Boot Code

User Manual

For Emulex® Adapters

P003410-01A Rev. A

Critical Connectivity Solutions™

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Introduction

This manual describes installing, updating, enabling and configuring Emulex® Fibre Channel (FC) boot code. This manual also describes the Emulex-boot-from-SAN implementation and its operation with distinct hardware and operating system requirements. Boot from SAN is booting servers directly from disk operating system images located on a storage area network (SAN) by way of Emulex LightPulse® adapters using Emulex FC boot code.

When booting from SAN, the storage device is typically identified by its World Wide Port Name (WWPN) and a logical unit number (LUN). By extending the server system boot basic input/output system (BIOS), boot from SAN functionality is provided by the boot BIOS contained on an Emulex adapter in the server. When properly configured, the adapter then permanently directs the server to boot from a logical unit (disk) on the SAN as if it were a local disk.

Emulex provides the following types of boot code:

- x86 BootBIOS works with the existing BIOS on x64 and x86 systems.
- OpenBoot works with the existing system firmware on Sun SPARC systems. OpenBoot is also called FCode.
- EFIBoot provides system boot capability through the use of the EFI (Extensible Firmware Interface) Shell.

Note: Emulex drivers support multipath boot configurations. Refer to your storage vendor's documentation for details on how to configure multipath booting.

Emulex Boot Code Files

Emulex provides *Universal Boot* and *Pair Boot* code images that contain multiple types of boot code. These images provide multi-platform support for boot from SAN. Universal Boot and Pair Boot transparently determine your system platform type and automatically execute the proper boot code image in the adapter. These code images reside in adapter flash memory, allowing easier adapter portability and configuration between servers.

Universal Boot contains the following types of boot code:

- x86 BootBIOS
- OpenBoot
- EFIBoot

Pair Boot contains the following types of boot code:

- x86 BootBIOS
- EFIBoot

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Boot from SAN

This document provides instructions for installing and using all of the types of boot code provided by Emulex.

Note: Note that not all procedures are required. Emulex HBAs usually ship from the factory with the latest version of boot code installed and enabled, so you would not need to install or enable boot code in those cases. However, if boot code is not installed, you must install it, and if it is not enabled, you must enable it. And you may want to update the boot code if a newer version is available on the Emulex Web site at http://www.emulex.com.

This section describes how to set up a system to boot from SAN. This specific procedure to follow is determined by the system architecture and the operating system.

Table 1: Boot from SAN Procedures

Architecture	Operating System	Procedure
x86 and x64	Windows 2008	*Configure Boot from SAN on Windows Server 2008 and Windows Server 2003 (x86 and x64)* on page 3
	Windows 2003	
	Linux	*Configure Boot from SAN on Linux or VMware (x86 and x64)* on page 5
	VMware	
	Solaris (SFS driver)	*Configure Boot from SAN on Linux or VMware (x86 and x64)* on page 5
SPARC and PowerPC	Linux	*Configure Boot from SAN on Linux (PowerPC)* on page 6
	Solaris (SFS driver)	*Configure Boot from SAN on Solaris SFS (SPARC)* on page 7
	Solaris (LPFC driver)	*Configure Boot from SAN on Solaris LPFC (SPARC)* on page 8
Itanium (IA64) and EFI-based systems	Windows 2008 Windows 2003	*Configure Boot from SAN on Windows Server 2008 and Windows Server 2003 (Itanium)* on page 3
	Linux	*Configure Boot from SAN on Linux (Itanium)* on page 6

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Windows Server 2008 and Windows Server 2003

Configure Boot from SAN on Windows Server 2008 and Windows Server 2003 (x86 and x64)

1. If necessary, install or update the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
2. If necessary, enable the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
3. Enable the adapter to boot from SAN (see *Enabling an Adapter to Boot from SAN* on page 19).
4. By default, the boot adapter uses auto topology with loop first. If you want to set the boot adapter to use a different topology, change it (see *Changing Topology* on page 21).
5. Configure boot devices (see *Configuring Boot Devices* on page 15).
6. If desired, configure the boot options on the adapter (see *Configuring Adapter Parameters* on page 18).
7. Install the operating system on an FC boot disk:
    - For Windows Server 2008, see *Install Windows Server 2008 on an FC Boot Disk (x86, x64 and Itanium)* on page 3.
    - For Windows Server 2003, see *Install Windows Server 2003 on an FC Boot Disk (x86, x64 and Itanium)* on page 4.

Configure Boot from SAN on Windows Server 2008 and Windows Server 2003 (Itanium)

1. If necessary, install or update the boot code on the adapter (see *Updating a Single Adapter* on page 49).
2. If necessary, enable the boot code on the adapter (see *Enable or Disable the BIOS* on page 32).
3. Configure boot devices (see *Configure Boot Devices* on page 40).
4. If desired, configure the boot options on the adapter (see *Configure Adapter Parameters* on page 33 and *Configure Boot Parameters* on page 36).
5. Install the operating system on an FC boot disk:
    - For Windows Server 2008, see *Configure Boot from SAN on Windows Server 2008 and Windows Server 2003 (x86 and x64)* on page 3.
    - For Windows Server 2003, see *Configure Boot from SAN on Windows Server 2008 and Windows Server 2003 (x86 and x64)* on page 3.

Install Windows Server 2008 on an FC Boot Disk (x86, x64 and Itanium)

This procedure installs Windows Server 2008 onto an unformatted Fibre Channel disk drive and configures the system to boot from the SAN disk drive.

Note: The computer's system BIOS may require that another controller take precedence over the Emulex adapter during boot. If this occurs, you must disconnect or disable the other adapter. This will allow you to configure and build your operating system on the drive connected to the Emulex adapter.

1. From http://www.emulex.com, download the distribution executable file for the latest version of the Emulex driver to your local drive. The file you download is an executable (.exe) file.

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2. In Windows Explorer, double-click the distribution executable file. A window displays the driver version information.
3. Click **Next** to access the Location window, or click **Cancel** to close the window. If you click **Next**, the default installation location is displayed. If desired, browse to a different location.
4. Click **Install** to continue the installation. A progress window is displayed. As each task is completed, the corresponding checkbox is automatically selected. After all tasks are completed, a confirmation window is displayed.
5. Clear the Run AutoPilot Installer checkbox and click **Finish** to close the distribution executable file.
6. In Windows Explorer, navigate to the folder you specified in step 3.
7. In the \AutoPilot Installer\Drivers*drivername* folder, open the folder that corresponds to your computer type, such as x86. *drivername* is the type of driver you downloaded (for example, Storport Miniport).
8. Copy all the files in this folder onto a formatted floppy disk or a USB device.
9. Boot the target system with the Windows Server 2008 setup media. The Install Windows splash screen is displayed.
10. Verify and if necessary change the Language, Time and Date and Keyboard values. Click **Next**. Another splash screen is displayed.
11. Click **Install Now**. The Where do you want to install Windows? screen is displayed.
12. Click **Load Driver**. Browse to the floppy disk or USB device specified in step 8 where the driver is located to load the Storport Miniport driver for the appropriate Operating System. Once selected, the correct driver the location and driver are displayed under the Select driver to be installed screen.
13. Select **Next.** After the driver is loaded, the Where do you want to install Windows? screen is displayed.
14. Select the same drive you configured as the boot device (for x86 and x64 systems, see *Configuring Boot Devices* on page 15. For Itanium systems, see *Configuring Boot Devices* on page 15).

Install Windows Server 2003 on an FC Boot Disk (x86, x64 and Itanium)

This procedure installs Windows Server 2003 onto a previously unformatted Fibre Channel disk drive and configures the system to boot from the SAN disk.

Note: The computer's system BIOS may require that another controller take precedence over the Emulex adapter during boot. If this occurs, you must disconnect or disable the other adapter. This will allow you to configure and build your operating system on the drive connected to the Emulex adapter.

1. From http://www.emulex.com, download the distribution executable file for the latest version of the Emulex driver to your local drive. The file you download is an executable (.exe) file.
2. In Windows Explorer, double-click the distribution executable file. A window is displayed with driver version information.
3. Click **Next** to access the Location window, or click **Cancel** to close the window. If you click **Next**, the default installation location is displayed. If desired, browse to a different location.
4. Click **Install** to continue the installation. A progress window is displayed. As each task is completed, the corresponding checkbox is automatically selected. After all tasks are completed, a confirmation window is displayed.

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5. Clear the Run AutoPilot Installer checkbox and click **Finish** to close the distribution executable file.
6. In Windows Explorer, navigate to the folder you specified in step 3.
7. In the \AutoPilot Installer\Drivers*drivername* folder, open the folder that corresponds to your computer type, such as x86.*drivername* is the type of driver you downloaded (for example, Storport Miniport).
8. Copy all the files in this folder onto a formatted floppy disk or USB floppy.
9. Boot the target system with the Windows Server 2003 setup media.
10. Follow the prompts that appear on the screen until the following message is displayed:

```
Press F6 if you need to install a third party SCSI or RAID driver
```

11. Press **<F6>**. The following message is displayed:

```
Setup could not determine the type of one or more mass storage
devices installed on your system, or you have chosen to
manually specify an adapter.
Currently, Setup will load support for the following mass
storage devices(s):
<additional information>
S=Specify Additional Device    ENTER=continue  F3=Exit.
```

12. Press **<S>** to specify additional devices. The following message is displayed:

```
Please insert the disk labeled Manufacturer-supplied hardware
support disk into Drive A:. Press ENTER when ready.
ENTER=continue  ESC=cancel  F3=Exit
```

13. Insert the floppy disk or USB floppy onto which you copied the driver files in step 8 and press **<Enter>**. A list of devices is displayed.
14. Select the adapter from the list and press **<Enter>**. The following message is displayed:

```
Setup will load support for the following mass storage device(s):
Emulex xxxxx PCIxx Fibre Channel Adapter
```

15. Press **<Enter>**.
16. Remove the USB floppy or floppy disk that contains the driver files.
17. Follow the remaining prompts to complete the installation.

Linux and VMware

Configure Boot from SAN on Linux or VMware (x86 and x64)

1. If necessary, install or update the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
2. If necessary, enable the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
3. Enable the adapter to boot from SAN (see *Enabling an Adapter to Boot from SAN* on page 19).
4. By default, the boot adapter uses auto topology with loop first. If you want to set the boot adapter to use a different topology, change it (see *Changing Topology* on page 21).
5. Configure boot devices (see *Configuring Boot Devices* on page 15).
6. If desired, configure the boot options on the adapter (see *Configuring Adapter Parameters* on page 18).
7. Use the driver on the operating system distribution disk to boot the system. If necessary, you can then update the driver to the desired version.

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Configure Boot from SAN on Linux (PowerPC)

1. If necessary, install or update the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
2. If necessary, enable the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).

Note: If you are installing SLES 10, step 3 can be eliminated as the install process updates the system's boot order to point to the newly installed device.

3. See the system documentation for instructions on accessing the System Management Services (SMS) feature to set the boot list. SMS is resident in the system firmware.

Configure Boot from SAN on Linux (Itanium)

1. If necessary, install or update the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
2. If necessary, enable the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
3. Configure boot devices (see *Configure Boot Devices* on page 40).
4. If desired, configure the boot options on the adapter (see *Configure Adapter Parameters* on page 33 and *Configure Boot Parameters* on page 36).
5. Use the driver on the operating system distribution disk to boot the system. If necessary, you can then update the driver to the desired version.

Solaris

Configure Boot from SAN on Solaris SFS (x86 and x64)

1. If necessary, install or update the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
2. If necessary, enable the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
3. Enable the adapter to boot from SAN (see *Enabling an Adapter to Boot from SAN* on page 19).
4. By default, the boot adapter uses auto topology with loop first. If you want to set the boot adapter to use a different topology, change it (see *Changing Topology* on page 21).
5. Configure boot devices (see *Configuring Boot Devices* on page 15).
6. If desired, configure the boot options on the adapter (see *Configuring Adapter Parameters* on page 18).
7. Boot the Solaris installation CD and follow the prompts.

Note: If you need help determining the LUNs to select for boot from SAN, see *Determine LUNs to Select for Boot from SAN* on page 7

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Determine LUNs to Select for Boot from SAN

1. Open a terminal window and leave it open.
2. In the terminal window, select the LUN you are going to use as the SAN boot disk (not the local drive) using the **luxadm probe** command. This shows all the available LUNs. Record this LUN information, which is used throughout this procedure. LUN 0 is used in the example:

   ```
   luxadm probe

   Found Fibre Channel device(s):
    Node WWN:50060e8003823800 Device Type:Disk device
      Logical Path:/dev/rdsk/c5t226000C0FF9833AFd6s2
    Node WWN:50060e8003823800 Device Type:Disk device
      Logical Path:/dev/rdsk/c5t226000C0FF9833AFd6s2
   Node WWN:50060e8003823800 Device Type:Disk device
   ```

3. Copy the `/dev/rdsk/nnn` part of the path statement for a drive.
4. In the terminal window, use the **luxadm display** command to show the WWPN or the LUN for which you selected the path in the prior step:

   ```
   luxadm display </dev/rdsk/nnn>
   ```

5. Record this LUN or WWPN information for use in the procedure.

Configure Boot from SAN on Solaris SFS (SPARC)

1. If necessary, install or update the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
2. If necessary, enable the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
3. Type the following at the OBP prompt:

   ```
   show-devs
   ```

   The ID information for each found adapter is displayed, such as:

   ```
   /pci@5d,700000/lpfc@1
   ```

4. Enable boot from SAN on each Emulex adapter in the system by typing the following set of commands, replacing *adapter_id* with the ID information (such as shown above), for each Emulex adapter in turn. There is a space between the first quotation mark and the first character of the adapter ID.

   ```
   " adapter_id" select-dev [for example, " /pci@5d,700000/lpfc@1" select-dev]
   set-sfs-boot
   unselect-dev
   ```

5. After all Emulex adapters have been enabled to boot from SAN, reboot the system with the following command:

   ```
   reset-all
   ```

6. After the system reboots, boot the Solaris installation CD and follow the prompts.

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Configure Boot from SAN on Solaris LPFC (SPARC)

Note: Solaris PCI code is used in the example paths displayed in this section. You must enter similar path names, specific to your system. If you have a Solaris SBus system:
Change *pci* references to *sbus*
Change *emlx* references to *lpfs*
For example, the command to select the Emulex adapter for a PCI system (LPFC driver) is:
" /pci@1f,4000/emlx@2" select-dev
The corresponding command for an SBus system is:
" /sbus@1f,4000/lpfs@2" select-dev

1. If necessary, install or update the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
2. If necessary, enable the boot code on the adapter (see *Installing, Updating and Enabling Boot Code* on page 13).
3. Type the following at the OBP prompt:

   ```
   show-devs
   ```

   The ID information for each found adapter is displayed, such as:

   ```
   /pci@5d,700000/emlx@2
   ```

4. Enable boot from SAN on each Emulex adapter in the system by typing the following set of commands, replacing *adapter_id* with the ID information (such as shown above), for each Emulex adapter in turn. There is a space between the first quotation mark and the first character of the adapter ID.

   ```
   " adapter_id" select-dev [for example, " /pci@5d,700000/emlx@2" select-dev]
   set-sd-boot
   unselect-dev
   ```

5. After all Emulex adapters have been enabled to boot from SAN, reboot the system with the following command:

   ```
   reset-all
   ```

6. Install the operating system on an FC boot disk:
   - To install the operating system from a network image, see *Install Solaris from a Network Image* on page 8.
   - To migrate an operating system image from a local SCSI disk to an FC device, see *Install Solaris by Migrating an Image from a Local SCSI Disk* on page 10.

Install Solaris from a Network Image

The system must have a DVD drive and must be part of the site's network and naming service. If you use a naming service, the system must already be in a service, such as NIS, NIS+, DNS, or LDAP. If you do not use a naming service, you must distribute information about this system by following your site's policies.

Note: This procedure assumes that the system is running the Volume Manager. If you are not using the Volume Manager to manage media, refer to Sun Microsystems System Administration Guide: Devices and File Systems.

1. Log on as a superuser or equivalent.
2. Insert the Solaris DVD in the system's drive.
3. Create a directory to contain the DVD image.

   ```
   # mkdir -p install_dir_path
   ```


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Install_dir_path specifies the directory where the DVD image is to be copied.

4. Change to the Tools directory on the mounted disc.

```
# cd /cdrom/cdrom0/Solaris_10/Tools
```

Note: For Solaris 10 only: remove the SUNWemlxu and SUNWemlxs from the `/install_dir_path/Solaris/Tools/Boot`
Unzip the lpfc driver /temp
`pkgadd -R /install_dir_path/Solaris/Tools/Boot -d /temp`
Modify the lpfc.conf file to use persistent binding. For more information, refer to the Emulex LPFC Driver for Solaris User Manual.

5. Copy the DVD image in the drive to the install server's hard disk.

```
# ./setup_install_server install_dir_path
```

install_dir_path specifies the directory where the DVD image is to be copied.

Note: The setup_install_server command indicates whether you have enough disk space available for the Solaris Software disc images. To determine available disk space, use the df -kl command.

6. Decide whether you need to make the install server available for mounting:

If the install server is on the same subnet as the system to be installed or you are using DHCP, you do not need to create a boot server. Proceed to Step 7.

If the install server is not on the same subnet as the system to be installed and you are not using DHCP, complete the following steps.

- Verify that the path to the install server's image is shared appropriately.

```
# share | grep install_dir_path
```

install_dir_path specifies the path to the installation image where the DVD image was copied:

  - If the path to the install server's directory is displayed and anon=0 is displayed in the options, proceed to Step 7.
  - If the path to the install server's directory is not displayed or you do not have anon=0 in the options, continue and make the install server available to the boot server. Using the share command, add this entry to the /etc/dfs/dfstab file.
    `share -F nfs -o ro,anon=0 -d "install server directory" install_dir_path`

- Verify that the nfsd daemon is running.
  - If the install server is running the current Solaris release, or compatible version, type the following command.
    `# svcs -l svc:/network/nfs/server:default`

    If the nfsd daemon is online, continue to Step d. If the nfsd daemon is not online, start it.
    `# svcadm enable svc:/network/nfs/server`
  - If the install server is running the Solaris 9 OS, or compatible version, type the following command.
    `# ps -ef | grep nfsd`

    If the nfsd daemon is running, continue to Step d. If the nfsd daemon is not running, start it.
    `# /etc/init.d/nfs.server start`

- Share the install server.

```
# shareall
```

7. Change directories to root (/).

```
# cd /
```


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8. Eject the Solaris DVD.
9. (Optional) Patch the files that are located in the miniroot on the net install image that was created by setup_install_server. Patching a file might be necessary if a boot image has problems. Refer to the Sun Microsystems Solaris 10 10/08 Installation Guide.

Install Solaris by Migrating an Image from a Local SCSI Disk

1. Type the following at the OBP prompt:

   ```
   show-devs
   ```

   The ID information for each found adapter is displayed, such as:

   ```
   /pci@5d,700000/lpfc@1 select-dev
   ```

2. Select the Emulex adapter on which you want to enable boot from SAN by entering the path to the adapter, for example:

   ```
   " /pci@5d,700000/lpfc@1" select-dev
   ```

3. To view the current boot device ID, type:

   ```
   show-devs
   " /pci@5d,700000/lpfc@1" select-dev /* to select lpfc@1 (for example) */
   .boot-id
   ```

   Make a note of the WWPN, DID or ALPA returned from the probe and write down the corresponding boot entry.

4. To enable boot from SAN, set the boot device ID to the SAN device you want to boot from, for example:

   ```
   " /pci@5d,700000/lpfc@1" select-dev
   wwpn|did|alpa lun target_id set-boot-id
   unselect-dev
   ```

   where *wwpn*|*did*|*alpa* is the device WWPN, DID, or AL_PA of the storage device. *lun* is the LUN number in hexadecimal. To enter it in decimal, enter d# [*lun*]. *target_id* is the target ID in hexadecimal. To enter it in decimal, enter d# [*target_id*].

   Note: Emulex recommends using the WWPN in most cases. The DID and AL_PA may change between boots, causing the SAN boot to fail, unless the DID and AL_PA are specifically configured to not change between boots.

   Example 1: alpa=e1, lun=100 (decimal) and target id=10 (decimal):

   ```
   alpa e1 d# 100 d# 10 set-boot-id
   ```

   Example 2: wwpn=50000034987AFE, lun=af (hexadecimal) and target id=10 (decimal):

   ```
   wwpn 50000034987AFE af d# 10 set-boot-id
   ```

   Example 3: did=6312200, lun=25 (hexadecimal) and target id=f (hexadecimal):

   ```
   did 6312200 25 f set-boot-id
   ```

5. Boot to the original local disk to set up the newly defined FC disk. Type:

   ```
   boot local_disk
   ```

   where *local_disk* is the complete path or the alias of the original boot disk.

   Note: If the Fibre Channel disk is not found when the system is rebooted, enter `touch / reconfigure` and reboot. If the disk is still not discovered, edit the /kernel/drv/lpfc.conf file and change the topology from 4 to 2 (or from 2 to 4). It may also be necessary to add an entry for the boot drive to the sd.conf file.

6. Run the format utility:

   ```
   format
   ```


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7. Select the target disk which will become the new boot disk (for example, c1t1d0).
8. Select the partition option and partition the disk as desired.
9. Select the label option and write a volume label to the target disk.

   For help with the format utility, see the man page "man format".
10. Install the boot on partition 0 of the target disk. (Type this command as one line.)

```
installboot /usr/platform/ `uname -i`/lib/fs/ufs/bootblk /dev/rdsk/clt1d0s0
```

11. Create a filesystem for each partition that contains a mounted filesystem:

```
newfs -v /dev/rdsk/clt1d0s0 (becomes root)
newfs -v /dev/rdsk/clt1d0s6 (becomes usr)
newfs -v /dev/rdsk/clt1d0s7 (becomes export/home)
```

12. Create temporary mount points for the new partitions:

```
mkdir root2
mkdir usr2
mkdir export2
```

13. Mount, copy, then unmount the usr2 file system:

```
mount /dev/dsk/clt1d0s6 /usr2
c0t0d0s6 ufsdump 0f - /dev/rdsk/c0t0d0s6 | (cd /usr2; ufsrestore rf -)
umount /usr2
```

14. Copy the export/home file system:

```
mount /dev/dsk/clt1d0s7 /export2
ufsdump 0f - /dev/rdsk/c0t0d0s7 | (cd /export2; ufsrestore rf -)
umount /export2
```

15. Perform copy:

```
mount /dev/dsk/clt1d0s0 /root2
ufsdump 0f - /dev/rdsk/c0t0d0s0 | (cd /root2; ufsrestore rf -)
```

16. Edit /root2/etc/vfstab, changing the controller number, target number and LUN number to point to the new Fibre Channel boot disk. For example, if the Fibre Channel boot disk is c1t1d0, replace all local disk entries of c0t0d0 with c1t1d0.

