User’s Guide

Fibre Channel and Fibre Channel over Ethernet
UEFI Configuration and Diagnostic Protocols
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Preface

The QLogic unified extensible firmware interface (UEFI) driver configuration protocol allows you to display and modify the adapter parameters stored in the nonvolatile memory on the adapter. The QLogic UEFI driver diagnostic protocol provides a minimal set of adapter diagnostics. Both protocols are provided as part of the QLogic UEFI extended SCSI pass-thru (ESPT) protocol driver. You can invoke either protocol from the UEFI shell. Each protocol uses a menu-driven interface that allows you to display and modify adapter configuration and diagnostic parameters. Both protocols support EFI 1.xx and UEFI 2.xx systems.

Intended Audience

This User Guide is intended for IT administrators who need to perform the following for their QLogic Fibre Channel/Fibre Channel over Ethernet (FCoE) adapters in UEFI environments:

- Display, configure, and modify adapter parameters resident in the Flash image on the adapter
- Run diagnostics

What Is in This Guide

This design guide contains the basic information you need to get started with the QLogic UEFI configuration and diagnostic protocols.

This preface gives an overview of the QLogic UEFI configuration and diagnostic protocols, specifies the intended audience, lists related documents, explains typographic conventions used in this guide, refers you to the QLogic license agreements, and provides technical support and contact information.

The remainder of the user's guide is organized into the following chapters:

- **Chapter 1 UEFI Driver Configuration** lists the hardware, software, and operating system requirements that must be met to ensure successful operation of the QLogic UEFI configuration and diagnostic protocols management utility.

- **Chapter 2 SAN Environment Features** describes how to install and uninstall QLogic UEFI configuration and diagnostic protocols.
Chapter 3 UEFI Driver Diagnostics describes how to customize QLogic UEFI configuration and diagnostic protocols. It includes starting and exiting the QLogic UEFI configuration and diagnostic protocols user interface, and getting help.

Appendix A AL_PA to Loop ID Conversion shows the correspondence between AL_PAs and loop IDs.

Related Materials

For information about downloading documentation from the QLogic Web site, see “Downloading Updates” on page xi.

Documentation Conventions

This guide uses the following documentation conventions:

- **NOTE** provides additional information.

- Text in blue font indicates a hyperlink (jump) to a figure, table, or section in this guide, and links to Web sites are shown in underlined blue. For example:
  - Table 9-2 lists problems related to the user interface and remote agent.
  - See “Installation Checklist” on page 3-6.
  - For more information, visit www.qlogic.com.

- Text in bold font indicates user interface elements such as a menu items, buttons, check boxes, or column headings. For example:
  - Click the Start button, point to Programs, point to Accessories, and then click Command Prompt.
  - Under Notification Options, select the Warning Alarms check box.

- Text in Courier font indicates a file name, directory path, or command line text. For example:
  - To return to the root directory from anywhere in the file structure: Type cd /root and press ENTER.
  - Enter the following command: sh ./install.bin
Text in italics indicates terms, emphasis, variables, or document titles. For example:

- For a complete listing of license agreements, refer to the QLogic Software End User License Agreement.
- What are shortcut keys?
- To enter the date type mm/dd/yyyy (where mm is the month, dd is the day, and yyyy is the year).

License Agreements

Refer to the QLogic Software End User License Agreement for a complete list of all license agreements affecting this product.

Technical Support

Customers should contact their authorized maintenance provider for technical support of their QLogic products. QLogic-direct customers may contact QLogic Technical Support; others will be redirected to their authorized maintenance provider. Visit the QLogic support Web site listed in Contact Information for the latest firmware and software updates.

For details about available service plans, or for information about renewing and extending your service, visit the Service Program Web page at http://www.qlogic.com/Support/Pages/ServicePrograms.aspx.

Downloading Updates

The QLogic Web site provides periodic updates to product firmware, software, and documentation.

To download firmware, software, and documentation:

2. Under QLogic Products, type the QLogic model name in the search box.
3. In the search results list, locate and select the firmware, software, or documentation for your product.
4. View the product details Web page to ensure that you have the correct firmware, software, or documentation. For additional information, click the Read Me and Release Notes icons under Support Files.
5. Click Download Now.
6. Save the file to your computer.
7. If you have downloaded firmware, software, drivers, or boot code, follow the installation instructions in the Readme file.

Instead of typing a model name in the search box, you can perform a guided search as follows:

1. Click the product type tab: Adapters, Switches, Routers, or ASICs.
2. Click the corresponding button to search by model or operating system.
3. Click an item in each selection column to define the search, and then click Go.
4. Locate the firmware, software, or document you need, and then click the icon to download or open the item.

Training

QLogic Global Training maintains a Web site at www.qlogictraining.com offering online and instructor-led training for all QLogic products. In addition, sales and technical professionals may obtain Associate and Specialist-level certifications to qualify for additional benefits from QLogic.

Contact Information

QLogic Technical Support for products under warranty is available during local standard working hours excluding QLogic Observed Holidays. For customers with extended service, consult your plan for available hours. For Support phone numbers, see the Contact Support link at support.qlogic.com.

Support Headquarters
QLogic Corporation
12701 Whitewater Drive, Suite 230
Minnetonka, MN 55343 USA

QLogic Web Site
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Technical Support Web Site
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Technical Support E-mail
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Technical Training E-mail
training@qlogic.com

Knowledge Database

The QLogic knowledge database is an extensive collection of QLogic product information that you can search for specific solutions. QLogic is constantly adding to the collection of information in the database to provide answers to your most urgent questions. Access the database from the QLogic Support Center: http://support.qlogic.com.
1 UEFI Driver Configuration

During the configuration process, make all changes to a local copy of the adapter parameters. Reverse these changes by using the Abandon or Quit options on the Main Menu. Commit the changes to the adapter’s nonvolatile memory by using the Write option on the Main Menu. See the following sections for details.

Starting the Configuration Protocol

For a more detailed description of the UEFI commands used in this procedure, see either the UEFI shell documentation provided with your computer or the UEFI project documentation at:


To access the configuration protocol from the UEFI shell:

1. Enter the following command:

   drivers

   A list of installed UEFI drivers is displayed in table form.

   Under the heading DRIVER NAME, locate the driver with name <OEM> Fibre Channel Driver (where OEM is QLogic or an OEM name). Note the driver’s handle number in the DRV column; this number is referred to as driverhandle.

   There may be one or more driver instances listed. If only one driver instance is listed, then it is managing one or more adapters. If more than one driver instance is listed, then each instance is managing a subset of the available adapters.

2. Enter the following command:

   drvcfg <driverhandle>

   A list of adapters managed by this driver is displayed. Note the controller handle number inside the brackets labeled Ctrl[]; this number is referred to as controllerhandle.

3. Enter the following command to start the configuration protocol:

   drvcfg -s <driverhandle> <controllerhandle>
The driver configuration **Main Menu** is displayed.

**NOTE**

Do not redirect the output of the driver configuration protocol. Redirecting console output may cause failures.

---

**Main Menu**

The driver configuration **Main Menu** contains the following options:

**Main Menu**

**NVRAM Parameters**

1. Edit Adapter Settings
2. Edit Advanced Settings
3. Edit Database
4. Edit Boot Settings

**Information**

5. Show Database
6. Show Translation
7. Show NVRAM Buffer
8. Info
9. Help

**Operation**

10. Abandon
11. Write
12. Quit

The **Main Menu** is divided into three sections: NVRAM Parameters, Information, and Operation. Use the NVRAM Parameters section to modify settings that are stored in the adapter’s nonvolatile memory. Use the Information section to view the user device, adapter, and help information. Use the Operation section to write and/or discard NVRAM data and quit the configuration protocol.
NV RAM Parameters

The NV RAM Parameters section of the Main Menu contains the following options:

- **Edit Adapter Settings.** This option displays the Edit Adapter Settings menu.
- **Edit Advanced Settings.** This option displays the Edit Advanced Settings menu.
- **Edit Database.** This option displays the Edit Database screen.
- **Edit Boot Settings.** This option displays the Edit Boot Settings menu.

Information

The Information section of the Main Menu contains the following options:

- **Show Database.** This option displays the contents of the WWN database in table form.
- **Show Translation.** This option displays the SCSI target ID translation table. This table is a list of SCSI ID (tid) and Fibre Channel loop ID mapping pairs. Each entry in the table contains the following parameters for each device:
  - SCSI ID (tid)
  - Fibre Channel loop ID (lid)
  - World wide port name (WWPN)
  - World wide node name (WWNN)

  All numbers are in hexadecimal. Tid values from 00h to 0Ah are persistent, and tid values above 0Ah are assigned sequentially as devices are discovered. Tid values above 80h are fabric attached, and values below 7Fh are arbitrated loop attached.

- **Show NV RAM Buffer.** This option displays the contents of the local NV RAM buffer in hexadecimal. This buffer is the local buffer containing changes made before using the Write selection to commit the changes to the adapter NV RAM.

- **Info.** This option displays the following adapter information:
  - Adapter UEFI device path
  - Adapter WWPN
  - Adapter WWNN (not available on 2Gb adapter)

  The device path determines which adapter configuration is being displayed.

- **Help.** This option displays a brief description of the Main Menu selections.
Operation

The Operation section of the **Main Menu** contains the following options:

- **Abandon.** This option discards the changes in the current configuration protocol local buffer and reloads its contents from the adapter NVRAM.

- **Write.** This option writes the current configuration protocol local buffer to the adapter NVRAM. Use this option any time you change a menu selection that modifies configuration data. When the NVRAM has been successfully written, the configuration protocol local buffer is reloaded from the adapter NVRAM.

- **Quit.** This option quits the configuration protocol and returns to the UEFI shell. Use the **Write** selection to write any changes to the adapter NVRAM before quitting.

Edit Adapter Settings Menu

The **Edit Adapter Settings** menu contains the following options:

**Edit Adapter Settings**

0. Previous Menu
1. Enable Hard Loop Id [n]
2. Hard Loop Id (hex) [0]
3. Reset Delay [5]
4. Enable FC Tape [y]
5. Frame Size [2048]
6. Connection Option [Loop Preferred, Otherwise Point To Point]
7. Data Rate [Auto]

The **Edit Adapter Settings** menu options are described in the following paragraphs:

- **Previous Menu.** This option returns you to the previous menu.

- **Enable Hard Loop Id.** When this option is **y** (enabled), the adapter attempts to use the loop ID specified in the **Hard Loop Id** option. The **Enable Hard Loop Id** option is not available on Converged Network Adapters.

- **Hard Loop Id.** If the **Enable Hard Loop Id** option is **y** (enabled), the adapter attempts to use the loop ID specified in this option. Valid values for this option are in the range of 0h–7Dh. To convert an arbitrated loop physical address (AL_PA) to a loop ID, see the table in **Appendix A**. This option is not available on Converged Network Adapters.

- **Reset Delay.** After resetting the loop, the firmware refrains from initiating any loop activity for the number of seconds specified in this option.
- **Enable FC Tape.** This option enables FCP-2 recovery.
- **Frame Size.** This option specifies the maximum frame length supported by the adapter.
- **Connection Option.** This option defines the type of connection (loop or point-to-point) or connection preference. This option is not available on Converged Network Adapters.
- **Data Rate.** This option determines the Fibre Channel data rate. This option is not available on Converged Network Adapters.

## Edit Advanced Settings Menu

The **Edit Advanced Settings** menu contains the following options:

1. Operation Mode [Interrupt for every I/O completion]
2. Interrupt Delay Timer [0]
3. Execution Throttle [16]
4. Login Retry Count [8]
5. Port Down Retry Count [16]
6. Link Down Timeout [8]
7. Luns Per Target [512]
8. Enable Extended Logging [n]
9. Enable LIP Reset [n]
10. Enable LIP Full Login [y]
11. Enable Target Reset [y]

The **Edit Advanced Setting** menu options are described in the following paragraphs:

- **Previous Menu.** This option returns you to the previous menu.
- **Operation Mode.** This option specifies the reduced operation (RIO) modes, if supported by the software driver. RIO modes allow posting multiple command completions in a single interrupt. This option is not available on all adapters.
- **Interrupt Delay Timer.** This option contains the value (in 100-microsecond increments) used by a timer to set the wait time between accessing (DMA) a set of handles and generating an interrupt. This option is not available on all adapters.
- **Execution Throttle.** This option specifies the maximum number of commands executing on any one port. When a port’s execution throttle is reached, no new commands are executed until the current command finishes executing. Valid values for this option are in the range of 1–256. This option is not available on all adapters.

- **Login Retry Count.** This option specifies the number of times the software tries to log into a device.

- **Port Down Retry Count.** This option specifies the number of seconds the software retries a command to a port returning port down status.

- **Link Down Timeout.** This option specifies the number of seconds the software waits for a link to come up.

- **Luns Per Target.** This option specifies the number of LUNs per target. Multiple LUN support is typically for redundant array of independent disks (RAID) boxes that use LUNs to map drives.

- **Enable Extended Logging.** This option provides additional error and debug information to the operating system. This option is not available on all adapters.

- **Enable LIP Reset.** This option determines the type of loop initialization process (LIP) reset that is used when the operating system initiates a bus reset routine. When this option is `y`, the driver initiates a global LIP reset to clear the target device reservations. When this option is `n`, the driver initiates a global LIP reset with full login. This option is not available on Converged Network Adapters.

- **Enable LIP Full Login.** This option instructs the ISP controller to re-login to all ports after any LIP. This option is not available on Converged Network Adapters.

- **Enable Target Reset.** This option enables the drivers to issue a Target Reset command to all devices on the loop when a SCSI Bus Reset command is issued.

---

**Edit Database Menu**

This **Main Menu** selection allows you to view and modify a particular entry in the WWN database. The first parameter is the number of the entry in the database to be displayed; this is an integer between 0 and 4. The second parameter is the port WWN (WWPN) for the selected entry; this parameter is a 16-digit hexadecimal number with the current value displayed in parenthesis. If database entry 0 or 1 is selected, a third parameter, the node WWN (WWNN), is displayed. This parameter is a 16-digit hexadecimal number. If 0 is entered for the node WWN, the UEFI ESPT driver treats this database entry like a port WWN-only entry.
Edit Boot Settings Menu

The Edit Boot Settings menu contains the following options:

0. Previous Menu
1. Enable Alternate Boot Device [n]
2. Enable Selective Login [n]
3. Enable Selective LUN Logins [n]
4. OS Mode [Windows/Linux/Other]
5. EFI Variable EFIFCScanLevel [1]
6. Enable World Login [n]
7. Disable Adapter [n]
8. BIOS Selectable Boot [n]

The Edit Boot Setting menu options are described in the following paragraphs:

- **Previous Menu.** This option returns you to the previous menu.

- **Enable Alternate Boot Device.** This option notifies the driver to use WWN database entries 0 and 1 as the primary and alternate boot devices. If this option is **y** (enabled), the device with WWPN and WWNN in database entry 1 is reported to UEFI as the primary boot device (if the device with WWPN and WWNN in database entry 0 is not found). If the primary boot device is found, the secondary boot device is not reported to UEFI. When this option is **n** (disabled), entries 0 and 1 are both reported if found. This option is not available on all adapters.

- **Enable Selective Login.** This option notifies the driver to use the WWN database as a list of devices that the adapter is permitted to login. Set this option to **y** (enable) to limit the adapter device discovery to devices matching those in the WWN database.

- **Enable Selective LUN Logins.** This option is used with Enable Selective Login, which logs in only those devices in the adapter WWN database. If the Enable Selective LUN Logins option is **n** (disabled), all LUNs present on any logged in device are presented to UEFI. If this option is **y** (enabled), only the LUN specified in the WWN database associated with the device is logged into. Enable this option to eliminate scanning and presenting a large number of LUNs to UEFI when only one is desired.

- **OS Mode.** This option enables/disables the Boot Order List Login feature. If the OS Mode is set to Windows/Linux/Other, Boot Order List Login is disabled. If OS Mode is set to HP-UX/OpenVMS, Boot Order List Login is enabled.
- **EFI Variable EFIFCScanLevel.** This option is used with the Boot Order List Login feature. The variable `EFIFCScanLevel` is maintained by UEFI in the system NVRAM. If the variable is not defined or set to 0, only devices in the Boot Order List are logged in and reported to UEFI. If the variable is set to a nonzero value, all devices found on the SAN are logged in and reported to UEFI. The driver configuration protocol allows this variable to be created if it does not exist. If the variable does not exist, the menu displays a message asking if it should be created.

- **Enable World Login.** This option forces a World Login. This option overrides all of the other login methods. If this option is `y` (enabled), the adapter logs into all connected devices. Use this option to troubleshoot connectivity problems. This option is not available on 2Gb adapters.

- **Disable Adapter.** This option disables the adapter UEFI driver. The system boots faster when the driver is disabled. The UEFI driver must be enabled to access SAN devices. This option is not available on all adapters.

- **BIOS Selectable Boot.** This option limits the number of devices mapped by the driver. The WWN database is used with this option. Table 1-1 defines the behavior of this option. This option is not available on all adapters.

### Table 1-1. BIOS Selectable Boot Option

<table>
<thead>
<tr>
<th>BIOS Selectable Boot</th>
<th>WWN Database</th>
<th>Notes</th>
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<tbody>
<tr>
<td>0</td>
<td>Do not care</td>
<td>Map first LUN found (any target).</td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>Map first LUN0 found (any target).</td>
</tr>
<tr>
<td>1</td>
<td>Specified</td>
<td>Map LUNs listed in database.</td>
</tr>
</tbody>
</table>
Controlling Adapter Login of SAN Devices

There are three methods of controlling the adapter login of SAN devices. The first method, Boot Order List Login, searches the Boot Order List for device paths matching the adapters that contain Fibre Channel device path nodes. The second method, Selective Login, uses a list of device WWNs and LUNs created and maintained in the adapter WWN database. The third method, World Login, logs into all devices connected to the adapter. The adapter tries all three methods in the order described. Boot Order List Login and Selective Login can be enabled/disabled using the driver configuration protocol.

The Selective Login method also provides Selective LUN Logins, Persistent Binding, and Alternate Boot Device selections. All these features use the adapter WWN database.

Boot Order List Login

The Boot Order List Login method uses the Boot Order List to determine which devices the adapter will log into. If the Boot Order List contains device paths pointing to Fibre Channel devices, and the Fibre Channel devices are attached to the adapter, the adapter logs into those devices. If the Boot Order List contains no device paths pointing to Fibre Channel devices attached to the adapter, the adapter does not log into devices. Boot Order List Login can be enabled/disabled with the OS Mode option.
Selective Login

The Selective Login method allows the system administrator to select which fabric devices the adapter logs into and reports to the system. When this feature is enabled, up to five devices can be specified. At driver binding start time, the driver queries the fabric simple name server (SNS) for devices. Each WWN received from the SNS is compared against the entries in the WWN database. The adapter logs in only those WWNs that are found in the database, which limits the number of devices that are logged in. Selective LUN Login selects only one LUN on each device that was selected using the WWN database. When the Enable Selective LUN Login option is n (disabled), all LUNs on all logged in devices are reported to UEFI. When the Enable Selective LUN Login option is y (enabled), only one LUN per device reported. Therefore, a maximum of five device/LUN combinations are reported to UEFI.

World Login

The World Login method logs into all devices connected to the adapter. If Boot Order List Login and Selective Login are disabled, World Login is used. If the Enable World Login option is y (enabled), World Login is used. The Enable World Login option overrides all other login methods.

WWN Database

The UEFI driver configuration protocol creates and maintains the WWN database for each adapter. Each adapter reserves the first six SCSI target IDs (tids) for use with persistent binding. The default tid for the adapter is 0. The next five tids are bound to the entries in the WWN database. Database entry 0 corresponds to tid 1, database entry 1 corresponds to tid 2, and so on.

All database entries have a port WWN field. Entry 0 has an 16-bit LUN field. Entry 1 uses the LUN field of entry 0. Entries 2–4 have 16-bit LUN fields.

In the driver configuration protocol, the Show Database option displays the WWN database, and the Edit Database option displays and modifies any particular database entry.

Persistent Binding

Persistent binding allows the system administrator to bind a device to a particular SCSI ID. To use this feature, the system administrator places the WWPN of the device to be bound in the WWN database of the adapter. At driver binding start time, the driver searches for devices on both the fabric and the loop. Each WWPN that is found is compared to the WWN database; when a match is found, the device is assigned the SCSI ID that corresponds to the entry in the database.
Alternate Boot Device Selection

Alternate Boot Device selection allows the system administrator to define and bind a primary and an alternate device to a single SCSI ID. Both the port and node WWNs of each device can be specified. At driver binding start time, the driver looks for the primary device. If it is found, the device is bound to a fixed SCSI ID and the alternate device is ignored. If the primary device is not found, the driver searches for the alternate device, and if found, the alternate device is bound to the same fixed SCSI ID as the primary device. This option is not available on all adapters.
3 UEFI Driver Diagnostics

Starting the Diagnostic Protocol

For a more detailed description of the UEFI commands used in this procedure, refer to either the UEFI shell documentation provided with your computer or the UEFI project documentation at:


There are three levels of diagnostics available:

- Standard
- Extended
- Manufacturing

The selection of the diagnostic level is made using a command line switch.

To start the diagnostic protocol from the UEFI shell:

1. Enter the following command:

   drivers

   A list of installed UEFI drivers is displayed in table form.

   Under the heading DRIVER NAME, find the driver with name `<OEM> Fibre Channel Driver` (where OEM is QLogic or an OEM name). Note the driver's handle number in the DRV column (this number is referred to as `driverhandle`).

   There may be one or more driver instances listed. If only one driver instance is listed, then it is managing one or more adapters. If more than one driver instance is listed, then each instance is managing a subset of the available adapters.

2. Enter the following command:

   drvdiag <driverhandle>

   A list of adapters managed by this driver is displayed. Note the controller handle number inside the brackets labeled `Ctrl[ ]`; this number is referred to as `controllerhandle`.

3. Refer to the following sections to determine the level of diagnostics required.
3–UEFI Driver Diagnostics
Standard Level Diagnostics

Enter the following command to start the standard interactive diagnostic:

```
drvdiag -s <driverhandle> <controllerhandle>
```

This command performs a mailbox test on the adapter registers, followed by a loopback test at the 10-bit interface. At the end of the test, a disconnect/connect sequence is performed to restart the adapter.

**Example:**

```
fs0:\> drvdiag -s 1d 1e
Run Diagnostics
   Drv[1D] Ctrl[1E] Lang[eng]
```

Fibre Channel Driver Diagnostics Utility

**NOTE:** Do not redirect console output to a file.

```
Mailbox Test:
   Mailbox test passed
FC Loopback Test: 1 iterations, Loopback point: 10 bit interface
   Loopback Test Passed
- PASSED
```

Extended Level Diagnostics

Enter the following command to start the extended interactive diagnostic:

```
drvdiag -e <driverhandle> <controllerhandle>
```

This command performs a mailbox test on the adapter registers followed by loopback tests at both the 10-bit interface (2Gb/4Gb/8Gb adapters only) and the 1-bit interface, and then runs an SRAM memory test. At the end of the test, a disconnect/connect sequence is performed to restart the adapter.
Example:

```
fs0:\> drvdiag -e 1d 1e
Run Diagnostics
   Drv[1D]  Ctrl[1E]  Lang[eng]
```

Fibre Channel Driver Diagnostics Utility

NOTE: Do not redirect console output to a file.

Mailbox Test:
    Mailbox test passed
FC Loopback Test: 10 iterations,  Loopback point: 10 bit interface
    Loopback Test Passed
FC Loopback Test: 10 iterations,  Loopback point: 1 bit interface
    Loopback Test Passed
Memory Test
    Sizing SRAM...
    Testing Address 00010000
    Testing Address 00018000
    Testing Address 00020000
    RISC SRAM size: 131072 words
Starting Test:
    Pattern Result
    0000     PASS
    FFFF     PASS
    5555     PASS
    AAAA     PASS
    Address  PASS
- PASSED

Manufacturing Level Diagnostics

Enter the following command to start the manufacturing interactive diagnostic protocol:

```
drvdiag -m <driverhandle> <controllerhandle>
```

The driver diagnostics **Main Menu** opens.
Main Menu

The driver diagnostics **Main Menu** contains the following options:

- **1. Show Adapter Connection Mode**
- **2. Set Loopback Test Point [1 bit Loopback]**
- **3. Set Loopback Test Iteration Count [1]**
- **4. Run Loopback Test**
- **5. Run Mailbox Test**
- **6. Show Adapter Path**
- **7. Run POST (Power On Self Test)**
- **8. Show Link Statistics**
- **9. Help**
- **10. Quit**

The driver diagnostics **Main Menu** options are described in the following paragraphs.

- **Show Adapter Connection Mode.** This option displays the state of the adapter's Fibre Channel connection; there are two states:
  - UP
  - DOWN

  If the connection is UP, then the type of connection is displayed:
  - LOOP (Fibre Channel Adapters only)
  - POINT-POINT (Fibre Channel Adapters only)
  - F_Port/VF_Port (Converged Network Adapters only)

- **Set Loopback Test Point.** This option displays and sets the test interface point for the loopback test. The selections are:
  - 10-bit (2Gb/4Gb/8Gb Fibre Channel Adapters only)
  - 1-bit
  - External Loopback

  The **External Loopback** option requires a special loopback connector.

- **Set Loopback Test Iteration Count.** This option displays and sets the iteration count for the loopback test. Valid values are in the range of 1–65535.
Run Loopback Test. This option executes the loopback test. The loopback test builds and transmits a known 4096-byte pattern and compares the received pattern with the transmitted pattern. There are several loopback test failure reasons:

- **Loopdown.** The external loopback point was selected, but the loop connection is down.
- **Failure due to loop errors.** The CRC error count and the loopback point where the failure occurred are displayed.
- **Data miscompare.** The received data does not match the transmitted data.

Run Mailbox Test. This option executes the mailbox register test on the adapter's ISP controller.

Show Adapter Path. This option displays the adapter UEFI path, which helps verify that diagnostics are running on the correct adapter.

Run POST (Power On Self Test). This option executes the POST diagnostic test on the current adapter. This option is not available on all adapters.

Show Link Statistics. This option displays Fibre Channel link statistics. This option is not available on all adapters. The following error counts are displayed:

- Link failure count
- Loss of sync count
- Loss of signal count
- Primitive sequence protocol error count
- Invalid transmission word count
- Invalid CRC count

Help. Displays help messages for manufacturing level diagnostics.

Quit. Quits diagnostic mode and returns to the UEFI shell.
AL_PA to Loop ID Conversion

Table A-1 shows the correspondence between AL_PAs and loop IDs (AL_PAs are listed in descending order, loop IDs are listed in ascending order, 16 per column).

<table>
<thead>
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<th>AL_PA</th>
<th>Loop ID</th>
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<td>CDH</td>
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<td>98H</td>
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<td>55H</td>
<td>50</td>
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<td>01</td>
<td>CCH</td>
<td>11</td>
<td>B1H</td>
<td>21</td>
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<td>33</td>
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A–AL_PA to Loop ID Conversion
# Revision History

The following table lists all previous changes made to this User’s Guide. For a list of the changes made to this revision of the User’s Guide, see the Document Revision History table on page ii.

<table>
<thead>
<tr>
<th>Revision and Date</th>
<th>Changes</th>
<th>Sections Affected</th>
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<tr>
<td>Rev. 1.0, 9-6-02</td>
<td>Initial</td>
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<tr>
<td>Rev. 1.1, 10-7-02</td>
<td>Feature additions:&lt;br&gt;Added boot options to configuration protocol.</td>
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<tr>
<td>Rev. 1.2, 11-13-02</td>
<td>Feature additions:&lt;br&gt;Added SCSI options, selective boot description.</td>
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<tr>
<td>Rev. 1.3, 03-21-03</td>
<td>Major Additions and revision</td>
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<td>Rev. 1.4, 07-01-03</td>
<td>Added Boot Order List options</td>
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<tr>
<td>Rev. 1.5, 09-25-03</td>
<td>Change requests</td>
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<td>Rev. 1.6, 11-17-03</td>
<td>Manufacture mode update:&lt;br&gt;Clarified manufacture mode with examples.</td>
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<td>Rev. 1.7, 11-18-03</td>
<td>Added post command.</td>
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<td>Rev. 1.8, 11-19-03</td>
<td>Minor changes:&lt;br&gt;Manju changes</td>
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<tr>
<td>Rev. 1.9, 08-09-04</td>
<td>Major changes:&lt;br&gt;Updated to describe the new user interface.&lt;br&gt;Cleaned up header and footer.&lt;br&gt;Fixed a few errors.</td>
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<tr>
<td>Rev. 1.10, 09-16-04</td>
<td>Minor changes:&lt;br&gt;Removed references to the Boot Order List Enable switch.&lt;br&gt;Updated the SAN Environment Features section.</td>
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<tr>
<td>Rev. 1.11, 11-1-04</td>
<td>Minor Changes:&lt;br&gt;Removed “QLogic Confidential”</td>
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<tr>
<td>Rev. 1.12, 07-11-05</td>
<td>Minor changes:&lt;br&gt;Removed references to QLA23xx adapters for 4 GB.</td>
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</table>
| Rev. 1.13, 09-15-05 | Minor changes:  
  - Added info. about the following switches: LED Mode, OS Mode.  
  - Updated the Boot Order List Login behavior.  
  - