEL 4 Ux and SLES 9SPx.

# modprobe lpfcmpl

**NOTE:**
modprobe lpfcmpl is for MultiPulse configuration only.

The command to reboot the server is:
# reboot
If your boot device is a SAN attached device, you will have to reboot your server.
To verify what RPM driver version is installed, use the RPM command with the –q option.
# rpm -q hp-lpfc
# rpm -q hp-multipulse
For MultiPulse configuration only:
# rpm -q fibreutils

### Installing HBAnyware on Linux

To install HBAnyware on a Linux system:
1. Download the file HP_ElxApps-<Kernel Version>-<HBAnyware Version>-<Driver Version>.zip to the target system.

Example: HP_ElxApps-26-3.2a16-8.1.10.11.zip

⚠️ NOTE:
Please refer to Table 1, 2, 3, 4 and 5 for HBAnyware and driver version information. Kernel Version: 26 for 2.6 kernels and Kernel Version 24 for 2.4 kernels.

2. Unzip the file on the target system.

Example 1.

# unzip HP_ElxApps-26-3.2a16-8.1.10.11.zip

3. Make the file executable under Linux.

Example 2.

# chmod +x HP_ElxApps-26-3.2a16-8.1.10.11.bin

4. Install the application.

Example: #./HP_ElxApps-26-3.2a16-8.1.10.11.bin

5. Launch the application.

Example: # HBAnyware or # /usr/sbin/hbanyware/hbanyware

⚠️ NOTE:
Refer to application’s online help for more information.

HBAnyware 3.4a16 has a known presentation issue with the 8.0.16.40 driver along with the AJ762A and AJ763A HBAs. The link speed is not displayed. This will be fixed in a future release.

### Installing HBAnyware on VMware

To install HBAnyware on a VMware system, do the following:

1. Log in as root.
2. Copy the following file to a directory on the install machine.

   elxvmwarecorekit-.rpm

3. Browse to the directory where you installed the rpm file.
4. Enter the following command to install the rpm:

   rpm -i elxvmwarecorekit-.i386.rpm

   For example: rpm -i elxvmwarecorekit-4.0a27-2.i386.rpm

   The rpm contents is installed in /usr/sbin/hbanyware.

   The hbacmd utility is also in /usr/sbin/hbanyware.

   The README is installed in /usr/share/doc/elxvmwarecorekit-.

   For information about HBAnyware and hbacmd, see the README file in the directory /usr/sbin/hbanyware/README.txt.
Uninstalling HBAnyware on VMware

Instructions on uninstalling HBAnyware are as follows:

1. Log in as root.
2. Enter the following command to verify that this kit is installed:
   \texttt{rpm -q elxvmwarecorekit}
3. Enter the following command to uninstall HBAnyware on VMware
   \texttt{rpm -e elxvmwarecorekit-<kit version>}

Important information

Restrictions

This section describes restrictions that apply to Linux and this release of HBAs:

- SuSE 10 SP1 has a known issue related to boot hang and \texttt{udev} timeout. To correct the issue, use the \texttt{./INSTALL} script with the \texttt{-p} flag. See the above section, “Installing the Linux device driver using the HP kit” on page 11 for more installation options.
- SLES 10 SP2 has an issue displaying 8Gb HBA speed. You can fix the issue with kernel version 2.6.16.60-0.25.
- The Emulex MultiPulse 2.2.22 2.2.38 and 2.2.39 drivers only supports active/active storage arrays.
- If using MultiPulse 2.1.x, you can have a maximum of four physical paths to a LUN. More than four paths can cause a failure.
- If using MultiPulse 2.2.x, you can have a maximum of eight physical paths to a LUN. More than eight paths can cause improper failure.
- Because the order in which a switch reports fibre channel ports to a name server can vary, the order in which LUNs are discovered can vary between system boots. Use a LUN persistency tool to ensure that the name of a device does not change between system boots.
  HP recommends that you use the \texttt{Udev} utility to ensure that the name of a device does not change between system boots. For detailed information, see the website: \url{http://www.kernel.org/pub/linux/utils/kernel/hotplug/udev.html}.
- When using MultiPulse with SUSE Linux systems in Boot from SAN configurations, HP recommends that you use the \texttt{Udev} utility to ensure that your system successfully boots. For detailed information about this procedure, see “Using the Udev utility with SUSE Linux systems” in the Booting Itanium Linux systems from a storage area network application notes, available on the website: \url{http://h18006.www1.hp.com/storage/saninfrastructure.html}.
- Boot from SAN is not supported on the A8002A with RHEL 4 U3 and U4, ia64, or SLES 10 IA64.
- Boot from SAN is not supported on the AJ762A and AJ763A with RHEL 4 U5, SLES9 SP3 and SLES10 SP1.
- Boot from SAN is not supported with DL160G5 servers or the HP Emulex LPe12000/LPe12002. A fix will be available in a later version of the x86 HBA BIOS.
- If you are installing the Linux operating system for the first time, load the operating system and then download and install the supported Linux HBA driver from the HP website: \url{http://welcome.hp.com/country/us/en/support.html}.
- XP LUNs presented to Linux hosts must start with LUN 0.
MultiPulse can coexist with multipathing products such as Emulex failover driver and Secure Path. However, note that MultiPulse only works with Emulex-based HBAs; it will not configure multiple paths for other HBAs in the system.