Currently file shows:

```
/dev/dsk/c0t0d0s1 (swap)

/dev/dsk/c0t0d0s0 and /dev/rdsk/c0t0d0s0 (root)
/dev/dsk/c0t0d0s6 and /dev/rdsk/c0t0d0s6 (usr)
/dev/dsk/c0t0d0s7 and /dev/rdsk/c0t0d0s7 (export)
```

Edit file to show:

```
/dev/dsk/c1t1d1s1 (swap)

/dev/dsk/clt1d0s0 and /dev/rdsk/c1t1d0s1 (root)
/dev/dsk/clt1d0s6 and /dev/rdsk/c1t1d0s6 (usr)
/dev/dsk/clt1d0s7 and /dev/rdsk/c1t1d0s7 (export)
```

17. Reboot the system:

```
sync
sync
halt
reset-all
```


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18. Boot to disk:

    ```
    boot disk
    ```

    The system should boot to the Fibre Channel disk.

19. View the current dump device setting:

    ```
    dumpadm
    ```

20. Change the dump device to the swap area of the Fibre Channel drive:

    ```
    dumpadm -d /dev/dsk/c1t1d0s1
    ```

    where /dev/dsk/c1t1d0s1 is a sample path to the swap area of the Fibre Channel drive.

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Installing, Updating and Enabling Boot Code

A variety of Emulex utilities allow you to install boot code, update boot code to a newer version and enable boot code. The utility that you will use depends on the operating system and, in some cases the driver type or system architecture. Table 2 indicates the utilities you can use to install and update boot code, and Table 3 indicates the utilities you can use to enable boot code.

Table 2. Utilities that Install and Update Boot Code

Operating System	HBAnyware Utility	HBAcmd Utility	EFI Utility	emlxadm	Offline Utilities
Windows	X	X	X		X
Linux	X	X	X		X
Solaris LPFC	X	X			X
Solaris emlxs (SFS)	X	X		X	
VMWare	X	X			X

After you decide which utility to use, see the appropriate procedure:

- HBAnyware utility: See the *HBAnyware Utility User Manual*.
- HBAcmd utility: See the *HBAnyware Utility User Manual*.
- EFI utility: See EFIBoot on page 29
- emlxadm: See the *FCA Utilities User Manual*.
- Offline utility: See the *Offline Utilities User Manual.*

Table 3. Utilities that Enable Boot Code

Operating System	HBAnyware Utility	HBAcmd Utility	EFI Utility	Offline Utilities
Windows	X	X	X	X
Linux	X	X	X	X
Solaris LPFC	X	X		X
Solaris emlxs (SFS)[a]				
VMware	X	X		

a. Boot code for Solaris emlxs (SFS) systems in enabled automatically when it is installed, so no utility is needed.

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BIOS Utility

Before using the BIOS utility, ensure that the boot code is loaded and enabled on the adapter as described in *Installing, Updating and Enabling Boot Code* on page 13.

Note: This section reflects the most recent release of the BIOS utility. Some selections may not be available if you are using an older version of the utility.

Starting the BIOS Utility

1. Turn on the computer.
2. Press and hold down **<Alt>** or **<Ctrl>** and press **<E>** immediately (within five seconds) when the bootup message to start the BIOS utility is displayed. An adapter listing is displayed (Figure 1).

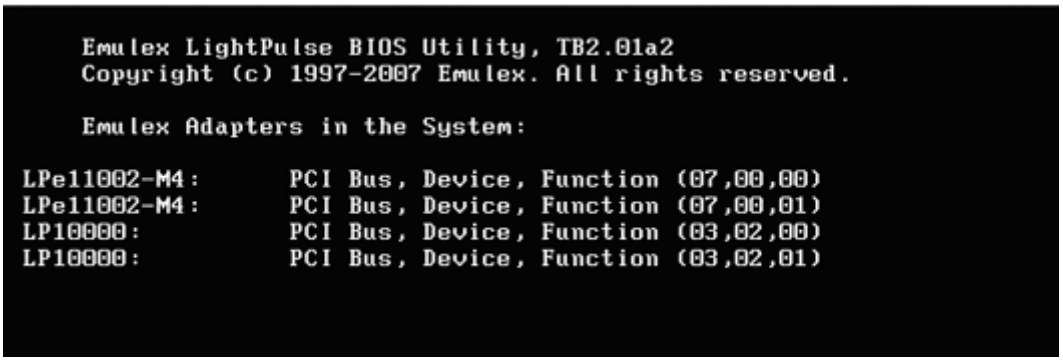

Figure 1: Adapter Listing screen

Note: If the bootup message does not appear, you must enable x86 BootBIOS. See *Enabling an Adapter to Boot from SAN* on page 19 for more information.

3. Select the adapter to configure by entering its number. The main configuration menu is displayed (Figure 2).

Figure 2: Main Configuration Menu

Under normal circumstances, the first procedure you will need to perform in the BIOS Utility is to configure boot devices (page 15). However, in the following two situations, you will need to perform the indicated procedure first:

- The adapter is not enabled to boot from SAN: You must enable the adapter's BIOS to boot from SAN (see "Enabling an Adapter to Boot from SAN" on page 19).
- You want to use a topology other than the default (auto topology with loop first): You must change the topology setting before boot devices (see "Changing Topology" on page 21).

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Configuring Boot Devices

This option supports FC_AL: (public and private loop) and fabric point-to-point. When operating in loop (FC_AL) topology, the system automatically determines whether you are configured for a public or private loop. The BIOS looks for a fabric loop (FL_Port) first. If a fabric loop is not detected, the BIOS looks for a private loop. For the "Configure Boot Devices" option, the eight boot entries are zero by default (<D> key).

To configure boot devices:

1. When the Main menu is displayed, select **<1>,** Configure Boot Devices.

   A list of 8 boot devices is shown (Figure 3). Emulex recommends that you configure only the bootable devices. The primary boot device is the first entry shown, and it is the first bootable device.

   If the first boot entry fails due to a hardware error, the system can boot from the second bootable entry. If the second boot entry fails, the system boots from the third bootable entry and so on.

Figure 3: List of Saved Boot Devices screen

2. Select a boot entry. Figure 4 is displayed.

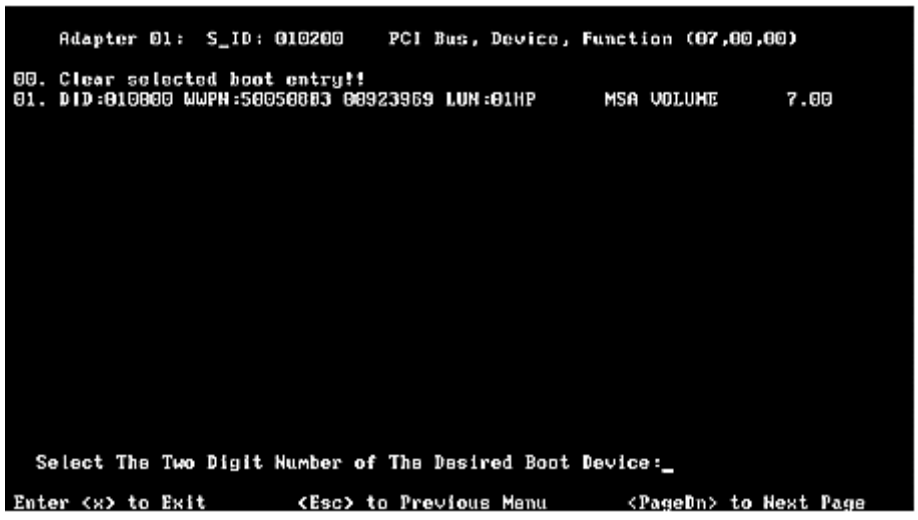

Figure 4: Device Selection list Example (Array) screen

> **Note:** To minimize the amount of time needed to locate the boot device, Emulex recommends that you select the drive with the lowest AL_PA as the boot device.

3. Select **<00>** to clear the selected boot entry, or select a device to configure booting by WWPN or DID.

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4. If you select a device, you are asked for the starting LUN. Enter the starting LUN (Figure 5). The starting LUN can be any number from 0 to 255.

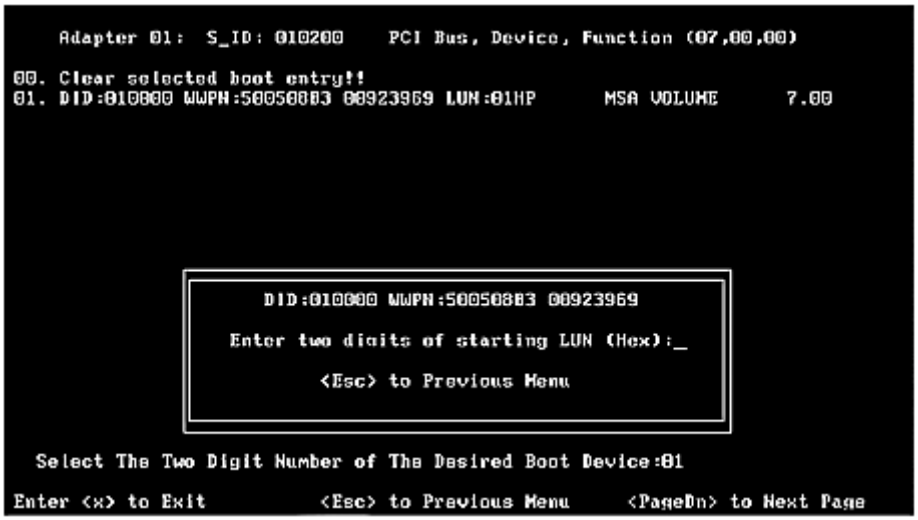

Figure 5: LUN listing screen

You can define a possible 256 LUNs per adapter, but the screen displays up to 16 consecutive LUNs at a time. In front of each entry, B#D or B#W specifies the boot entry number and whether the device boots by DID or WWPN. For example, B1D means that boot entry 1 boots from the-DID. B2W means that boot entry 2 boots from WWPN.

Type the two digits corresponding to the entry you are selecting. The boot device menu (Figure 6) displays the following options:

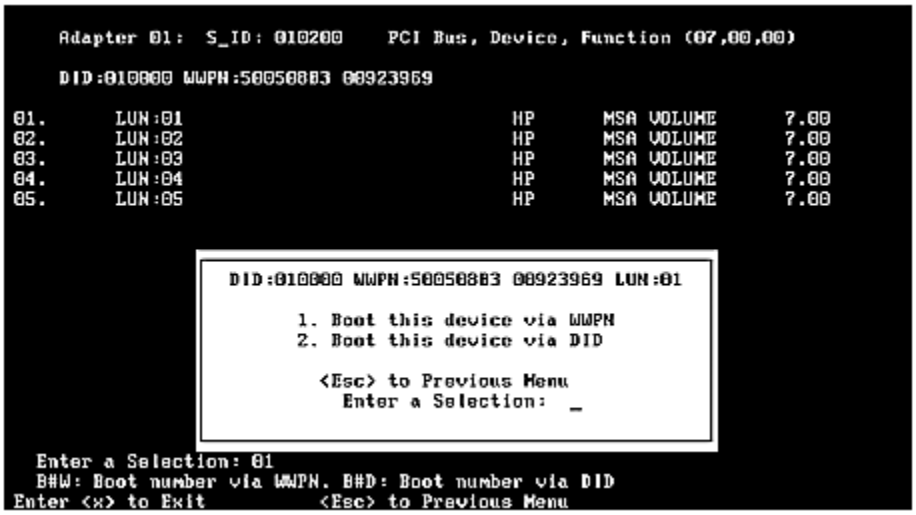

Figure 6: Boot Devices menu

1. Boot this device by WWPN
2. Boot this device by DID

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5. Select the boot method you want.

   If you select to boot the device by WWPN, the WWPN of the earlier selected entry is saved in the flash memory. However, during the initial BIOS scan, the utility issues a Name Server Inquiry GID_PN (Get Port Identifier). Then, based on this DID, it continues with the remainder of the scanning.

   If you select to boot this device by DID, the earlier selected entry is saved in the flash memory.

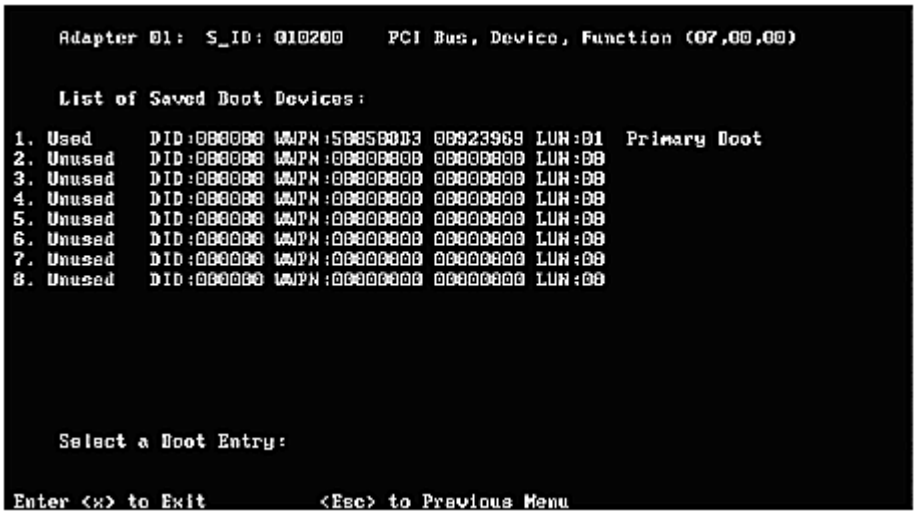

Figure 7: Primary Boot Device Set Up screen

6. Press **<X>** to exit and reboot the system for the new boot path to take effect.

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Configuring Adapter Parameters

Note: The default topology is auto topology with loop first. Change this topology setting, if necessary, before configuring boot devices.

To configure adapter parameters:

1. When the Main menu is displayed, select **<2>,** Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).

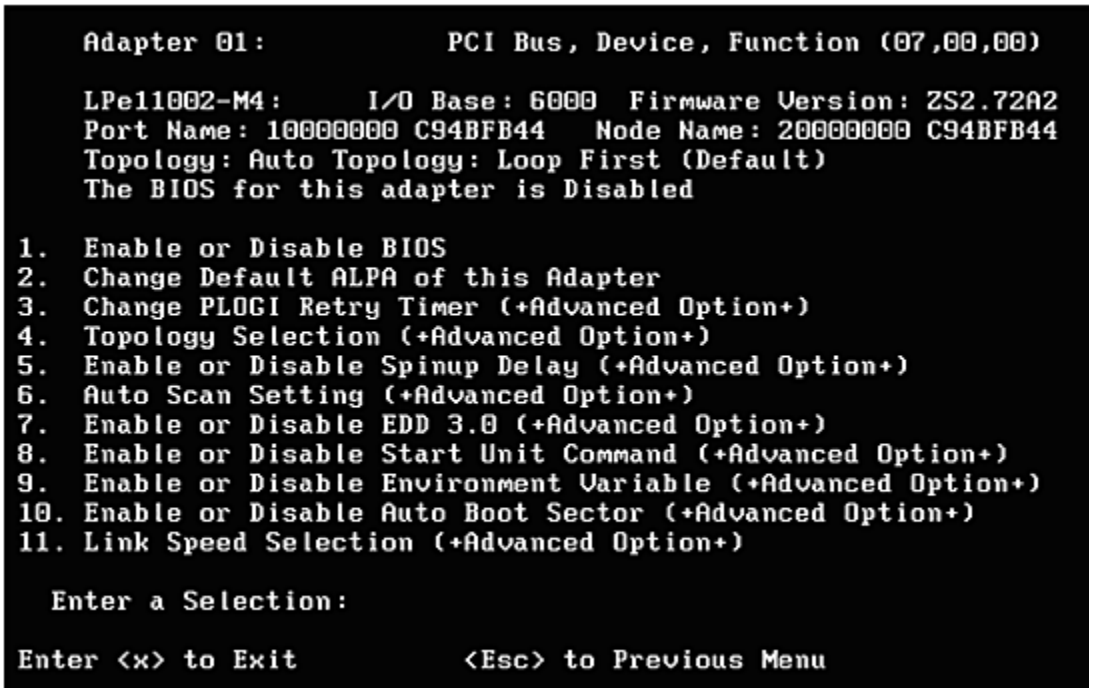

Figure 8: Adapter Configuration menu

Default settings are acceptable for most installations. In the BIOS utility, press <D> to reset the selected adapter to default values.

Adapter Configuration Menu Summaries

1. Enable or Disable BIOS. Enable the selected adapter to boot from SAN. You must enable at least one adapter to boot from SAN to use remote boot functionality.
2. Change Default ALPA of this Adapter. This option applies only to arbitrated loop (FC-AL). The factory default is 01 (hexadecimal). All adapters or boot drives can be configured to other AL_PAs (Arbitrated Loop Physical Address) rather than their default values. See *Changing the Default AL_PA* on page 20 for more information.
3. Change PLOGI Retry Timer (+Advanced Option+). Set the interval for the port log in retry timer. The factory default is No PLOGI Retry: 0 msec. See *Changing the PLOGI Retry Timer* on page 20 for more information.
4. Topology Selection (+Advanced Option+). If it is necessary to change the topology, do so before you configure boot devices. The default topology is auto topology with loop first. For FC-AL, each adapter has a default AL_PA of 01 (Hex). See *Changing Topology* on page 21 for more information.
5. Enable or Disable Spinup Delay (+Advanced Option+). Enable or disable the spinup delay. The factory default is disabled. See *Enabling or Disabling the Spinup Delay* on page 21 for more information.

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6. Auto Scan Setting (+Advanced Option+). Enable the first device in the boot entry list to issue a Name Server Inquiry. The factory default is disabled. If there is more than one adapter with the same PCI Bus number in the system, and each has a boot drive attached, the first PCI-scanned adapter is the boot adapter. The first adapter is usually in the lowest PCI slot in the system. This information can be viewed from the BIOS utility. See *Setting Auto Scan* on page 22 for more information.
7. Enable or Disable EDD 3.0 (+Advanced Option+). Enable or disable the Enhanced Disk Driver (EDD) option, which is available on Intel IA-64 servers only. The factory default is disabled. See *Enabling or Disabling EDD 3.0* on page 23 for more information.
8. Enable or Disable Start Unit Command (+Advanced Option+). You must know the specific LUN to issue the SCSI Start Unit Command. The factory default is disabled. See *Enabling or Disabling the Start Unit Command* on page 23 for more information.
9. Enable or Disable Environment Variable (+Advanced Option+). Enable or disable the ability to set the boot controller order, if the system supports the environment variable. The factory default is disabled. See *Enabling or Disabling the Environment Variable* on page 24 for more information.
10. Enable or Disable Auto Boot Sector (+Advanced Option+). (Applies only to HP MSA1000 arrays.) This option automatically defines the boot sector of the target disk for the migration boot process. The factory default is disabled. See *Enabling or Disabling Auto Boot Sector* on page 24 for more information.
11. Link Speed Selection (+Advanced Option+). Select the adapter link speed. The factory default is Auto Select. See *Selecting Link Speed* on page 25 for more information.

Enabling an Adapter to Boot from SAN

To enable an adapter to boot from SAN:

1. On the Adapter Configuration menu, select **<1>** Enable or Disable BIOS. The current status of the boot BIOS is displayed (Figure 14).

Figure 9: BIOS status screen

2. To enable the boot BIOS, select **<1>**, or to disable it, select **<2>**.

At least one adapter must be enabled to boot from SAN in order to use remote boot functionality.

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Changing the Default AL_PA

This option allows you to change the AL_PA of the selected adapter. The default value of the AL_PA for the adapter BIOS is 00 (hex).

Note: This option applies only to arbitrated loop (FC-AL).

To change the default AL_PA:

1. On the Main menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).
2. Select **<2>**, Change Default ALPA of this adapter. Figure 10 is displayed.

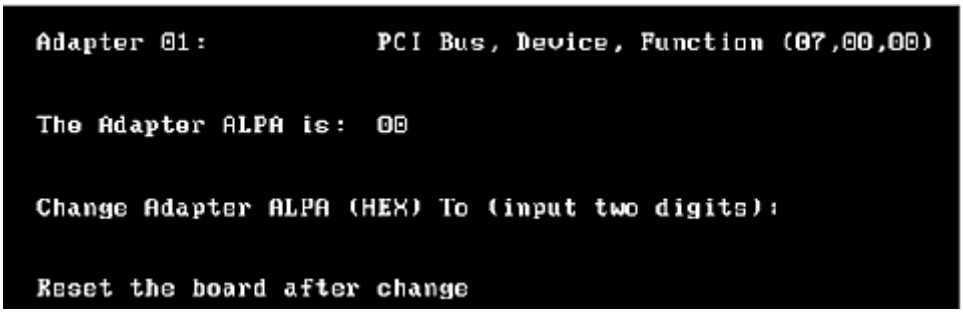

Figure 10: Change Default ALPA screen

3. Type the AL_PA, in hexadecimal notation, to the value you want to make the default.
4. Press **<X>** to exit the BIOS utility and reboot the system.

Note: If the adapter's AL_PA is changed, it does not show on the NVRAM AL_PA until the system has been reset.

Changing the PLOGI Retry Timer

This option allows you to set the interval for the PLOGI (port log in) retry timer. This option is especially useful for Tachyon-based RAID arrays. Rarely, a Tachyon-based RAID array resets itself and the port goes offline temporarily. When the port returns to operation, the PLOGI retry interval scans the loop to discover this device. This default setting is No PLOGI Retry: 0 msec.

To set the interval for the PLOGI retry timer:

1. On the Main menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).
2. Select **<3>**, Change PLOGI Retry Timer (+Advanced Option+). Figure 11 is displayed.

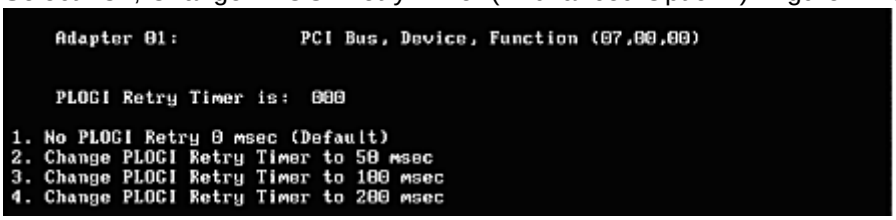

Figure 11: Change the PLOGI Retry Timer screen

3. Select the PLOGI retry timer interval. The time it takes for one PLOGI to scan the whole loop (if 126 AL_PAs are on the loop) is shown below:
    - 50 msec takes 5 to 6 seconds per device.
    - 100 msec takes 12 seconds per device.
    - 200 msec takes 22 seconds per device.

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4. Press **<X>** to exit the BIOS utility and reboot the system.

Changing Topology

Note: The default topology is auto topology with loop first. Change this topology setting, if necessary, before configuring boot devices.

To select the adapter topology:

1. On the Main menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).
2. Select **<4>**, Topology Selection (+Advanced Option+). Figure 12 is displayed.

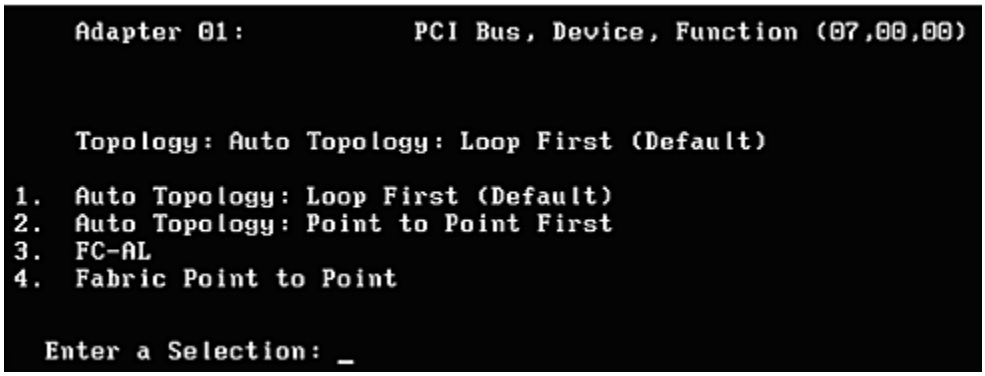

Figure 12: Topology menu

3. Select the topology for the adapter:
   - Select **<1>** for auto topology with loop first (default).
   - Select **<2>** for auto topology with point-to-point first.
   - Select **<3>** for FC-AL.
   - Select **<4>** for fabric point-to-point.
4. Press **<X>** to exit the BIOS utility and reboot the system.

Enabling or Disabling the Spinup Delay

This option allows you to enable or disable the spinup delay. The factory default setting is disabled.

If at least one boot device has been defined, and the spinup delay is enabled, the BIOS searches for the first available boot device.

- If a boot device is present, the BIOS boots from it immediately.
- If a boot device is not ready, the BIOS waits for the spinup delay and, for up to three additional minutes, continues the boot scanning algorithm to find another multi-boot device.

If no boot devices have been defined, and auto scan is enabled, then the BIOS waits for five minutes before scanning for devices.

- In a private loop, the BIOS attempts to boot from the lowest target AL_PA it finds.
- In an attached fabric, the BIOS attempts to boot from the first target found in the NameServer data.

To enable or disable the spinup delay:

1. On the Main Configuration menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).

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2. Select **<5>**, Enable or Disable Spinup Delay (+Advanced Option+) (Figure 13).

Figure 13: Enable or Disable Spinup Delay screen

3. Select **<1>** to enable the spinup delay, or select **<2>** to disable it.
4. Press **<X>** to exit the BIOS utility and reboot the system.

Setting Auto Scan

This option allows you to set auto scan. The factory default setting is disabled. Auto Scan is available only if none of the eight boot entries are configured to boot from DID or WWPN. Emulex strongly recommends that you use the Configure Boot Devices menu to configure eight boot entries for fabric point-to-point, public loop or private loop configurations. With auto scan enabled, the first device issues a Name Server Inquiry. The boot device is either the first DID, LUN 0, or not LUN 0 device returned, depending on the option you select. This device is the only boot device and it is the only device exported to the Multi-boot menu.

To set auto scan:

1. On the Main menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).
2. Select **<6>**, Auto Scan Setting (+Advanced Option+). Figure 14 is displayed.

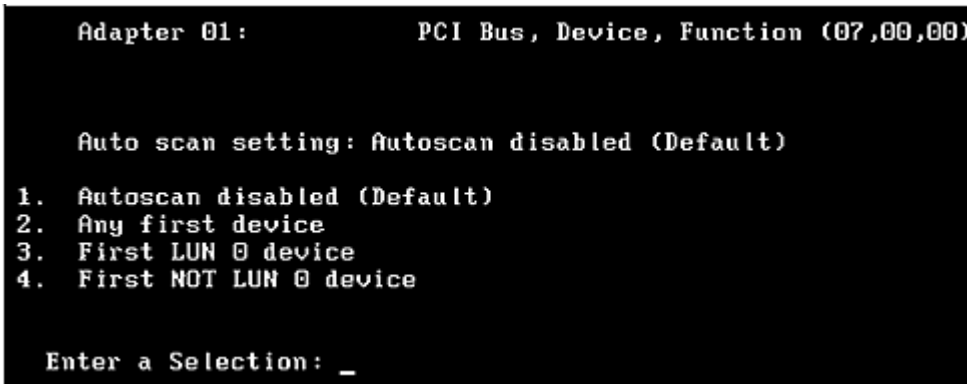

Figure 14: Set Auto Scan menu

3. Select the auto scan option:
   - Select **<1>** to disable auto scan.
   - Select **<2>** to scan for any first device.The first adapter issues a Name Server Inquiry and the first D_ID from the inquiry becomes the boot device. The adapter attempts to log in to a public loop first. If it fails, it logs in to a private loop. The first successfully scanned device becomes the boot device. This device only is exported to the multi-boot menu.
   - Select **<3>** to scan for the first LUN 0 device.
   - Select **<4>** to scan for the first device other than LUN 0.
4. Press **<X>** to exit the BIOS utility and reboot the system.

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Enabling or Disabling EDD 3.0

This option allows you to enable or disable the Enhanced Disk Drive (EDD) option, available on Intel Itanium servers only. Enabling EDD 3.0 displays the path to the boot device.The default setting is disabled.

Note: An x86 series system could hang during Windows 2000 Server installation if EDD 3.0 is enabled.

To enable or disable EDD 3.0:

1. On the Main menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).
2. Select **<7>**, Enable or Disable EDD 3.0 (+Advanced Option+). Figure 15 ia displayed.

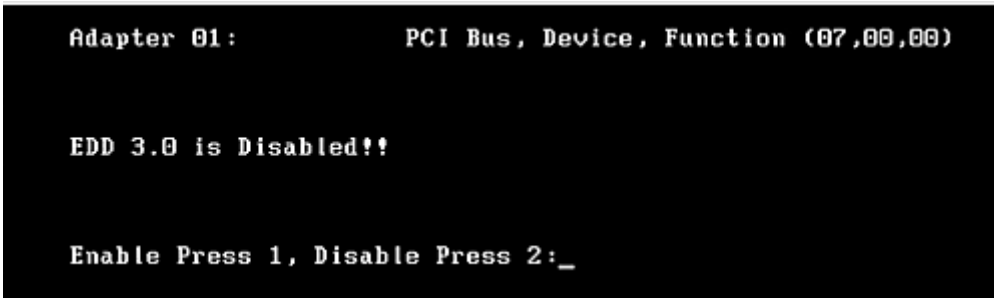

Figure 15: Enable or Disable EDD 3.0 screen

3. Select **<1>** to enable EDD 3.0, or press **<2>** to disable it.
4. Press **<X>** to exit the BIOS utility and reboot the system.

Enabling or Disabling the Start Unit Command

This command is used to issue the SCSI start unit command. You must know the specific LUN to issue the SCSI start unit command. The default setting is disabled.

To enable or disable the start unit command:

1. On the Main menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).
2. Select **<8>**, Enable or Disable Start Unit Command (+Advanced Option+) (Figure 16).

Figure 16: Enable or Disable Start Unit Command screen

3. Select **<1>** to enable the start unit command, or **<2>** to disable it.
4. Press **<X>** to exit the BIOS utility and reboot the system.

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Enabling or Disabling the Environment Variable

This option allows you to set the boot controller order if the system supports the environment variable. The default setting is disabled.

To enable or disable the environment variable:

1. On the Main menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).
2. Select **<9>**, Enable or Disable Environment Variable (+Advanced Option+) (Figure 17).

Figure 17: Enable or Disable Environment Variable screen

3. Select **<1>** to enable the environment variable, or **<2>** to disable it.
4. Press **<X>** to exit the BIOS utility and reboot the system.

Enabling or Disabling Auto Boot Sector

This option automatically defines the boot sector of the target disk for the migration boot process, which applies only to HP MSA1000 arrays. If there is no partition on the target, the default boot sector format is 63 sectors. The default setting is disabled.

To enable or disable auto sector format select:

1. On the Main menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).
2. Select **<10>**, Enable or Disable Auto Boot Sector (+Advanced Option+) (Figure 18).

Figure 18: Enable or Disable Auto Sector Format Select screen

3. Select **<1>** to enable auto boot sector, or **<2>** to disable it.
4. Press **<X>** to exit the BIOS utility and reboot the system.

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Selecting Link Speed

This option allows you to select the adapter's link speed. The default link speed is Auto Select, which automatically selects the link speed.

To select the adapter's link speed:

1. On the Main menu, select **<2>**, Configure This Adapter's Parameters. The adapter configuration menu is displayed (Figure 8).
2. Select **<11>**, Link Speed Selection (Figure 19).

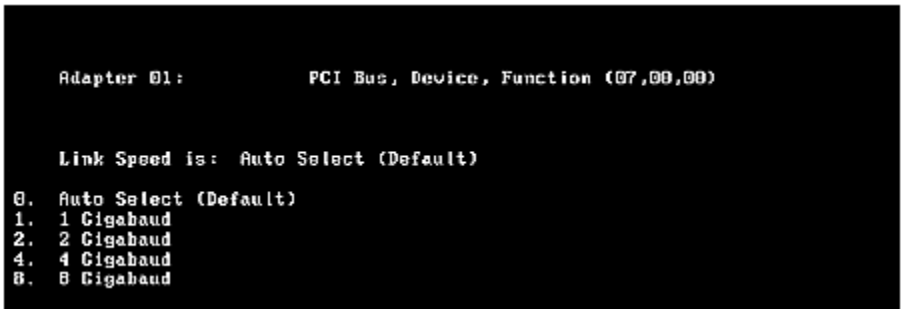

Figure 19: Link Speed Selection menu

3. Select one of the following:
   - **<0>** for Auto Select (the adapter's speed is selected automatically based on its model).
   - **<1>** for 1 Gigabaud.
   - **<2>** for 2 Gigabaud.
   - **<4>** for 4 Gigabaud.
   - **<8>** for 8 Gigabaud.
4. Press **<X>** to exit the BIOS utility and reboot the system.

Using Multi-Path Boot from SAN

Multi-boot BIOS is in compliance with BIOS Boot Specification (BBS). The system must have a Multi-boot system BIOS in order to take advantage of this feature. Multi-boot BIOS allows you to select any boot disk in the system BIOS setup menu. The boot disk can be an FC drive, a SCSI drive, an IDE drive, a USB device or floppy drive. The Emulex BIOS supplies the first eight drives to the system BIOS menu. The Multi-boot BIOS can override the FC drive that is selected in the BIOS utility.

For example, the system has eight FC disks only. The boot disk has AL_PA 02. However, you can select AL_PA 23 in the system BIOS setup menu. The boot device is the FC disk with AL_PA 23 instead of AL_PA 02, as is set in the BIOS utility.

If your system supports Multi-boot BBS, the local boot disk (drive C) is the first entry in Multi-boot on the system BIOS setup menu. The list of entries is determined by the list of configured boot entries in the BIOS utility. For example:

```
Adapter 1: boot_entry0, boot_entry1
Adapter 2: boot_entry2, boot_entry3
```

The order of boot entries exported to Multi-boot (BBS) is

```
boot_entry0, boot_entry1, boot_entry2, and boot_entry3.
```

However, Multi-boot allows changing the boot order in the server BIOS, which allows any disk to become the C drive.

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OpenBoot

OpenBoot commands are supported by the Sun SPARC system.

Attribute Commands

boot - id

Syntax: .boot - id
Description: Displays the current boot device id.
Parameters: None

.devalias

Syntax: .devalias
Description: Displays the boot list.
Parameters: None

.fcode

Syntax: .fcode
Description: Displays the current version of OpenBoot.
Parameters: None

.host-did

Syntax: .host-did
Description: Displays the actual current AL_PA of the adapter.
Parameters: None

.nvram

Syntax: .nvram
Description: Displays the current flags for OpenBoot.

```
show-devs
"/pci@1f,0/pci@1/lpfc@1" select-dev
/* select lpfc@1 (for example) */
.nvram
```

Parameters: None

.probe-scsi-all

Syntax: .probe-scsi-all
Description: Displays the current SCSI and FC devices.
Parameters: None

.show-devs

Syntax: .show-devs
Description: Displays a list of the devices found.
Parameters: None

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.topology

Syntax: .topology

Description: Displays the current topology.

Parameters: None

Functional Commands

.remove-boot-id

Syntax: .remove-boot-id

Description: Removes the boot id from boot list.

```
"/pci@1f,0/pci@1/lpfc@1" select-dev
remove-boot-id       /* to clear boot id settings */
unselect-dev
or
"/pci@1f,0/pci@1/lpfc@1" select-dev
set-default-mode /* to clear boot id settings */
unselect-dev
```

Parameters: None

set-default-mode

Syntax: set-default-mode

Description: Resets to the default value mode.

Parameters: None

set-link-speed

Syntax: set-link-speed

Description: Shows the current link-speed setting. Changes and sets the link speed. The default is 0=Auto Select Link Speed.

Parameters: 0=Auto Select Link Speed (Default),1=1 Gb/s Link Speed -- Only, 2=2 Gb/s Link Speed -- Only, =4 Gb/s Link Speed -- Only

set-max-lun

Syntax: set-max-lun

Description: Shows the current maximum LUN support. Changes and sets the support setting, the default max lun is 256.

Parameters: 0=Set Max Lun to 255 (Default), 1=Set Max Lun to 1023, 2=Set Max Lun to 2047, 3=Set Max Lun to 4095

set-post-linkup

Syntax: set-post-linkup

Description: Controls if a linkup is to occur during a POST. The default is off.

Parameters: 0=Set Linkup Switch OFF (Default), 1=Set Linkup Switch ON

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Table 4: Signature Table

Signature	OpenBoot signature
Valid_flag	internal flag for OpenBoot
Host_did	shows host DID number
Enable_flag	internal flag for OpenBoot
Topology_flag	topology flag for OpenBoot
Link_Speed_Flag	set link speed
Diag_Switch	set fcode diag switch
Boot_id	shows target ID number
Lnk_timer	internal use for OpenBoot
Plogi_timer	internal use for OpenBoot
LUN	shows boot LUN in use
DID	shows boot ID in use
WWPN	shows boot WWPN in use

Note: Target ID can be bound to either DID (destination ID) or WWPN (worldwide port name) and saved in an adapter nvram. It can also be saved in an environmental variable boot-device.

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EFIBoot

Note: This section reflects the most recent release of the EFI utility. Some selections may not be available if you are using an older version of the utility.

Note: EFIBoot is not supported on converged network adapters (CNAs) such as the LP21000 and LP21002

Note: If you have several adapters in your system, the EFI system firmware or boot code uses the highest version driver that is on one of your adapters. Adapters with older versions of EFIBoot are managed by the more recent version, but only as long as the adapter with the most recent version is in the system. The adapters must be updated to actually update and not just use the most recent version available.

Install the EFI Utility

Before you install the EFI utility, download the EFIBoot zip file and extract the contents to a floppy disk, CD, USB device or hard drive.The EFIBoot zip file includes the.prg file, the elxcli*version*.efi file (where *version* corresponds to the EFIBoot code version) and the readme.txt file. The elxcli*version*.efi file contains the EFI utility.

To install the EFI utility:

1. Start your system. A menu similar to Figure 20 is displayed. The menu items vary depending on the configuration of your system.

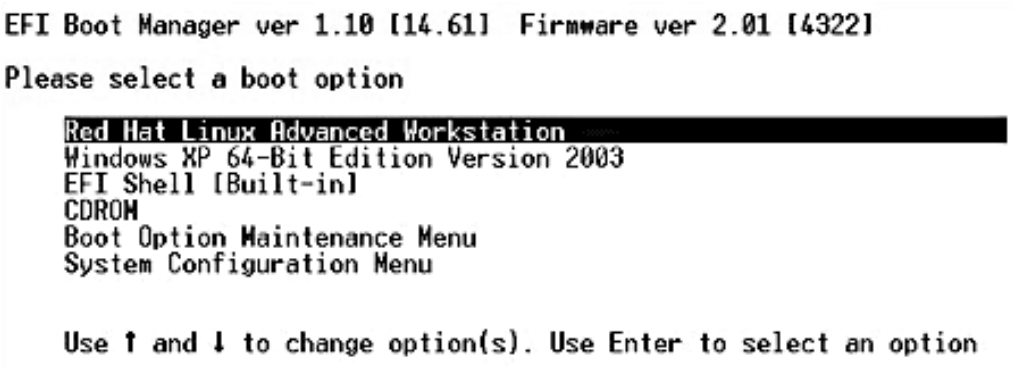

Figure 20: Boot Option menu

2. Select **EFI Shell** from the menu. An EFI shell starts and the shell prompt is displayed.
3. Change to the drive where the Emulex EFIBoot file was extracted. To see a list of drives, type:

   `map -r` **<Enter>**

   A list of drive names is displayed (Figure 21)

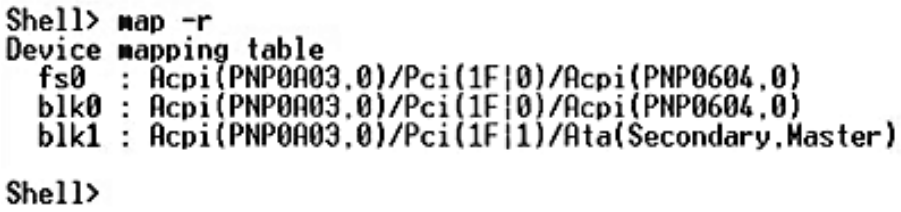

Figure 21: Drive List example

4. Change to the desired drive by entering the drive name followed by a colon (for example, fs0:).

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5. Load the EFI utility file:

   `load` *`filename`*`.efi` **`<Enter>`**

   where filename is the The following message is displayed:

   ```
   load elxcli400A2.efi
   load:Image fs0: \elxcli400A2.efi loaded at 0x3FCD7000 - Success
   ```

   The EFI utility is now resident in memory, and can be accessed through the `drvcfg` shell command.

Note: The utility is available only until the next reboot. However, if the driver.prg file has been stored in the flash memory on the adapter, the utility is available at every startup as long as the adapter is in the system.

Start the EFI Utility

To access the main EFI utility:

1. View Emulex driver image handle information. At the shell prompt type:

   `drivers` **`<Enter>`**

   A list of drivers is displayed (Figure 22).

```
fs0:\> drivers
            T   D
D           Y C I
R           P F A
V  VERSION  E G G #D #C DRIVER NAME                          IMAGE NAME
== ======== = = = == == ==================================== ==============
15 00000001 B - -  1  1 DebugPort Driver                     73E9457A-CEA1-4
52 00000001 D - -  1  - National(R) PC8741x SIO Driver       C5DAC13B-8D24-4
5B 00000000 ? - -  -  - BIOS[INT10] VGA Mini Port Driver     BBDAC3A1-B06F-4
5C 00000000 ? - -  -  - BIOS[INT16] Keyboard Driver          5479662B-6AE4-4
5D 00000000 ? - -  -  - BIOS[UNDI] Simple Network Protocol   D0CAA91E-2DE4-4
5E 00000010 ? - -  -  - BIOS[INT13] Block Io Driver          4495E47E-42A9-4
5F 00000024 ? - -  -  - BIOS[INT10] Video Driver             29CF55F8-B675-4
60 00000010 D - -  2  - Platform Console Management Driver   51CCF399-4FDF-4
61 00000010 D - -  1  - Platform Console Management Driver   51CCF399-4FDF-4
62 00000010 B - -  1  1 Console Splitter Driver              408EDCEC-CF6D-4
63 00000010 ? - -  -  - Console Splitter Driver              408EDCEC-CF6D-4
64 00000010 B - -  2  2 Console Splitter Driver              408EDCEC-CF6D-4
65 00000010 B - -  2  2 Console Splitter Driver              408EDCEC-CF6D-4
69 00000010 D - -  1  - UGA Console Driver                   CCCB0C28-4B24-1
6A 00000010 B - -  1  1 Serial Terminal Driver               9E863906-A40F-4
6B 00000010 ? - -  -  - VGA Class Driver                     BF89F10D-B205-4
6C 00000010 D - -  9  - Generic Disk I/O Driver              490E1CEA-B81C-1
C2 00032013 B X X  1 24 Emulex SCSI Pass Thru Driver         \/elxcli320a3.e
```

Figure 22: Driver Listing screen

2. Run the drvcfg command followed by the driver image handle for the Emulex SCSI Pass Thru Driver, for example, C2 (your driver image handle number may be different):

   `drvcfg-s c2` **`<Enter>`**

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A list of all the adapters in the system is displayed (Figure 23). Your list may vary depending on the boot package you are using. Locate the adapter to enable, update, configure or troubleshoot. Use the up/down arrows on your keyboard to select it, and press **<Enter>**.

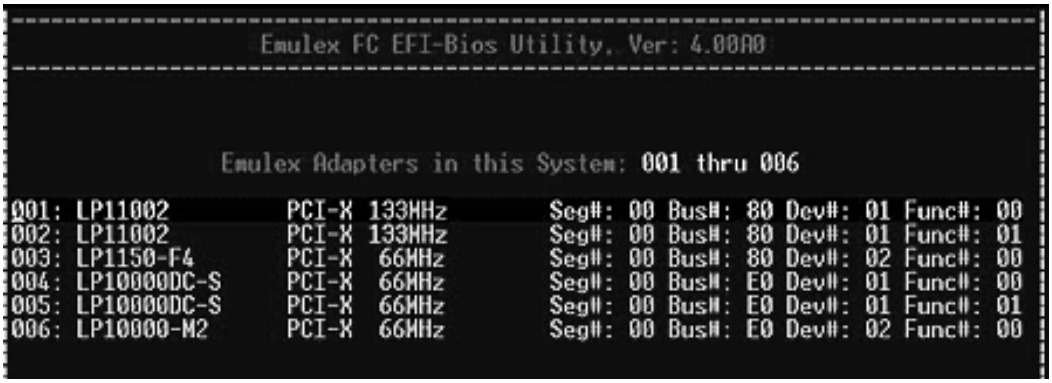

Figure 23: Adapter Listing screen

The EFI Main Utility menu is displayed (Figure 24).

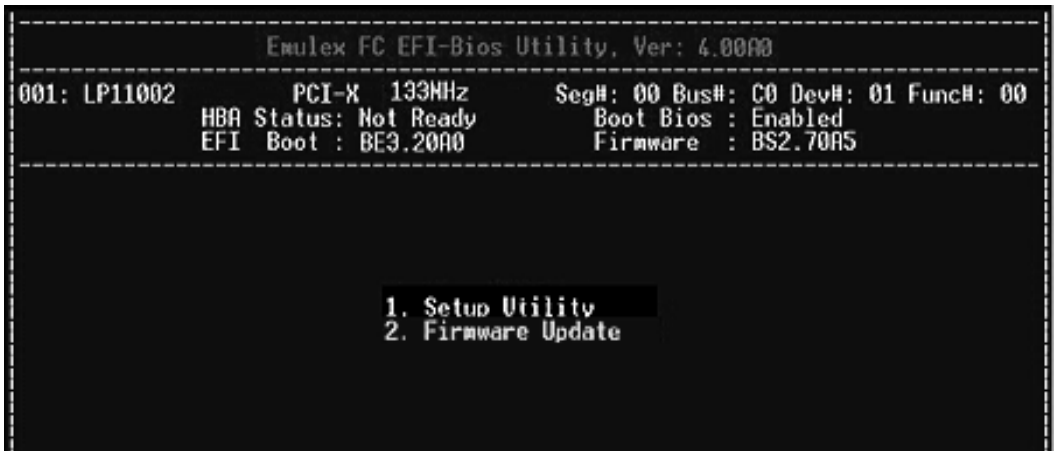

Figure 24: Main EFI-Bios Utility menu

EFI Utility Conventions

The EFI utility has menus and configuration screens with a navigation bar at the bottom of the each one:

- Press the up/down arrows on your keyboard to move through and select menu options or configuration fields. Screens with adapter listings and information display up to eight rows at a time. If applicable, press the up/down arrows to scroll to additional adapters.
- Press the left and right arrows to scroll through pages of information.
- Press **<Enter>** to select a menu option, to select a row in a configuration screen, or to change a configuration default.
- Usually, press **<Esc>** to return to the previous menu. There are a few exceptions to this convention.
- Press <**F1>** to view online help for a menu item.

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Configure EFIBoot

The EFI utility has many options that can be modified to provide for different behavior. Use the EFI utility to do the following tasks:

- Enable or disable the BIOS
- Configure HBA parameters
- Configure boot parameters
- Reset to default values
- Save and restore configurations

Note: You must issue a **connect -r** command in the EFI shell or reboot for any changes to take effect.

Enable or Disable the BIOS

The BIOS must be enabled before it can be configured.

To enable the BIOS:

1. On the Main EFI-Bios Utility menu, select **1**. **Setup Utility** and press **<Enter>**. The EFI-BIOS Setup Utility menu is displayed (Figure 25).

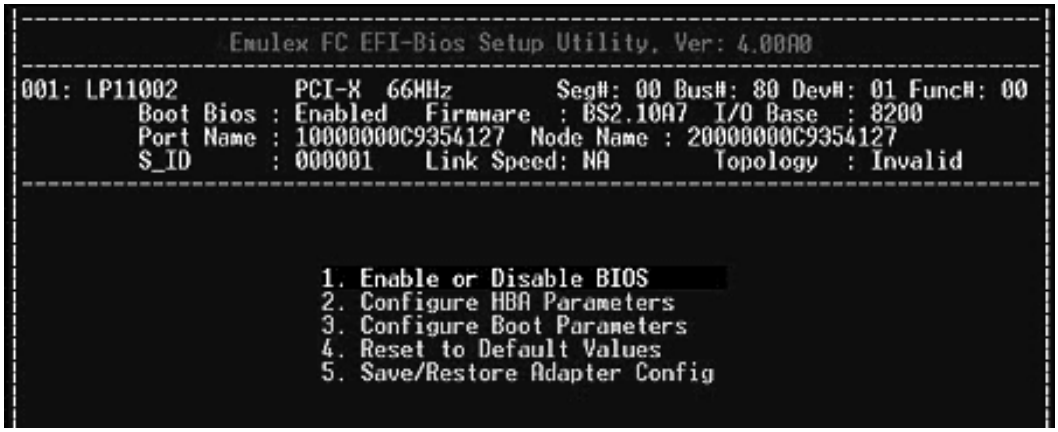

Figure 25: EFI-BIOS Setup Utility menu

2. Select **1. Enable or Disable BIOS** and press **<Enter>**. The current BIOS status is displayed (Figure 26).

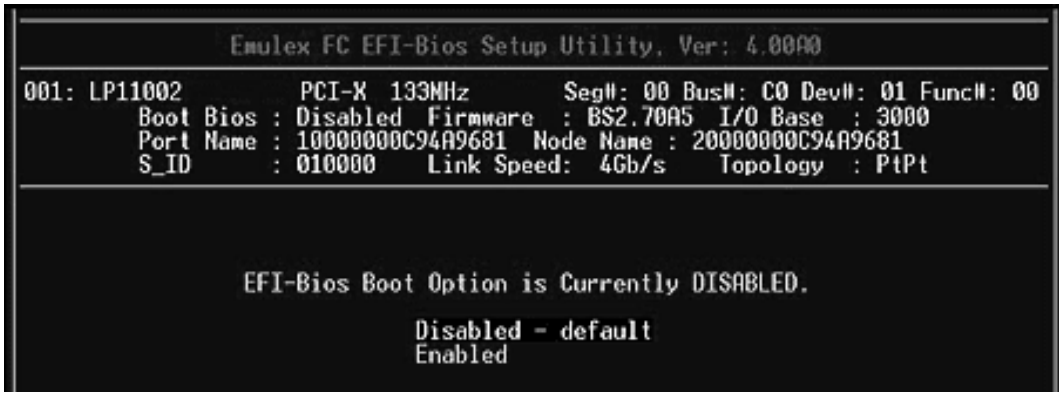

Figure 26: BIOS Status screen

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3. If the current status is disabled, select **Enabled** and press **<Enter>**. The status changes to enabled (Figure 27).

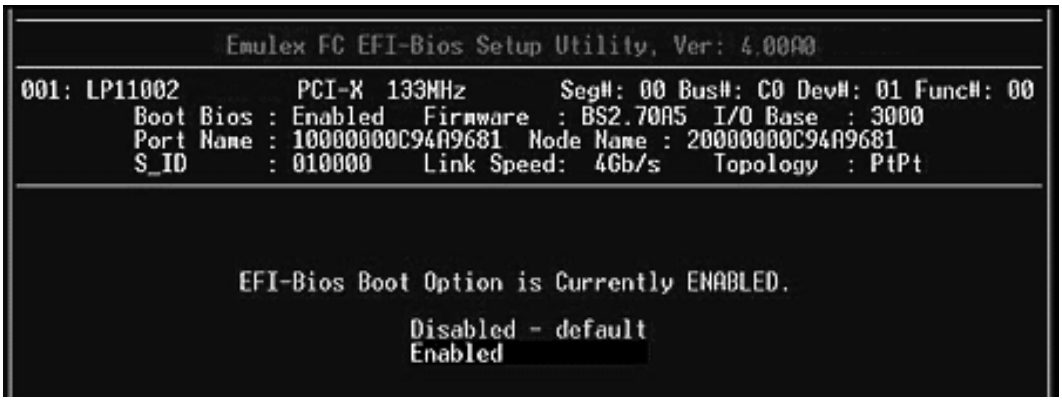

Figure 27: BIOS Enabled screen.

Note: You can configure EFIBoot systems for up to eight boot devices. Configure one boot device at a time.

Note: Press **<Esc>** to return to the EFI utility menu.

Configure Adapter Parameters

The EFI utility enables you to configure the following adapter parameters:

- Default arbitrated loop physical address (AL_PA)
- Topology
- Port login (PLOGI) retry timer
- Link speed

On the EFI-BIOS Setup Utility menu (Figure 25) select **2. Configure HBA Parameters** and press **<Enter>**. The Adapter Configuration (Figure 28) is displayed.

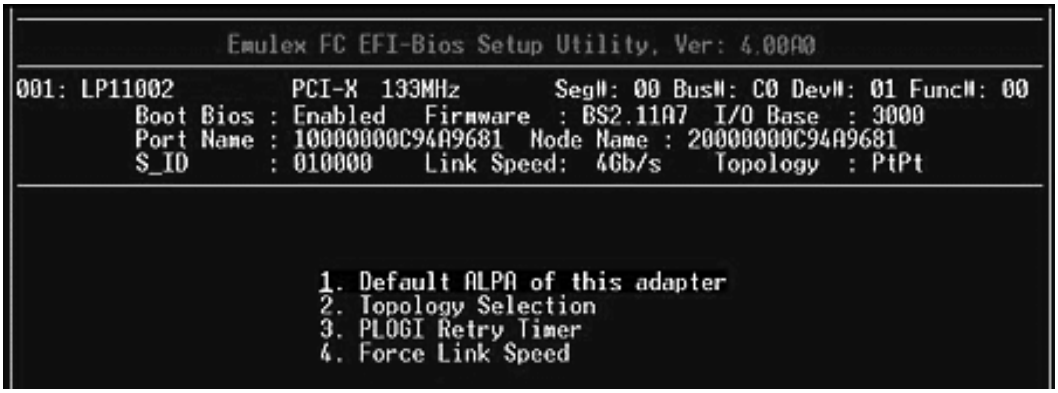

Figure 28: Adapter Configuration menu

Change the Default AL_PA

When a device is connected to an FC arbitrated loop, the loop initialization process (LIP) automatically assigns an AL_PA to the device. This number is assigned to the device as long as it is connected to the loop and powered up. When the device is removed from the loop or turned off, as it is reconnected or

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when another LIP occurs, the device may be assigned a different AL_PA. The HardALPA=0xn parameter allows you to permanently assign an AL_PA to a host adapter. This does not alter the adapter flash memory. The default for this parameter is 0x00. All valid AL_PA values are listed in Table 5.

Table 5: Valid AL_PA Values

0x00	0x01	0x02	0x04	0x08	0x0F	0x10	0x17
0x18	0x1B	0x1D	0x1E	0x1F	0x23	0x25	0x26
0x27	0x29	0x2A	0x2B	0x2C	0x2D	0x2E	0x31
0x32	0x33	0x34	0x35	0x36	0x39	0x3A	0x3C
0x43	0x45	0x46	0x47	0x49	0x4A	0x4B	0x4C
0x4D	0x4E	0x51	0x52	0x53	0x54	0x55	0x56
0x59	0x5A	0x5C	0x63	0x65	0x66	0x67	0x69
0x6A	0x6B	0x6C	0x6D	0x6E	0x71	0x72	0x73
0x74	0x75	0x76	0x79	0x7A	0x7C	0x80	0x81
0x82	0x84	0x88	0x8F	0x90	0x97	0x98	0x9B
0x9D	0x9E	0x9F	0xA3	0xA5	0xA6	0xA7	0xA9
0xAA	0xAB	0xAC	0xAD	0xAE	0xB1	0xB2	0xB3
0xB4	0xB5	0xB6	0xB9	0xBA	0xBC	0xC3	0xC5
0xC6	0xC7	0xC9	0xCA	0xCB	0xCC	0xCD	0xCE
0xD1	0xD2	0xD3	0xD4	0xD5	0xD6	0xD9	0xDA
0xDC	0xE0	0xE1	0xE2	0xE4	0xE8	0xEF	

To change the default AL_PA:

1. On the Adapter Configuration menu, select **1. Default ALPA of this adapter** and press **<Enter>**. A screen similar to Figure 29 is displayed.

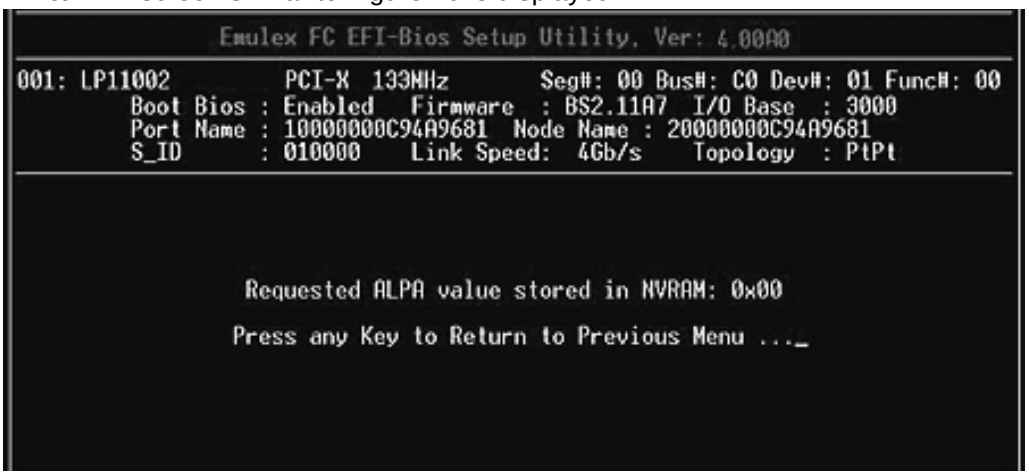

Figure 29: Default AL_PA Setup screen

2. Select the HardALPA value field, use the up/down arrows to change the default value, and press **<Enter>**. The new value is displayed.

Note: Press **<Esc>** to return to the EFI utility menu.

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Change the Topology

Emulex drivers support arbitrated loop and point-to-point topologies.

To change the topology:

1. On the Adapter Configuration menu, select **2. Topology Selection** and press **<Enter>**. The screen shown in Figure 30 is displayed.

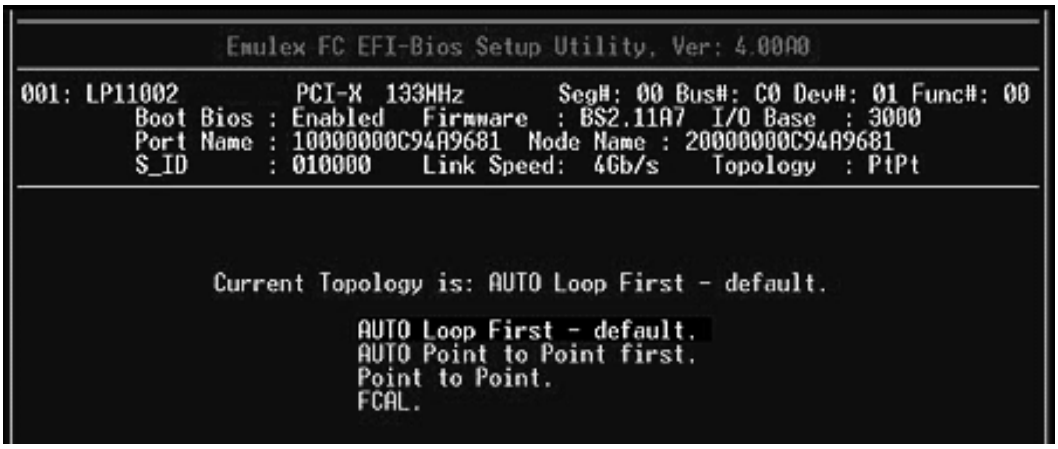

Figure 30: Topology Options screen

2. Use the up/down arrows to select a different topology and press **<Enter>**. The screen is refreshed with the new value.

Note: The presence of a fabric is detected automatically.

Press **<Esc>** to return to the EFI utility menu.

Change the PLOGI Retry Timer

This option allows you to set the interval for the port login (PLOGI) retry timer. This option is especially useful for Tachyon-based RAID arrays. Under very rare occasions, a Tachyon-based RAID array resets itself and the port goes offline temporarily in the loop. When the port comes to life, the PLOGI retry interval scans the loop to discover this device.

To change timer values:

1. On the Adapter Configuration menu, select **3. PLOGI Retry Timer** and press **<Enter>**. The screen shown in Figure 31 is displayed.

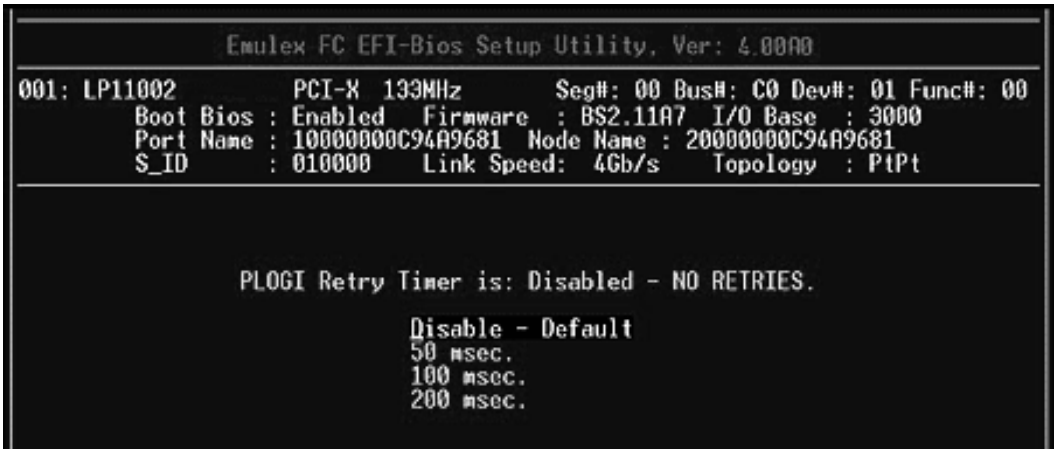

Figure 31: PLOGI Retry Timer Setup screen

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2. Use the up/down arrows to select a retry timer option and press **<Enter>**. The screen is refreshed with the new value.

Note: Press **<Esc>** to return to the EFI utility menu.

Change the Link Speed

Use this feature to change, or force, the link speed between ports instead of doing an auto negotiating. The supported link speeds depend upon the adapter. The screen (Figure 32) will only show options that are valid for the current adapter.

To change the link speed:

1. On the Adapter Configuration menu, select **4. Force Link Speed** and press **<Enter>**. The screen shown in Figure 32 is displayed.

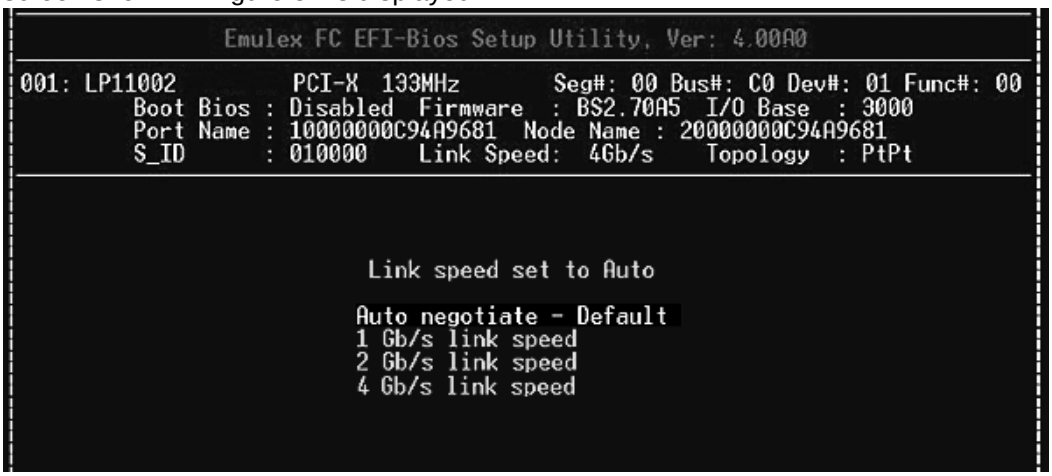

Figure 32: Force Link Speed Setup screen

2. Use the up/down arrows to select a link speed and press **<Enter>**.

   Possible link speed choices:

   - 1 Gb/s
   - 1 & 2 Gb/s
   - 1, 2 and 4 Gb/s
   - 2, 4 and 8 Gb/s

Note: Emulex's 8 G/bs adapters do not support 1 G/bs link speed.

3. The screen is refreshed with the new value.

Note: Press **<Esc>** to return to the EFI utility menu.

Configure Boot Parameters

The EFI utility enables you to configure the following boot parameters:

- Device path
- Maximum LUNs per target
- Boot target scan
- Boot devices
- Delay device discovery

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To configure boot parameters, on the EFI-BIOS Setup Utility menu (Figure 25) select **3. Configure Boot Parameters** and press **<Enter>**. The menu shown in Figure 33 is displayed.

Figure 33: Boot Configuration menu

Change the Device Path

This option allows you to make the Fibre Channel driver appear as a SCSI driver. This is useful for older Itanium systems that do not have native support in the EFI system firmware or boot code for FC device paths.

To change the device path:

1. On the Boot Configuration menu, select **1, Device Path Selection** and press **<Enter>**. The screen shown in Figure 34 is displayed.

Figure 34: Device Path screen

2. Use the up/down arrows to change the path and press **<Enter>**. The screen is refreshed with the new value.

Note: The device path is typically not changed. The SCSI device path is used for legacy systems.

Press **<Esc>** to return to the EFI utility menu.

Change the Maximum LUNs per Target Setting

The maximum number of LUNs represents the maximum number of LUNs that are polled during device discovery. The minimum value is 1, the maximum value is 4096. The default is 256.

To change the maximum number of LUNs:

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1. On the Boot Configuration menu, select **2. Maximum LUNs/Target** and press **<Enter>**. The screen shown in Figure 35 is displayed.

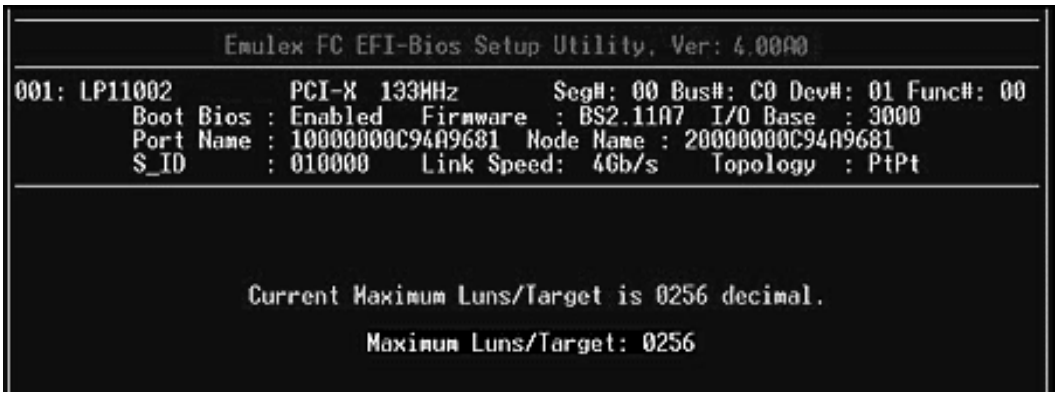

Figure 35: Current Maximum LUNs screen

2. Use the up/down arrows to change the maximum LUN value (between 1 and 4096) and press **<Enter>**. The screen is refreshed with the new value.

Note: 256 is the default and typical number of LUNs in a device.

Press any key to return to the configuration menu.

Set Up Boot Target Scan

This option is available only if none of the eight boot entries are configured to boot from DID or WWPN. Emulex strongly recommends that you use the Configure Boot Devices menu to configure eight boot entries for fabric point-to-point, public loop or private loop configurations.

With boot scan enabled, the first device issues a Name Server Inquiry.

To set up a boot target scan:

1. On the Boot Configuration menu, select **3. Boot Target Scan** and press **<Enter>**. The screen shown in Figure 36 is displayed.

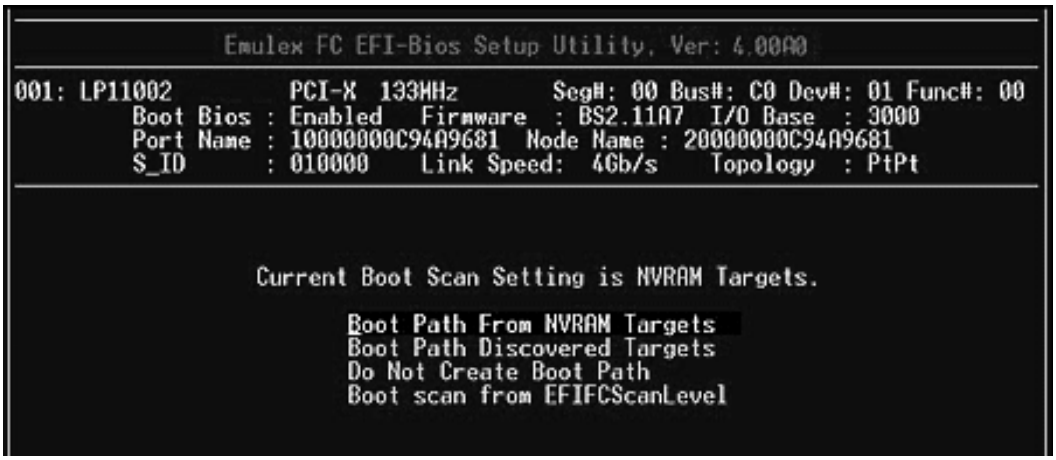

Figure 36: Boot Scan Options screen

2. Use the up/down arrows to select a boot scan setting and press **<Enter>**.

The boot scan options are:

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- Boot Path from NVRAM Targets - Boot scan discovers only LUNs that are saved to the adapter's non-volatile random access memory (NVRAM). Select up to eight attached devices to use as potential boot devices. Limiting discovery to a set of eight selected targets can greatly reduce the time it takes for the EFIBoot driver to complete discovery.
- Boot Path from Discovered Targets - Boot scan discovers all devices that are attached to the FC port. Discovery can take a long time on large SANs if this option is used.
- Boot Scan from EFIFcScanLevel - Allows 3rd party software to toggle between Boot Path from NVRAM and Boot Path from Discovered Targets by manipulating an EFI system NVRAM variable. After the scan is set to EFIFcScanLevel, the scan method can be changed without entering the EFI Boot configuration utility.

  If EfiFcScanLevel is selected, the scan is determined by the value of the EfiFcScanLevel variable maintained by the EFI system firmware or boot code. The value of this variable can be changed either by using the menu in the EFIBoot Configuration utility, or by using 3rd party software from the EFI shell command prompt.

If you select Boot Scan from EfiFcScanLevel:

- If the EfiFcScanLevel variable already exists, the screen in Figure 37 shows the current setting and allows you to select a new setting.

Figure 37: Existing EFIFcScanLevel Variable screen

- If the EfiFcScanLevel variable does not exist in the EFI BIOS NVRAM store, the EFIBoot configuration utility prompts you to create it, as shown in Figure 38.

Figure 38: No Existing EFIFcScanLevel Variable screen

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Press **<Y>** for Yes or **<N>** for no. If you press **<Y>** to create the variable, the utility creates it and presents you with a menu to select the initial value. Valid values are NVRAM and Discovered Targets. A new variable is created and the boot path is changed.

Note: If you have a large SAN and set the boot path to “Boot Path Discovered Targets,” discovery takes a long time.

Press **<Esc>** to return to the EFI utility menu.

Configure Boot Devices

This list allows you to select up to eight boot devices that will be enumerated by the boot driver. Whether they are used for boot or not depends on how you configure the boot manager in the EFI system firmware or boot code.

To configure an EFI boot device:

1. On the Boot Configuration menu, select **4. Configure Boot Devices** and press **<Enter>**. The screen shown in Figure 39 is displayed.

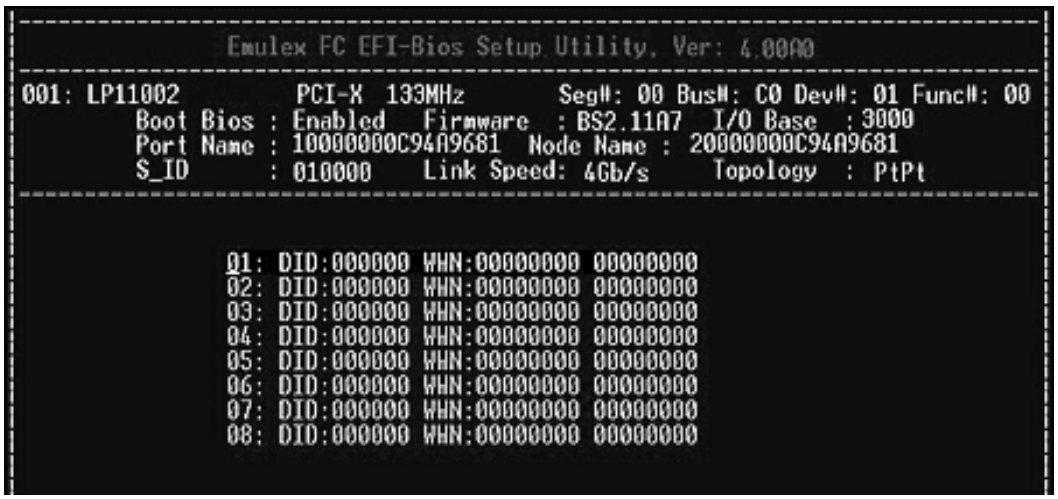

Figure 39: Device Rows screen

2. Select a device row and press **<Enter>**. The screen shown in Figure 40 displays the selected device row.

Figure 40: Boot Device Configuration Options menu

Note: Press **<Esc>** to return to the list of devices.

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3. Select **1. Scan Targets** and press **<Enter>**. The system scans the adapter and shows your targets, as shown in Figure 41.

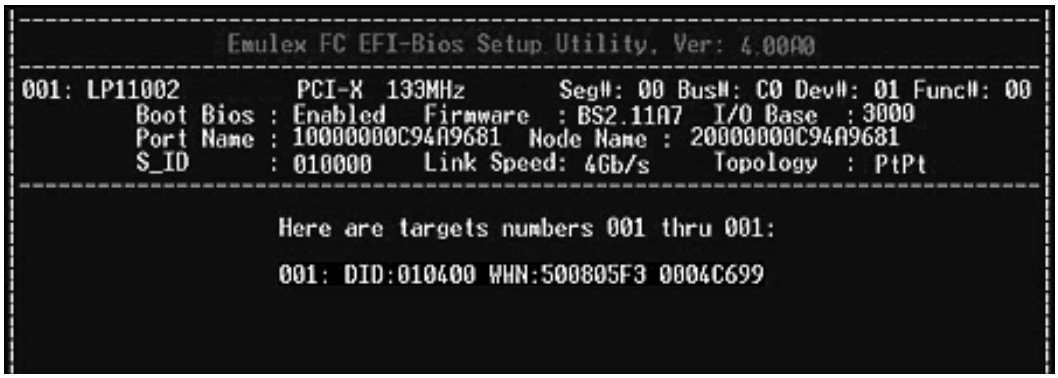

Figure 41: Target Listing screen

Note: Eight targets are displayed per screen. If more than eight targets are configured, press the right arrow key to view additional targets eight at a time.

4. Select a target row and press **<Enter>**. LUNs for the target are displayed, as shown in Figure 42.

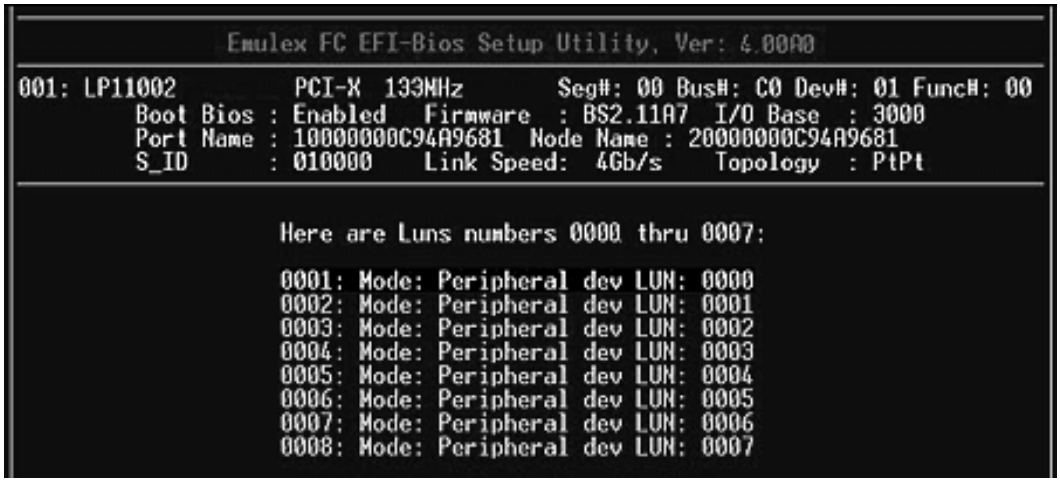

Figure 42: LUN Listing Screen

Note: Eight LUNs are displayed per screen. If more than eight LUNs are configured for the target, press the right arrow key to view more LUNs.

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5. Select a LUN and press **<Enter>**. The screen shown in Figure 43 is displayed.

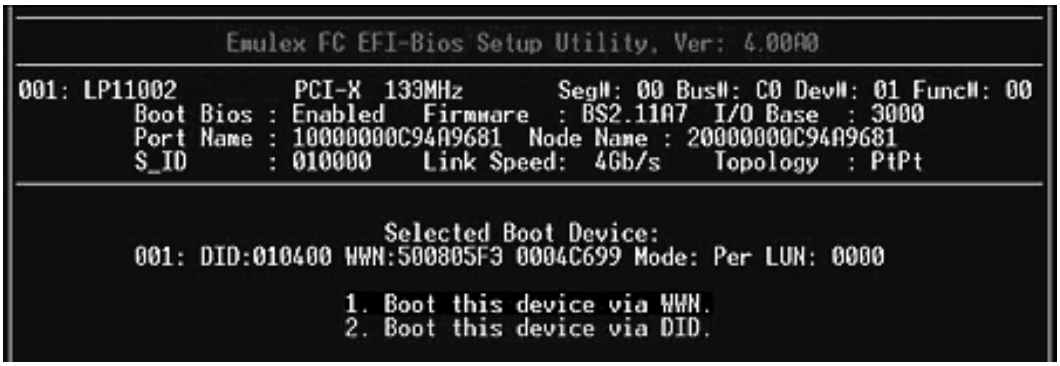

Figure 43: LUN Boot Options menu

Note: Press **<Esc>** to return to the list of devices.

6. Select **1. Boot this device via WWN** and press **<Enter>**. Figure 44 shows the LUN selected in step 5.

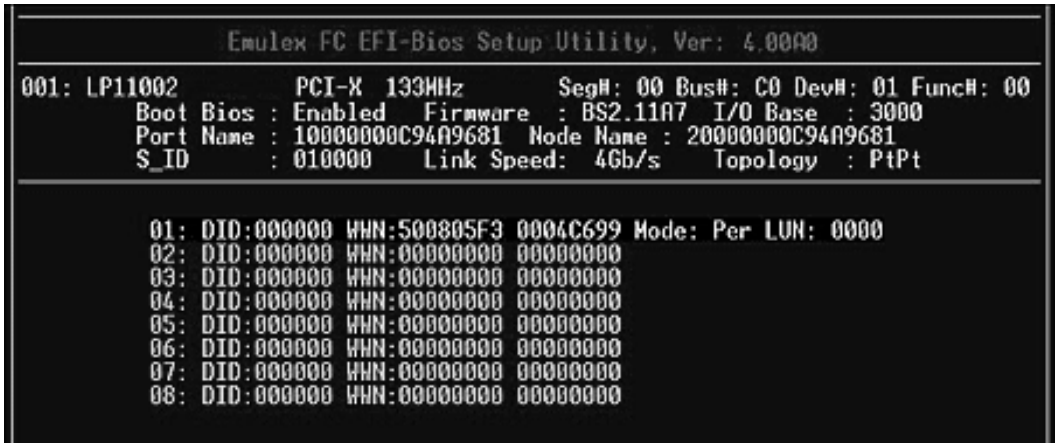

Figure 44: Device Rows with a Selected LUN to Boot with WWNN screen

Note: Press **<Esc>** to return to the EFI utility menu.

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Cancel a Boot Device

To cancel boot device:

1. On the Boot Configuration menu, select **4. Configure Boot Devices** and press **<Enter>**. The screen shown in Figure 45 is displayed.

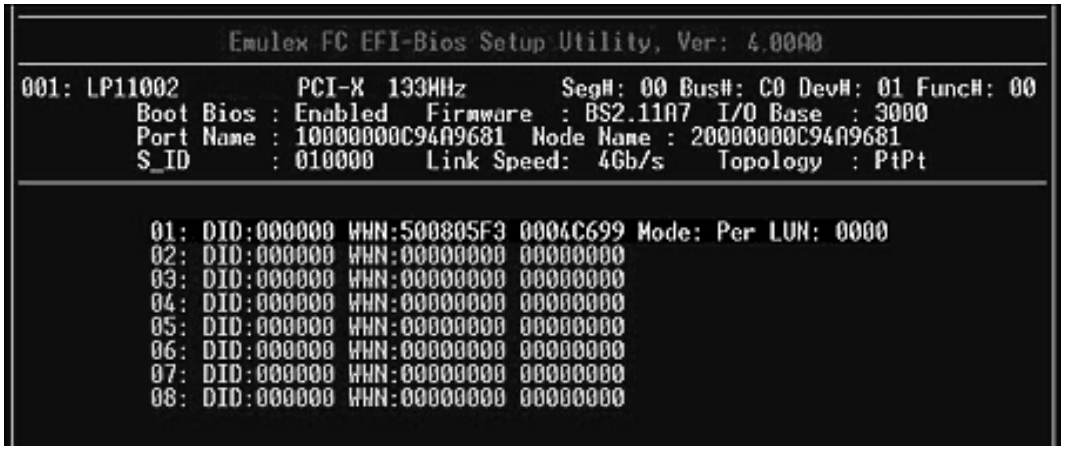

Figure 45: Boot LUNs

2. Select a device row and press **<Enter>**. The screen shown in Figure 46 is displayed.

Figure 46: Selected Boot Device

3. Select **2. Clear Flash Boot Info** and press **<Enter>**. The system clears the target as the remote boot device.

Change Device Discovery Delay

This parameter sets a delay to occur after an loop initialization and before a scan is initiated to discover the target. The default is off or 0 seconds. Change the default if you have an HP MSA1000 or HP MSA1500 RAID array and if both of the following conditions exist:

- The MSA array is direct connected or part of an arbitrated loop (for example, daisy chained with a JBOD).
- The boot LUN is not reliably discovered. In this case, a delay may be necessary to allow the array to complete a reset.

Caution: Do not change the delay device discovery time if your MSA array is connected to a fabric switch. Setting it to any other time guarantees that the maximum delay time is seen on every loop initialization.

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If both of the above conditions exist, typically set this parameter to 20 seconds. However, the delay only need be only enough for the array to be reliably discovered after a reset. Your value may be different.

To change the delay device discovery value:

1. On the Boot Configuration menu, select **5. Delay Device Discovery** and press **<Enter>**. The screen shown in Figure 47 is displayed.

Figure 47: Delay Device Discovery screen

2. Use the left /right arrows to select values in 10-second increments and press **<Enter>**.

Reset to Default Values

The EFI utility enables you to reset EFI boot parameter to their factory default settings. These defaults are listed in Table 6.

Table 6: Adapter Defaults

Parameter	Default	Valid Values
Enable/Disable BIOS	Disabled	Enabled Disabled
AL_PA Value	0x00 Fibre	See AL_PA reference table
Device Path	FC	Fibre Channel (FC) SCSI
PLOGI Retry Timer	Disabled	Disabled 50 msec 100 msec 200 msec
Boot Target Scan	Boot path from NVRAM targets	Boot path from NVRAM targets Boot path discovered targets Do not create boot path
Max LUNs Setting	0256	0–4096
Topology	Auto (start FC-AL)	Auto (start FC-AL) Point-to-Point Auto (start Point-to-Point) FC-AL
Delay Device Discovery	0000	0000–0255

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To reset parameters to their factory default settings:

1. On the EFI-BIOS Setup Utility menu (Figure 25) select **4. Reset to Default Values** and press **<Enter>**. The screen shown in Figure 48 is displayed.

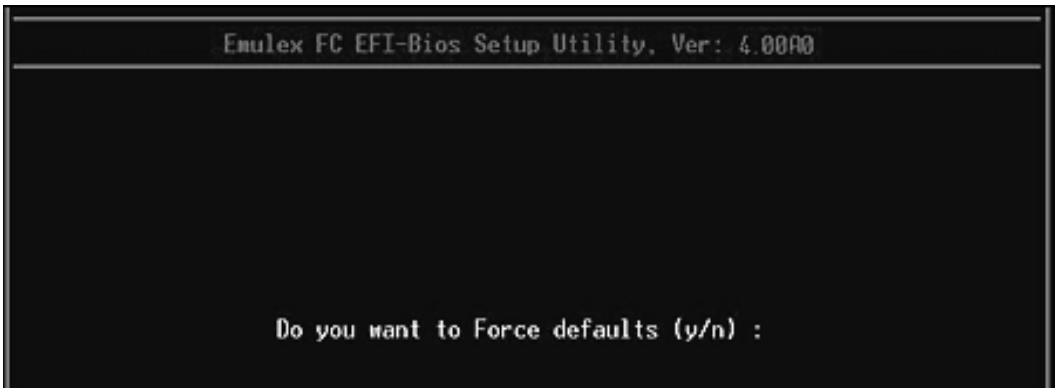

Figure 48: Force Defaults Dialog screen

2. Press **<Y>**. All settings revert to their factory default values.

Save and Restore Configurations

The EFI utility enables you to save a specific configuration to a file and to restore a previously saved configuration from NVRAM or a file. This allows you to easily apply a specific configuration across multiple adapters or systems, and to restore the appropriate settings if unintended changes are made.

To save or restore a configuration, on the EFI-BIOS Setup Utility menu (Figure 25) select **5. Save/Restore Adapter Config** and press **<Enter>**. The screen shown in Figure 49 is displayed.

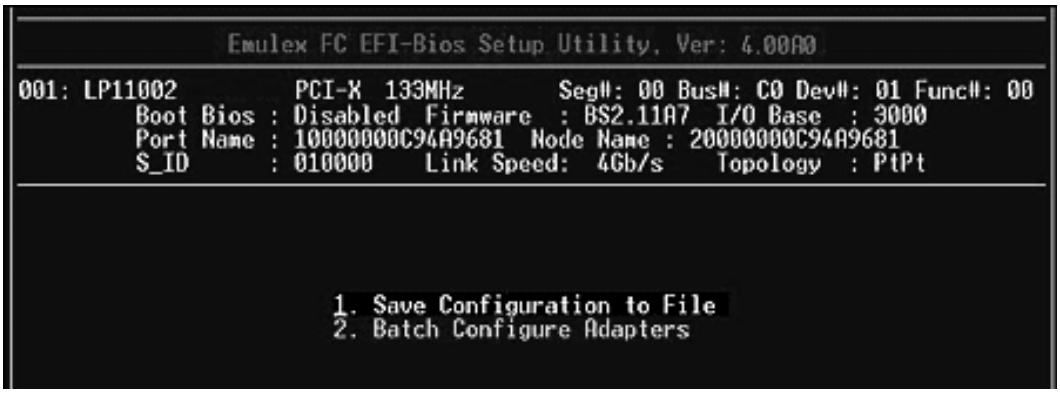

Figure 49: Save Configuration menu

Save the Configuration to a File

Saving a configuration to a file allows you to reuse the configuration at a later time, such as to restore a changed configuration or to migrate the configuration across other adapters or systems.

The file must be saved to a formatted storage medium with a valid file system recognized by the EFI system firmware or boot code. This can include partitioned and formatted hard drives with a file allocation table (FAT) file system, floppy disk or USB device.

To save configuration to a file:

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1. On the Save Configuration menu, select **1. Save Configuration to File**. The screen shown in Figure 50 prompts you to enter a directory path to the file where the configuration is to be saved.

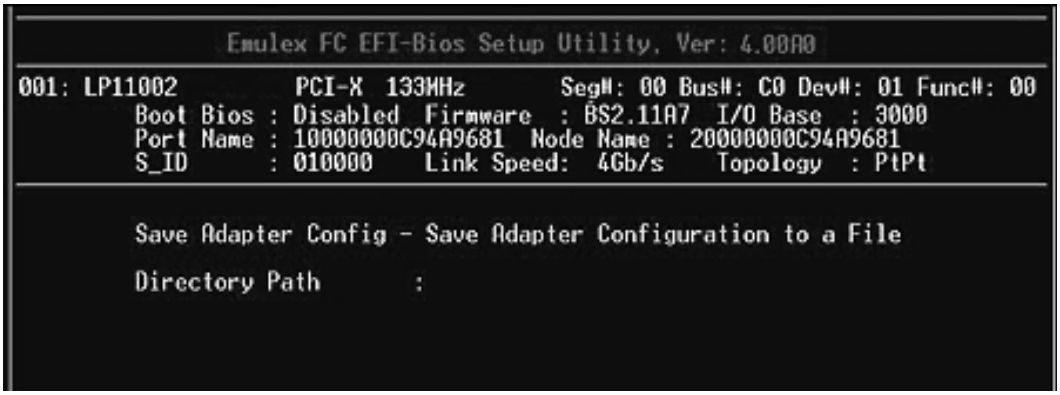

Figure 50: Save Configuration Path screen

2. After you enter the directory path, you are prompted to enter the file name. Do so, and then press **<Enter>**. The screen shown in Figure 51 displays the status of the save.

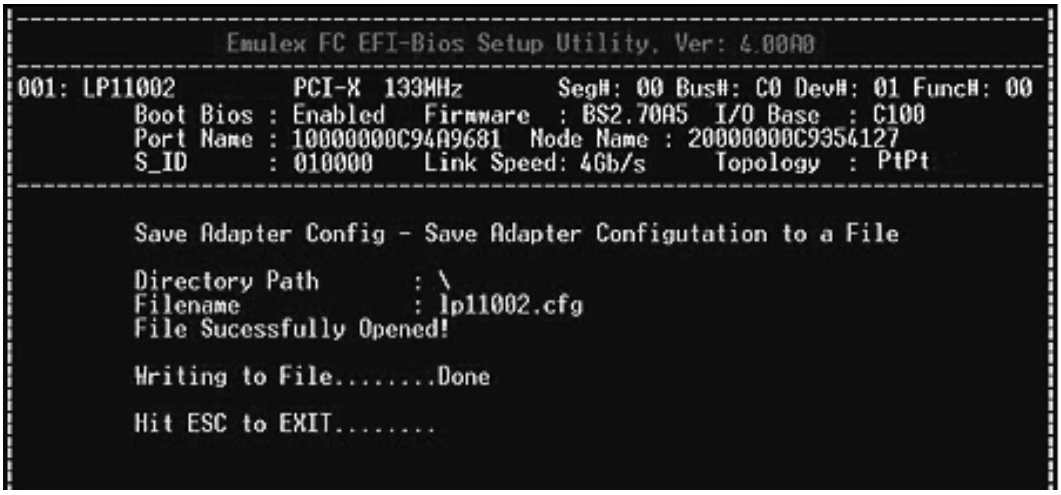

Figure 51: Completed Save Configuration to a File screen

Batch Configuration

Batch configuration migrates an adapter's configuration across several adapters at the same time.

Note: No other adapter functions can be performed while batch configuration is in progress.

There are two ways to perform batch configuration:

- Migrate the configuration of one adapter to other adapters in the system.
- Migrate the configuration stored in a previously saved configuration file to the adapters in the system. This allows configurations to be migrated across systems.

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To migrate the configuration of one adapter to other adapters in the system:

1. On the Save Configuration menu, select **2. Batch Configure Adapters**. You are prompted to select a source for the configuration (Figure 52).

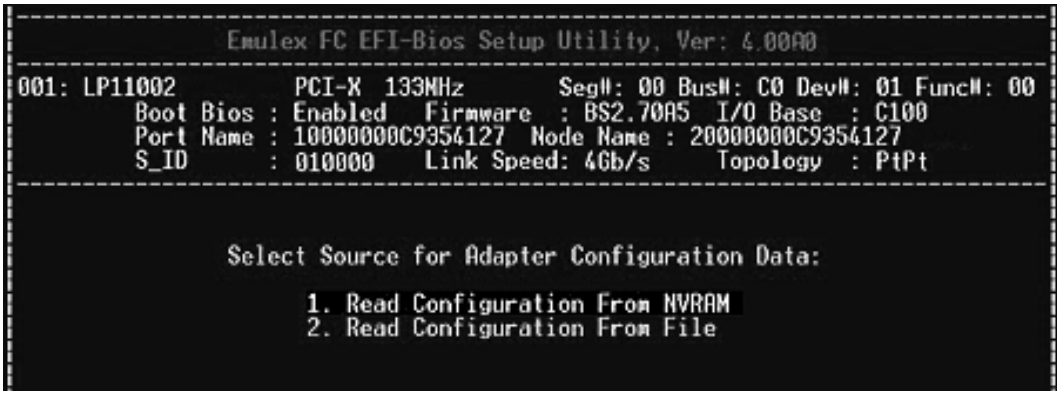

Figure 52: Select Source for Adapter Configuration Data menu

2. Select **1. Read Configuration from NVRAM** and press **<Enter>**. A list of the adapters in the system is displayed (Figure 53).

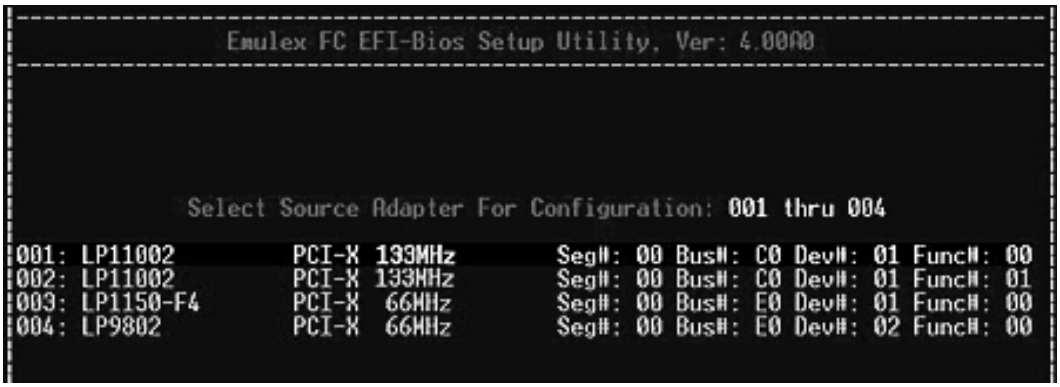

Figure 53: Select Source Adapter for Configuration listing screen

3. Use the up and down arrows on your keyboard to select the source adapter for the configuration and press **<Enter>**. A menu of all adapters in your system, except the source adapter, is displayed (Figure 54).

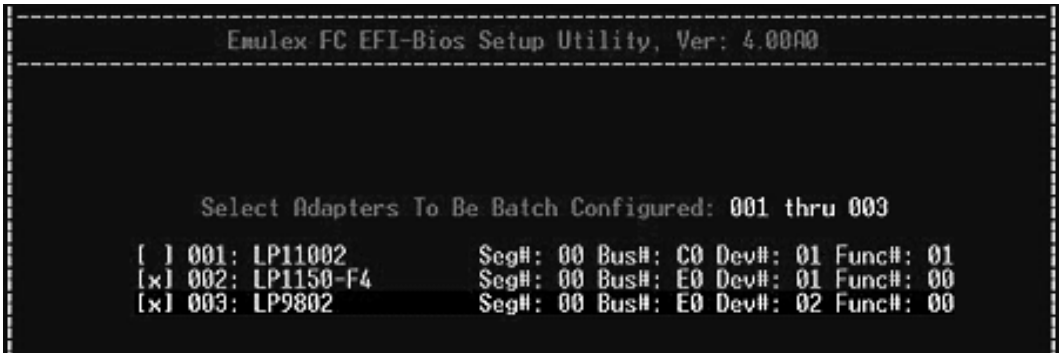

Figure 54: Select Adapters to be Batch Configured listing screen

4. Select (check) the adapters that are to be batch configured. To select an adapter, highlight the row and press the space bar.

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5. Press **<P>** to configure the selected adapters. If the adapters are configured successfully, a screen similar to Figure 55 is displayed.

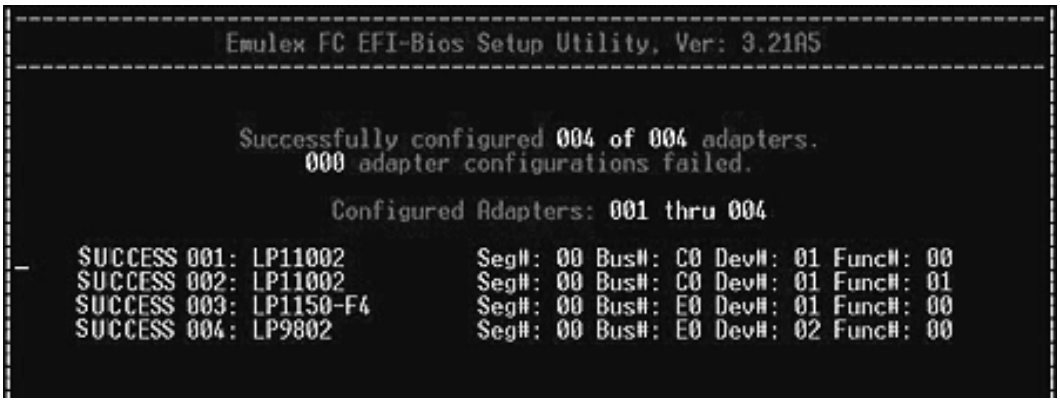

Figure 55: Successful Batch Configuration screen

If all adapters are not configured successfully, a screen similar to Figure 56 is displayed.

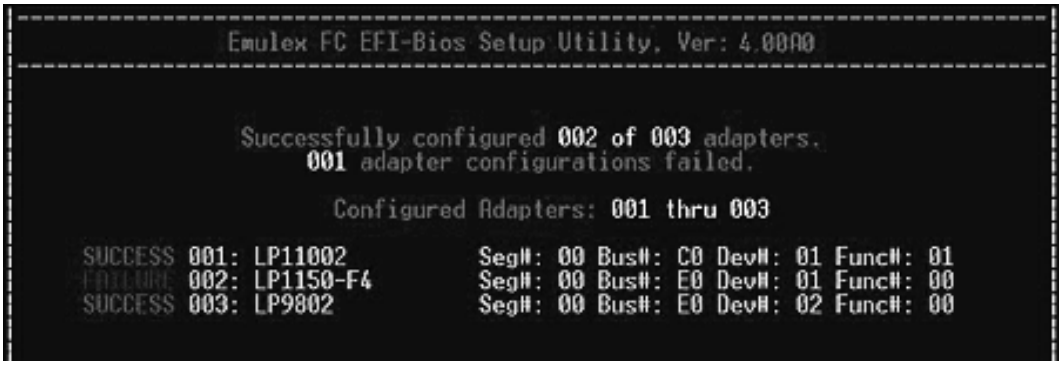

Figure 56: Unsuccessful Adapter Configuration screen

To migrate the configuration stored in a configuration file to the adapters in the system:

1. On the Save Configuration menu, select, **2. Batch Configure Adapters**. You are prompted to select a source for the configuration (Figure 52).
2. Select **2. Read Configuration From File**. The screen shown in Figure 57 prompts you to enter a directory path to the previously saved configuration file.

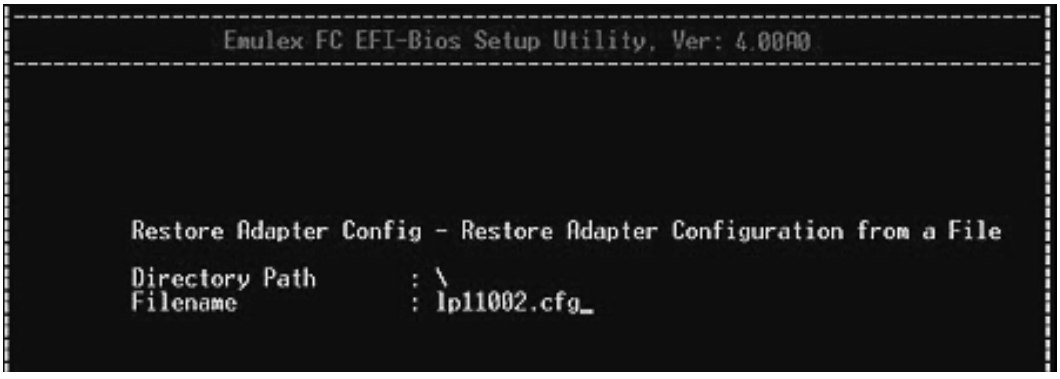

Figure 57: Read Configuration Path screen

3. Enter the directory path and file name and press **<Enter>**. A list of the adapters in the system is displayed (Figure 54).

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4. Select (check) the adapters that are to be batch configured. To select an adapter, highlight the row and press the space bar.
5. Press **<P>** to configure the selected adapters. If the adapters are configured successfully, the screen shown in Figure 55 is displayed.

   If all adapters are not configured successfully, the screen shown in Figure 56 is displayed.

Updating an Adapter's Firmware or Boot Code

Updating a Single Adapter

Note: If you are updating boot code on an adapter that is already attached to a boot device, it is recommended that you use the EFI utility, and not another utility such as the HBAnyware utility, to perform the update.

To update the boot code using the EFI utility:

1. On the main EFI utility menu, select **2. Firmware Update**, and press **<Enter>**.
2. On the Firmware Update Utility menu, select **1. Update Selected Adapter**, and press **<Enter>,**

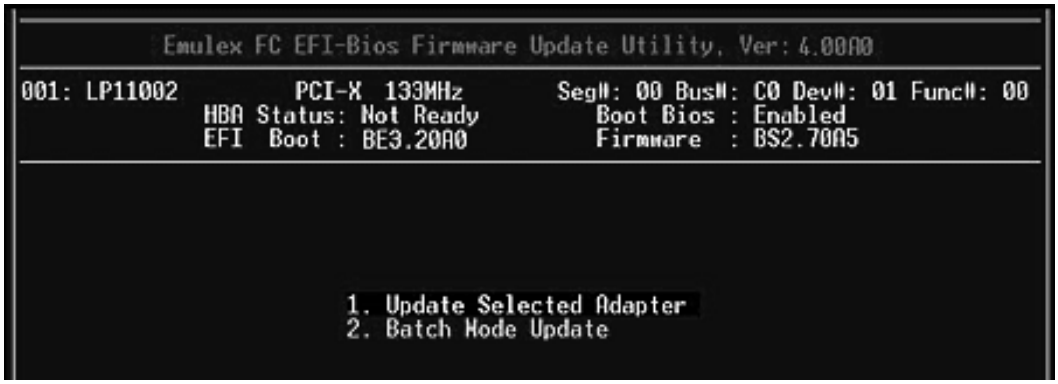

Figure 58: Update Selected Adapter

3. Enter the directory path and filename in the screen that is displayed (Figure 59). Press **<Enter>**.

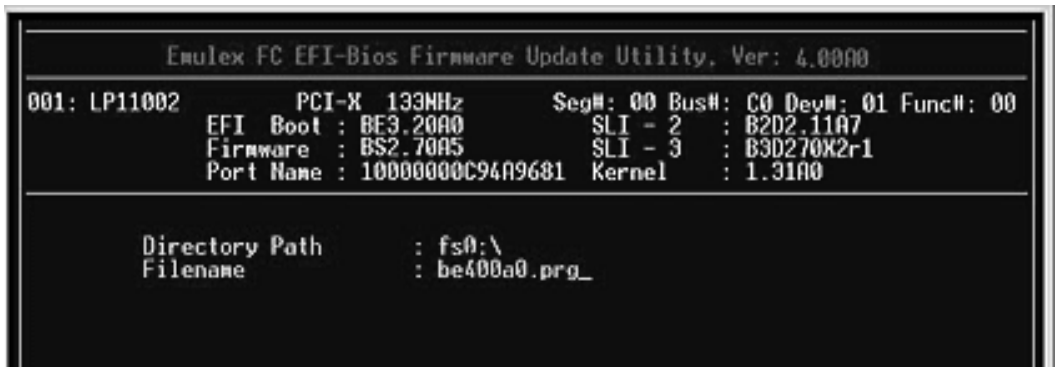

Figure 59: Directory Path and Filename Information

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The boot code is updated on the selected adapter. Information similar to Figure 60 is displayed.

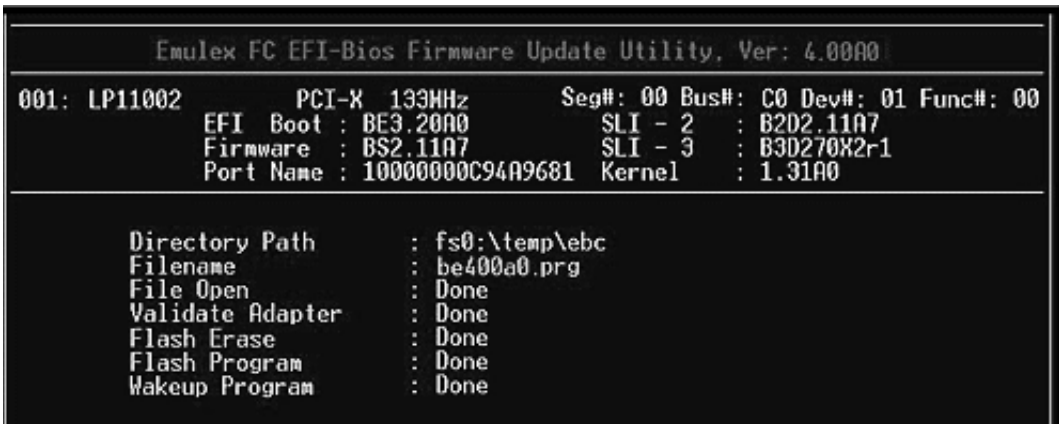

Figure 60: Successful Boot Code Update screen

4. Reboot the system for this change to take effect.

Update Firmware or Boot Code Across Multiple Adapters

1. On the main EFI utility menu select **2. Firmware Update**, and press **<Enter>**. The Firmware Update Utility menu is displayed (Figure 58).
2. Select **2. Batch Mode Update**, and press **<Enter>**. A list of all adapters of the model selected when you started the EFI utility is displayed (Figure 61).

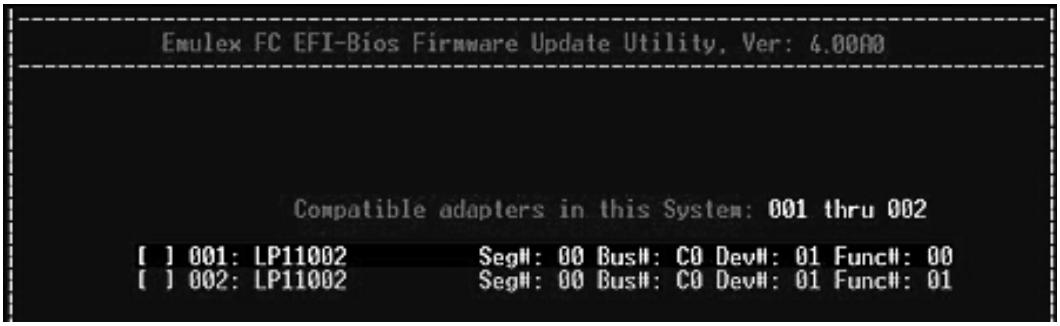

Figure 61: Compatible Adapter List

3. Check the adapters you want to update. To select an adapter, use the up/down arrow keys to highlight it, and press the space bar.
4. Press **<P>** to update the firmware or boot code. You are prompted for a directory path and file name for the firmware or boot code image file (Figure 62). Enter the path and file name, and then press **<Enter>**.

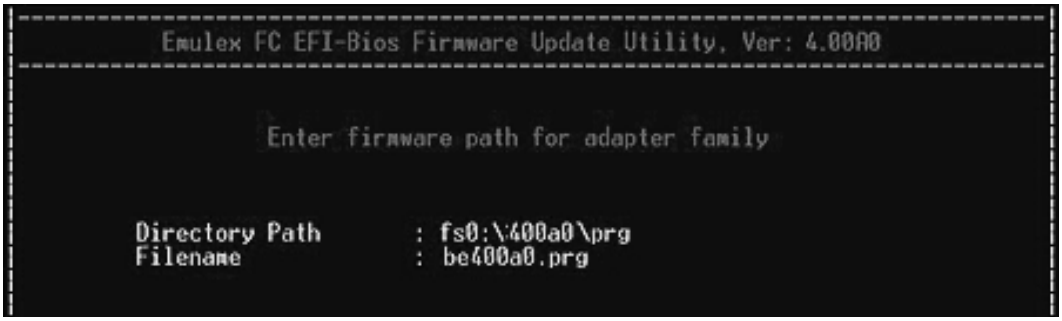

Figure 62: Batch Mode Update path screen

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The boot code update begins on the first adapter. Information similar to Figure 63 is displayed for each adapter:

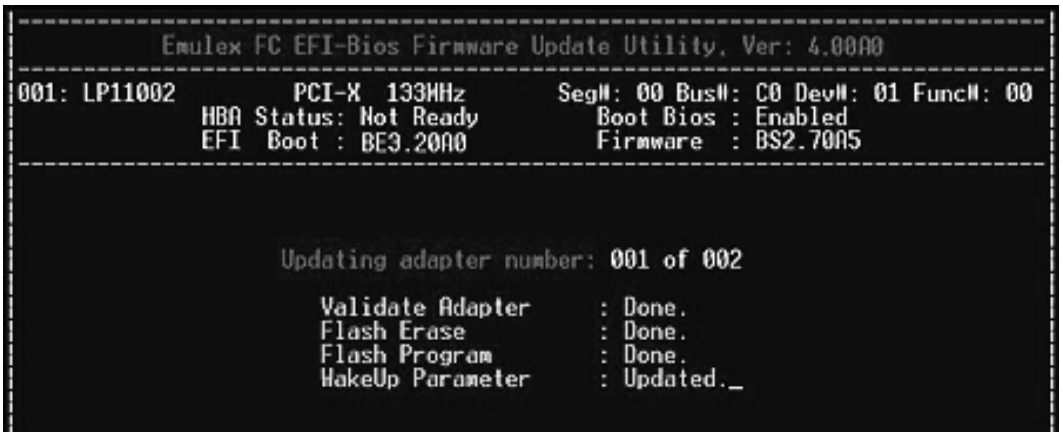

Figure 63: Boot Code Update Progress screen

After all adapters are updated, a listing with success or failure status is displayed (Figure 64).

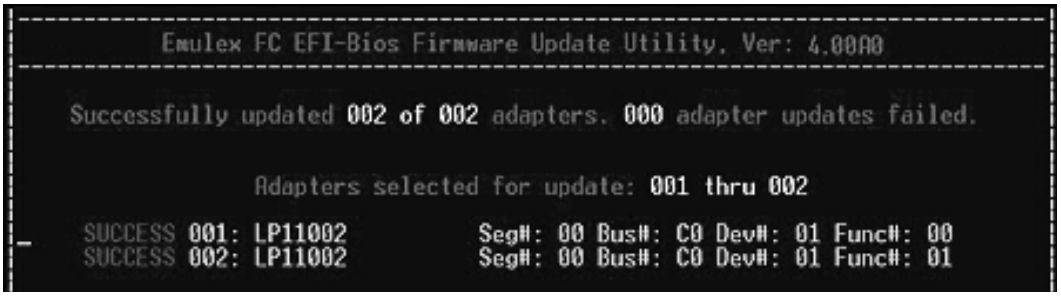

Figure 64: Successful Batch Update screen

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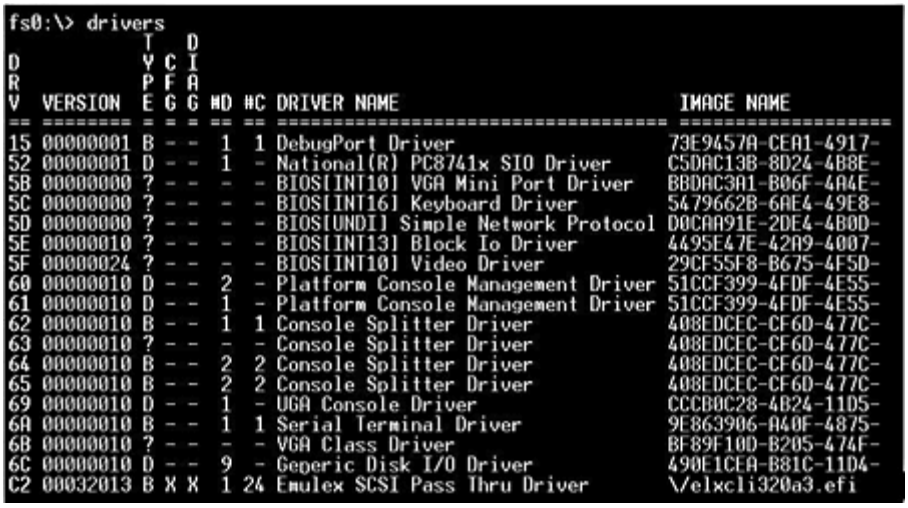
EFIBoot Reference

Driver Handle Table Column Definitions

To view Emulex driver handle information, at the shell prompt type:

```
drivers
```

A list of drivers is displayed.



```
fs0:\> drivers
          T   D
D         Y C I
R         P F A
V  VERSION  E G G #D #C DRIVER NAME                          IMAGE NAME
== ======== = = = == == ================================= ==================
15 00000001 B - -  1  1 DebugPort Driver                   73E9457A-CEA1-4917-
52 00000001 D - -  1  - National(R) PC8741x SIO Driver     C5DAC13B-8D24-4B8E-
5B 00000000 ? - -  -  - BIOS[INT10] VGA Mini Port Driver   BBDAC3A1-B06F-4A4E-
5C 00000000 ? - -  -  - BIOS[INT16] Keyboard Driver        5479662B-6AE4-49E8-
5D 00000000 ? - -  -  - BIOS[UNDI] Simple Network Protocol D0CAA91E-2DE4-4B0D-
5E 00000010 ? - -  -  - BIOS[INT13] Block Io Driver        4495E47E-42A9-4007-
5F 00000024 ? - -  -  - BIOS[INT10] Video Driver           29CF55F8-B675-4F5D-
60 00000010 D - -  2  - Platform Console Management Driver 51CCF399-4FDF-4E55-
61 00000010 D - -  1  - Platform Console Management Driver 51CCF399-4FDF-4E55-
62 00000010 B - -  1  1 Console Splitter Driver            408EDCEC-CF6D-477C-
63 00000010 ? - -  -  - Console Splitter Driver            408EDCEC-CF6D-477C-
64 00000010 B - -  2  2 Console Splitter Driver            408EDCEC-CF6D-477C-
65 00000010 B - -  2  2 Console Splitter Driver            408EDCEC-CF6D-477C-
69 00000010 D - -  1  - UGA Console Driver                 CCCB0C28-4B24-11D5-
6A 00000010 B - -  1  1 Serial Terminal Driver             9E863906-A40F-4875-
6B 00000010 ? - -  -  - VGA Class Driver                   BF89F10D-B205-474F-
6C 00000010 D - -  9  - Generic Disk I/O Driver            490E1CEA-B81C-11D4-
C2 00032013 B X X  1 24 Emulex SCSI Pass Thru Driver       \elxcli320a3.efi
```

Figure 65: Driver Listing screen

Driver Handle Table Column Definitions

Drv - The device driver handle number.

Version - The driver version.

Type - The device type. D indicates a device driver. B indicates a Bus driver.

Cfg - If this column is marked with an X, the driver is supported by the EFI utility (configuration protocol).

Diag - If this column is marked with an X, the driver is supported by the EFI diagnostic protocol.

#D - The number of devices for the driver.

#C - The number of child devices for the driver (Bus drivers only).

Driver Name and Image Name - The driver and image name.

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Topology Information

Arbitrated Loop Operation

- FC-AL (Loop) topology only is used. After successful loop initialization, the driver attempts login with FL_PORT (switched fabric loop port).
- If FL_PORT login is successful, public loop operation is entered.
- If FL_PORT login is unsuccessful, private loop mode is entered.

Point-to-Point Operation

- If F_PORT (point-to-point) login is successful, fabric mode is used.
- If F_PORT login is unsuccessful, N_PORT-to-N_PORT direct connection topology is used.
- If a switch is discovered, the driver performs the following tasks:
    - FL_PORT login (FC-AL topology) or F_PORT login (Point-to-Point topology).
    - Simple Name Server login.
    - State Change Registration.
    - Symbolic Name Registration.
    - FCP Type Registration if RegFcpType is set to 1.
    - Driver logs out and re-logs in. The name server indicates that registration is complete.
    - Simple Name Server Query for devices (the registry parameter SnsAll determines whether all N_PORTS are requested or only SCSI FCP N_PORTS).
    - Discovery/device creation occurs for each target device described by the name server.
    - RSCN and LOGO/PRLO are handled by the driver. Reception of either causes new discovery/logins to take place.

Note: In a fabric environment, the order in which disk devices are created is based on the name server response data (which is not guaranteed to be in any special order). Between successive boots, the same device may be identified with a different physical device number. However, any devices that have been assigned a device letter through the disk administrator continue to use that letter regardless of the physical device number.

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Troubleshooting

There are circumstances in which your system may operate in an unexpected manner. The Troubleshooting section explains several of these circumstances and offers one or more workarounds for each situation.

x86 BootBIOS Troubleshooting

The Bootup Message Does Not Appear As the System Boots

Situation: You want to access the BIOS utility, but the bootup message does not appear.

Resolution: Make sure that x86 BootBIOS has been loaded and enabled.

Retry This Adapter Message

Situation: The message "Retry This Adapter" appears during BIOS scanning.

Resolution: Check the hardware configuration or reconfigure the adapter BIOS using the BIOS utility.

Cannot Mount Root File System Message (Solaris SFS Driver)

Situation: The message “Cannot Mount Root File System” appears during bootup.

Resolution: Make sure the correct storage device is identified in the scsi_vhci.conf file. The XP128 storage array is used in the following example:

```
# cd /kernel/drv
# pg scsi_vhci.conf
#
# Copyright 2004 Sun Microsystems, Inc.  All rights reserved.
# Use is subject to license terms.
#
# pragma ident   "@(#)scsi_vhci.conf     1.9     04/08/26 SMI"
#
name="scsi_vhci" class="root";
.
.
.
device-type-scsi-options-list =
"HP      OPEN-3*4", "symmetric-option";
symmetric-option = 0x1000000;
#
```

Cannot Find UNIX Kernel Message (Solaris SFS Driver)

Situation: The message “Cannot Find UNIX Kernel” appears during bootup.

Resolution: Set up the correct LUN to boot in the BIOS utility. The correct LUN can be seen at the end of the Device Address line when you issue a `luxadm display <device>` command; See the luxadm documentation from Sun for more information.

No Such Partition Message (Solaris SFS Driver)

Situation: The message “No Such Partition” appears during bootup:

Resolution: Make sure the correct boot device is selected at the GRUB menu. See the GRUB documentation from Sun and the /boot/grub/menu.lst for more details.

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OpenBoot

The System Cannot mount or fsck /etc/vfstab a FC Boot Disk (Solaris LPFC Driver)

Situation: During the boot process, the system cannot mount or fsck /etc/vfstab a FC boot disk.

Resolution: Make sure that persistent binding is implemented correctly.

A Loaded File Is Not Executable (Solaris LPFC Driver)

Situation: After entering boot disk, a message states that the file that was loaded is not executable.

Resolution: The boot block may not be installed correctly to the FC drive. See *Configure Boot from SAN on Solaris LPFC (SPARC)* on page 8.

The System Hangs or Reboots After Displaying Driver Information (Solaris LPFC Driver)

Situation: The system hangs for a long time after displaying driver information, or it reboots after displaying driver information.

Resolution: Possible incorrect topology set in the /kernel/drv/lpfc.conf file on the target disk.

FC Disk Is Not Found (Solaris LPFC Driver)

Situation: You have performed the setup tasks and the FC disk is not found when you reboot the system.

Resolution: If the FC disk is not found when the system is rebooted, it may be necessary to do the following:

1. Type "cfgadm -a" to list the target.
2. Type "cfgadm -vc configure c1::c5t2200002037AE0091" to configure the FC target.
3. Type "cfgadm -c unconfigure c1" to remove the FC target.

   It may also be necessary to add an entry for the boot drive to the sd.conf file.

The Displayed List of Emulex Adapters Ends with “fibre-channel” (Solaris LPFC Driver)

Situation: After all Emulex adapters have been enabled to boot from SAN, the system has been rebooted, and you show all system devices, the path to an Emulex adapter ends with “fibre-channel”, for example:

```
/pci@1f,2000/fibre-channel
```

instead of “lpfc@#”, for example:

```
/pci@1f,4000/lpfc@2
```

Resolution: The OpenBoot code is not loaded in the adapter’s firmware. You must install OpenBoot before you can set up boot from SAN on the adapter (see page [insert cross reference]).

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EFIBoot

The EFI Diagnostic Utility tests all hardware and hardware components in your system.

Conventions

- Press the up/down arrows on your keyboard to move through and highlight menu options or configuration fields. Menus with adapter listings and information display up to eight rows at a time. If applicable, press the up/down arrows to scroll to additional adapters.
- Press the left/right arrows on your keyboard to scroll through pages of information.
- Press **<Enter>** to select a menu option.
- Press **<Esc>** to return to the previous menu.
- Press the space bar to select or check a test data pattern. All patterns are selected by default.
- Press **<F1>** to view online help for a menu item.
- Press **<F2>** to clear the status (Passed, Failed or Unsupported) of each test on a data test pattern menu. This clears the menu, but does not clear the results log.
- Press **<F3>** to execute a selected test pattern.
- Press **<F4>** to reset the data patterns back to the default (all checked).
- When you view any of the Adapter Data information, press any key to return to the Diagnostic Main menu.

Accessing the EFI Diagnostic Utility

Note: Before you can use the EFI utility for the first time, you must install it.

To access the main EFI utility:

1. To view Emulex driver image handle information, at the shell prompt type:

   ```
   fs0:\> drivers
   ```

   A list of drivers is displayed (See “Drive List example” on page 29)

2. Enter this command, followed by the driver image handle for the SCSI Pass Thru driver. For example, C2 (your driver image handle may be different:

   ```
   drvdiag-s c2
   ```

3. Press **<Enter>**. Information similar to Figure 66 is displayed, listing all adapters in the system:

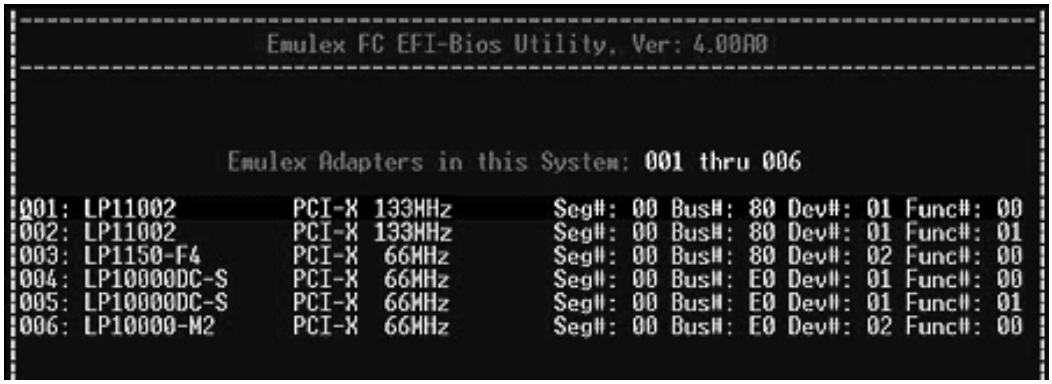

Figure 66: Adapter Listing screen

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4. Use the up/down arrows and to select (highlight) an adapter and press **<Enter>**. The Diagnostic Main menu is displayed:

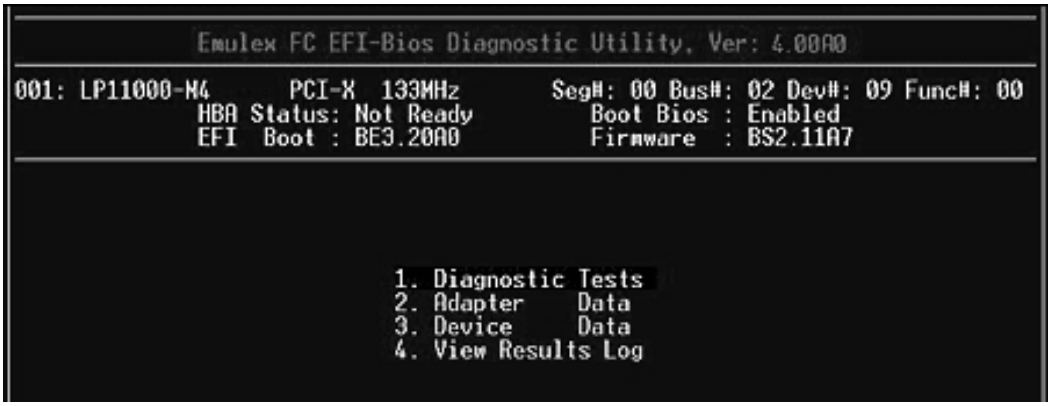

Figure 67: Diagnostic Main menu

Running Loopback Tests

Test patterns for the PCI Loopback, Internal Loopback and External Loopback tests may be selected to be run individually. Test indicators are Passed, Failed or Unsupported. Unsupported is displayed if the test is not supported. For example, if an unsupported link speed is selected, a test is not performed at the unsupported speed, and a status of Unsupported is displayed in front of the link speed on the link speed menu.

To run a single test:

1. Access the Diagnostic Main menu (Figure 67) and select **<1>**. Diagnostic Tests. Press **<Enter>**. The Diagnostic Tests menu is displayed:

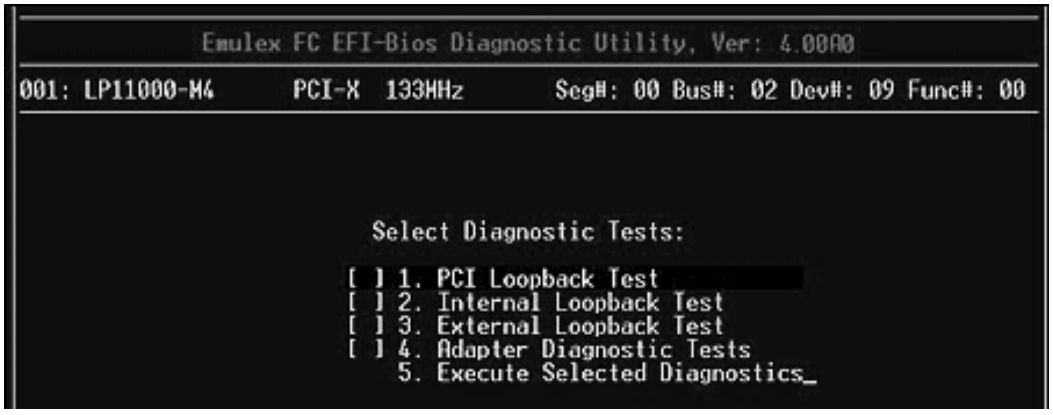

Figure 68: Diagnostic Tests menu

2. Use the up/down arrow keys to highlight a test and press the space bar. That test is checked.
3. Press **<F3>**. The selected test runs.

To run multiple tests from the Diagnostic Tests menu:

1. On the Diagnostic Main menu (Figure 67), select **<1>**. Diagnostic Tests. Press **<Enter>**. The Diagnostic Tests menu is displayed (Figure 68).
2. Use the up/down arrow keys to highlight tests and press the space bar to select or deselect.
3. Highlight **<5>**. Execute Selected Diagnostics. Press **<Enter>**. The selected tests run.

To run individual Loopback test patterns:

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1. Access the Diagnostic Main menu (Figure 67) and select **<1>**. Diagnostic Tests. Press **<Enter>**. The Diagnostic Tests menu is displayed (Figure 68).
2. Use the up/down arrow keys to highlight a test. Press <**Enter>**.
3. Another menu is displayed. Select one or more individual patterns for the diagnostic test. For example:

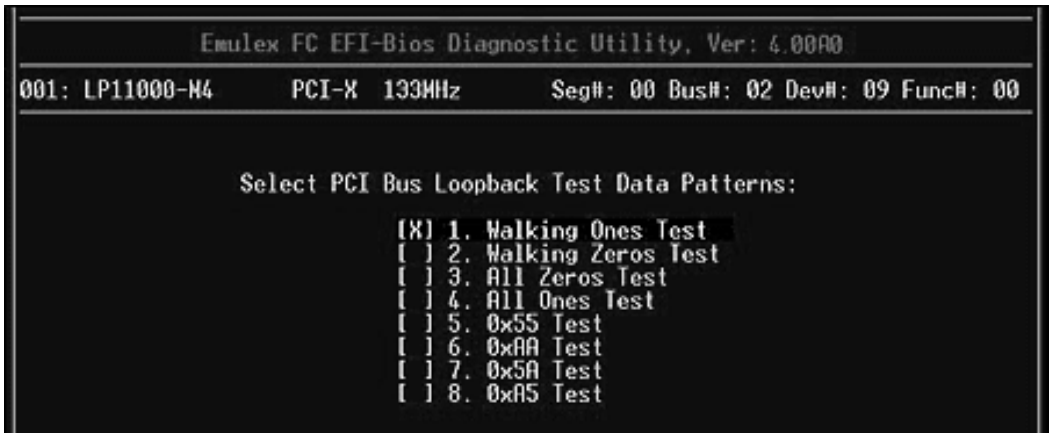

Figure 69: PCI Loopback Test Data Patterns menu

4. Press **<Esc>** one or more times as necessary to display the Diagnostic Tests menu.
5. Use the up/down arrow keys to highlight <5>. Execute Selected Diagnostic. and press **<Enter>**. The selected tests run. After tests are performed, the status of each selected pattern is displayed. For example:

Figure 70: PCI Loopback Test Data Pattern Status menu

Diagnostic Test Specifics

PCI Loopback Test

The PCI loopback test executes the RunBuiDiag64 mailbox command once for each test pattern. The data length for each test is 128 bytes. A loopback connector is required for this test.

Internal and External Loopback Tests

Internal and external loopback tests execute the ElsEcho FCP command to send 124 bytes from the transmit to the receive side of an FC port. A loopback connector is required for the external loopback test.

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Internal and external loopback test menus have two configurations (data patterns and link speeds). The data test patterns are the same as the PCI Loopback patterns (Figure 69).

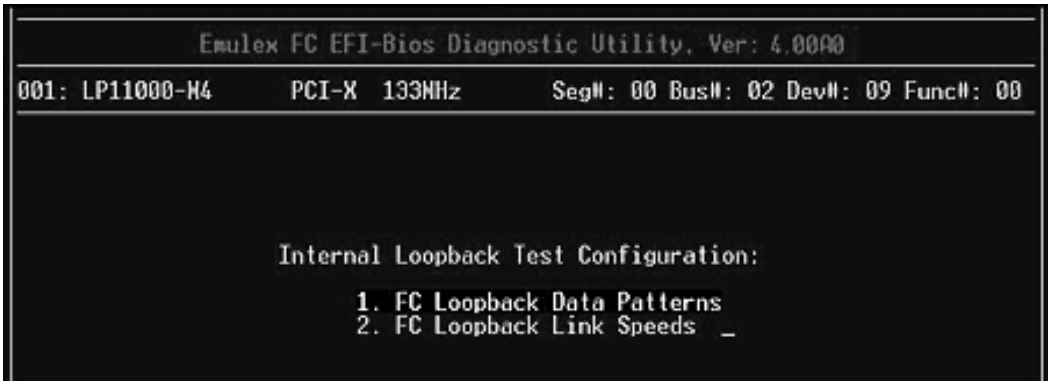

Figure 71: Internal Loopback Test Configuration menu

Internal and external loopback link speeds have the same three options. Link speed defaults to one Gb for both internal and external tests.

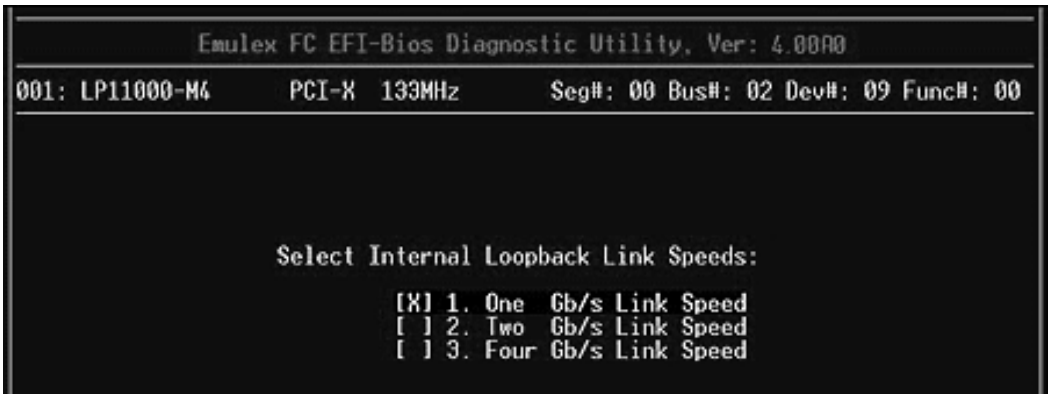

Figure 72: Internal Loopback Link Speeds menu

As tests are performed a screen similar to the following is displayed:

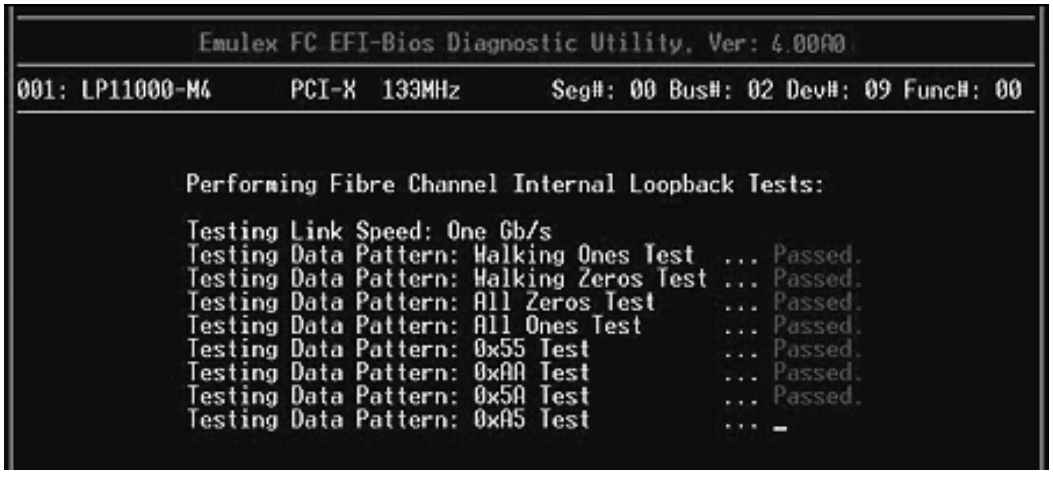

Figure 73: Internal Loopback Test progress screen

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Test results are displayed on the Test Data Pattern menu and saved to results log.

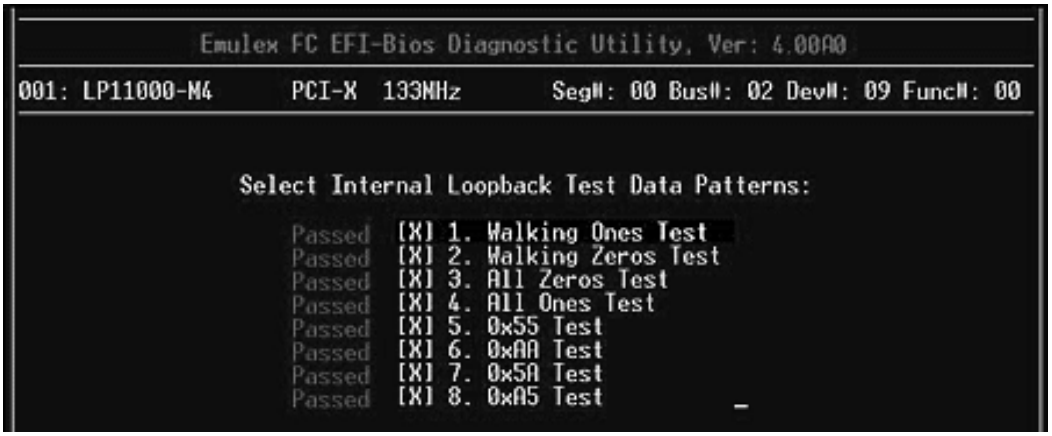

Figure 74: Internal Loopback Test Data Pattern results screen

Running Adapter Diagnostic Tests

The Adapter Diagnostic Tests include adapter restart, display of some configuration parameters, results of linkup and target login. These actions cannot be selected individually. If any one of these tests fail, Failed is displayed on the Diagnostic Test menu (Figure 68).

When you run adapter diagnostic tests, a screen similar to the following is displayed:

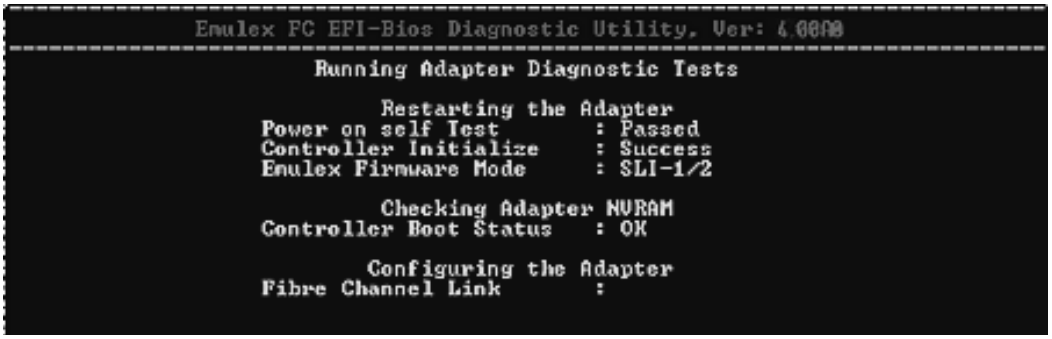

Figure 75: Running Adapter Diagnostic Tests In progress screen

If all tests pass, “Passed” is displayed on the Diagnostic Utility menu. For example:

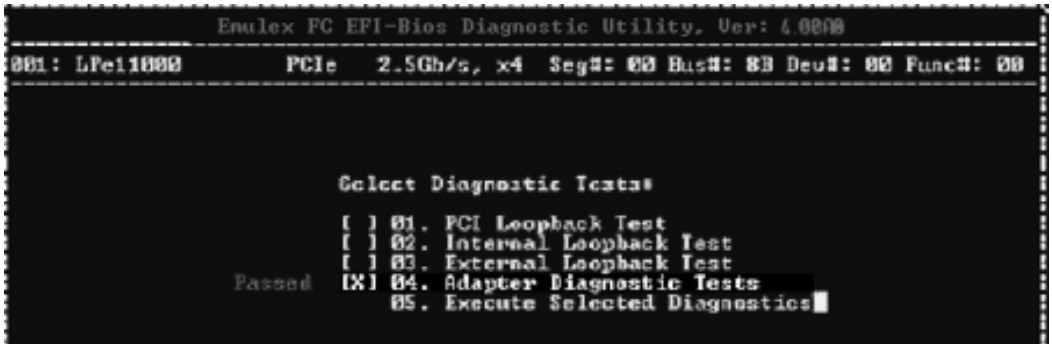

Figure 76: Select Diagnostic Tests - Adapter Diagnostic Tests Passed screen

If any one of these tests fail, Failed is displayed on the Select Diagnostic Tests screen.

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Viewing Adapter Data

To view data for a specific adapter:

1. Access the Diagnostic Main menu (Figure 67) and select **<2>**. Adapter Data. Press **<Enter>**. The Adapter Data menu is displayed:

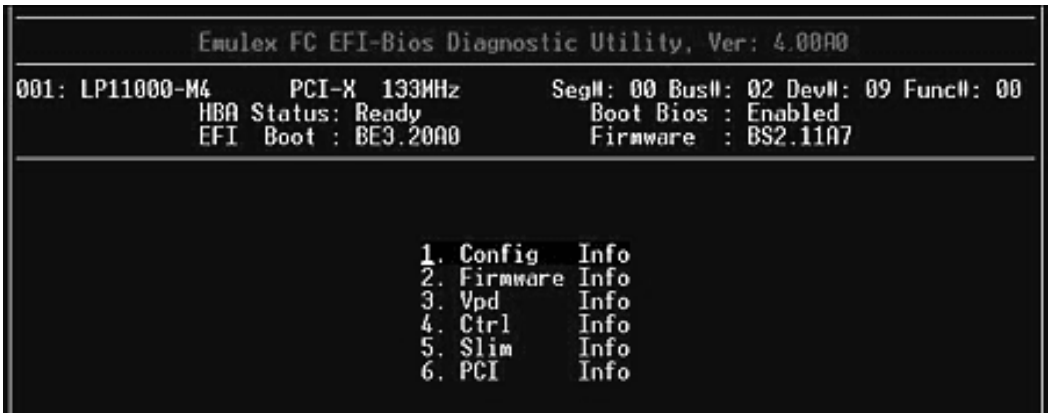

Figure 77: Adapter Data menu

Examples

Figure 78: Configuration Information screen

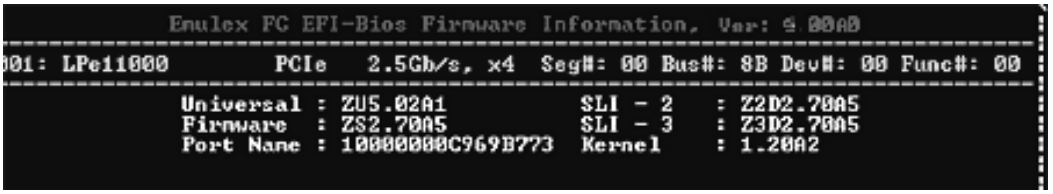

Figure 79: Firmware Information screen

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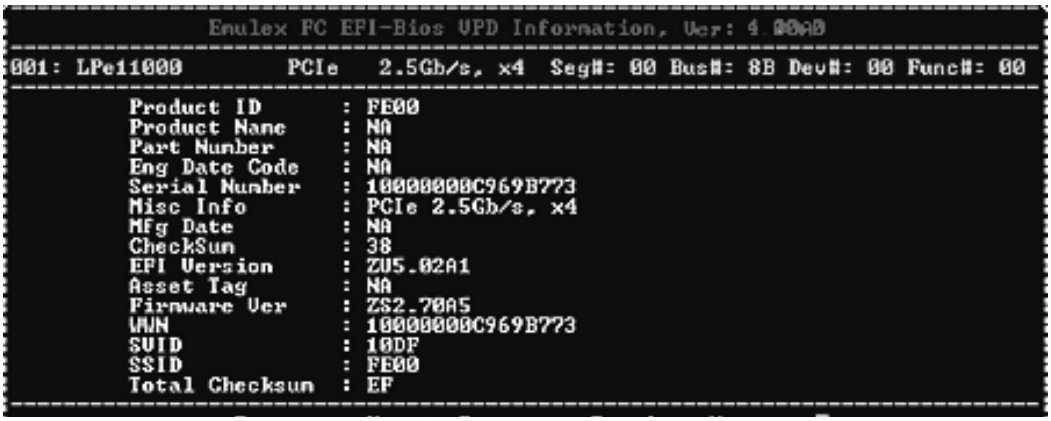

Figure 80: Vendor Product Data (VPD) screen

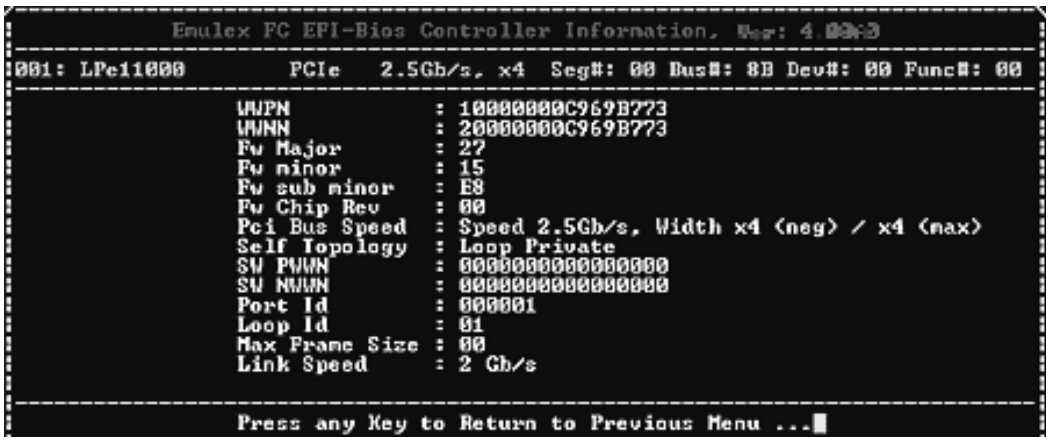

Figure 81: Controller Information screen

Figure 82: Service Level Interface Memory (SLIM) Information screen

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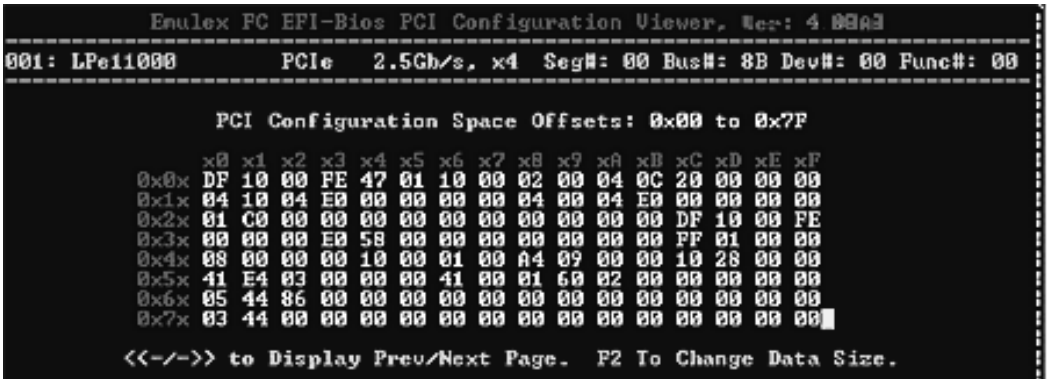


Figure 83: Peripheral Component Interconnect (PCI) Information screen

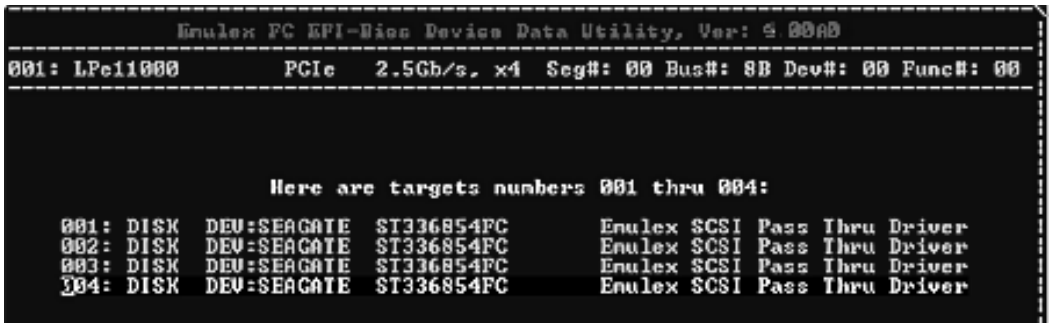
Note: View up to 256 bytes of PCI configuration space using paging. 128 bytes display at a time. Use the **<F2>** key to select byte, word, or dword display.

Viewing Device Data

The device data is stored in the results log and is displayed on the console in ASCII and hex format.

To view data for attached block devices:

1. Access the Diagnostic Main menu (Figure 67) and select **<3>**. Device Data. Press **<Enter>**. The Device Data Target Selection menu is displayed.



Note: Up to eight devices are displayed per page. If there are more than eight devices, use the left/right arrow keys to scroll to the previous/next page.

Figure 84: Device Data Target Selection menu

2. Use the up/down arrow keys to highlight an attached block I/O device and press **<Enter>**. A screen similar to Figure 85 is displayed.

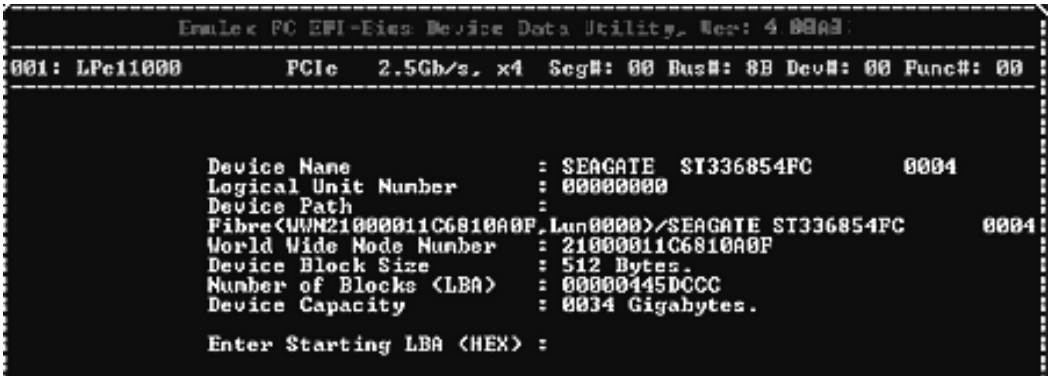


Figure 85: Device Data screen

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3. To read the individual block from the media, specify the logical block address (LBA) and press **<Enter>**. 256 bytes of sector data display per screen. Use the left/right arrow keys to scroll through the data. Information similar to the following is displayed:

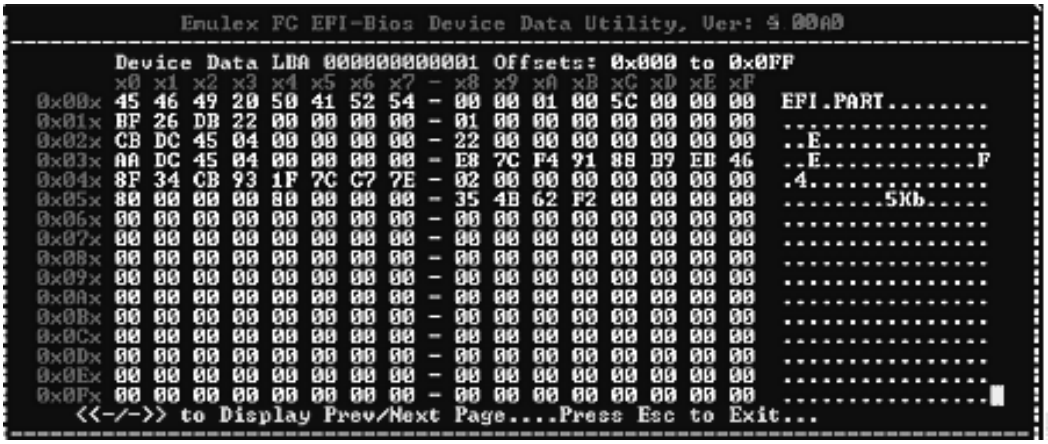

Figure 86: LBA Data screen

Viewing the Results Log

The results log stores diagnostic test results, adapter diagnostics and device data. The results log stores up to 8k of data (about 1,600 rows). Once the buffer is full, no more data is logged.

Note: There is no reminder when the buffer is full.

To view the results log:

1. Access the Diagnostic Main menu (Figure 67) and select **<4>**. View Results Log. Press **<Enter>**. A screen similar to the following is displayed:

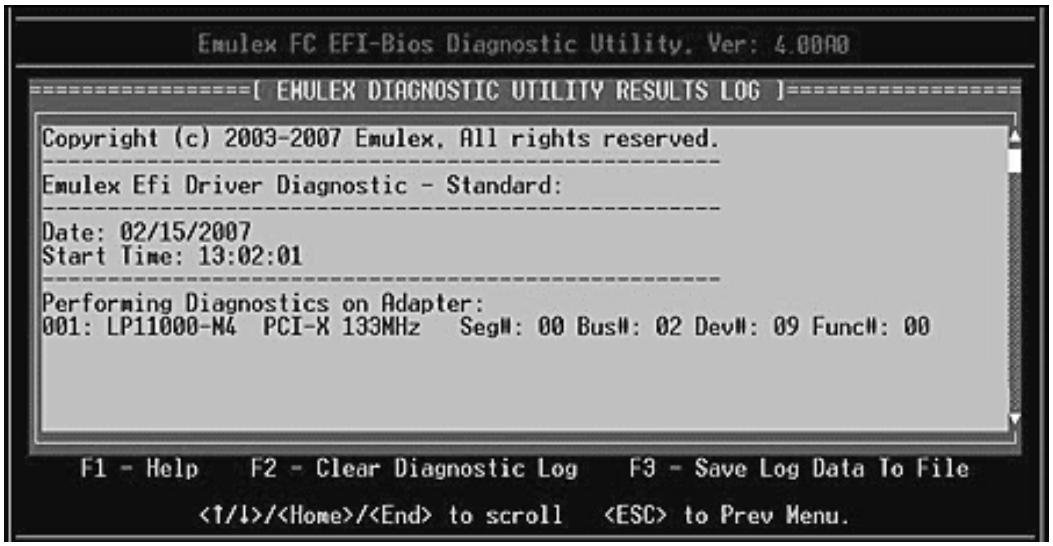

Figure 87: Results Log screen

To scroll through the results log:

- Use the up/down arrow keys to scroll one row at a time.
- Use the Home/End keys to scroll one page at a time.

Note: The Page Up and Page Dn keys do not navigate the results log.

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To view help on the results log screen.

1. Press **<F1>**. Help text is displayed.
2. Press **<Esc>**. Log results are displayed.

To save results log information:

1. View the results log.
2. Press **<F3>.** The Log to File screen is displayed.

Figure 88: Log to File screen

3. Enter the directory path and press **<Enter>**. The Filename field is displayed.
4. Enter the filename and press **<Enter>**.

Note: The filename must be unique.

Once the file is successfully saved, a screen similar to the following is displayed:

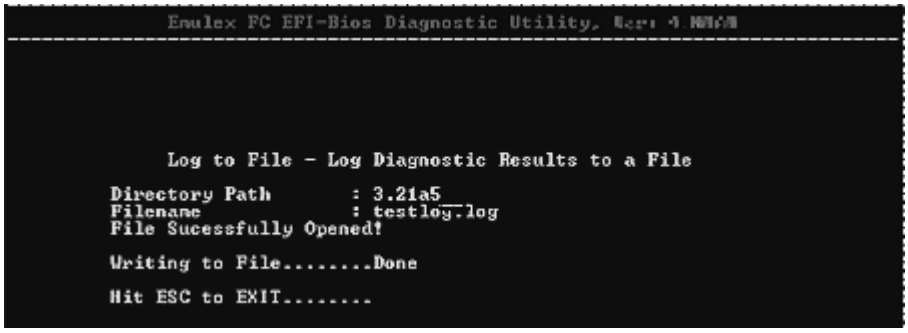

Figure 89: Successful Log to File screen

To clear the log result, press **<F2>**. The results on the diagnostic tests are erased, and a new time and date is written to the log.

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