No more than 10 targets are supported in a BFS zone.

On a sx2000 system with the default logging level, a Call Trace may appear in the /var/log/messages file during failover events.

When running the scsi_info command on older XP arrays such as XP1024/128, you may see output similar to that shown in the following example. Ignore the error, and note that the XP array’s WWN is not all zeros.

The XP array returns INQUIRY data that differs slightly from that returned by EVA or MSA arrays.

```
[root@coco /]# scsi_info /dev/sdal SCSI_ID="4,0,8,0":
VENDOR="HP":MODEL="OPEN-E":FW_REV="5005":WWN="0000000000000000":LUN="5235303020303030-3130353930203030"
[root@coco /]# scsi_info /dev/sdam
SCSI_ID="4,0,8,1":VENDOR="HP":MODEL="OPEN-E":FW_REV="5005":WWN="0000000000000000":LUN="5235303020303030-3130353930203030"
[root@coco /]# scsi_info /dev/sdan
SCSI_ID="4,0,9,0":VENDOR="HP":MODEL="OPEN-3":FW_REV="2114":WWN="0300000000002018e9":LUN="5234353120303030-333031303203030"
[root@coco /]# scsi_info /dev/sdao SCSI_ID="4,0,9,1":VENDOR="HP":MODEL="OPEN-3":FW_REV="2114":WWN="0b00000000600000":LUN="5234353120303030-333031303203030"
```

Starting with RHEL 5 U3 and SLES 10 SP3 active/passive arrays will not be supported.

Installing PSP 7.91/92 causes fibreutils to downgrade. Re-install fibreutils rpm from the downloaded kit.

Example:
```
# rpm -Fvh fibreutils.<version>.linux.<arch>.rpm
```

When an EVA 4400 with embedded switch is configured in a Heterogeneous SAN, HP recommends editing the HBA config file:

```
# Edit /etc/modprobe.conf with your favorite editor.
options lpfcmpl mpl_hbeat_tmo_busy=0 Save the file, then run the make_initrd script.
# /opt/hp/hp-lpfc/make_initrd
Reboot your server with the correct initrd.
```

EVA 4400 with embedded switch is not currently supported with SLES 9 SP4.

Dynamic LUN addition and removal are both supported. However, the ability to dynamically add a new LUN (or a LUN that had been previously removed) using the LUN number of a previously removed LUN is not supported, nor is dynamic target addition, which is defined as adding a new fibre channel target (such as adding a new storage array) to a SAN, presenting that new target
to a fibre channel host bus adapter, and then prompting the operating system to do an online
scan (such as using the hp_rescan utility that comes with fibreutils). This functionality is not supported
with the Emulex failover driver (MultiPulse). If you add a new fibre channel target to a host server,
you must reboot that host server.

- VMware ESX 3.x.x is not supported on the IA64 architecture.
- Emulex HBA driver 7.4.0.39 is needed to support Emulex switch firmware 8.0.2.2.0.

**FC2142SR and FC2242SR HBAs for Linux on ProLiant systems**

HP ProLiant DL380 (G4) servers must have Systems ROMPaq Firmware 4.05 P51-08/16/2005 or
later to be compatible with the FC2142SR and FC2242SR. Failure to use this ROMPaq version can
cause the HBAs to hang during the power-on self-test (POST). For detailed information, see http://

**Compatibility and interoperability**

- The HBAs support the servers and switches described in “Devices supported” on page 4, and
  support the operating systems described in “Operating systems” on page 5.
- HP recommends that you implement zoning with HBAs, as described in the HP StorageWorks
san/documentation.html.

**Determining the current version**

This section describes how to determine the HBA driver and firmware versions.

**2.4 kernels**

To view driver and firmware information:

1. Go to the /proc/scsi/lpfc directory to view a list of SCSI HBAs. A numbered file (such as
   0 or 1) represents each HBA on the system.
2. Open the file to view the version information.

**2.6 kernels**

To view driver and firmware information:

1. Go to the /sys/class/scsi_host directory to view a list of SCSI HBAs. A numbered file
   (such as host0 or host1) represents each HBA on the system.
   - Review the following files for version information:
     lpfc_drvr_version contains driver information.
     fwrev contains firmware information.

**Effective date**

March 2009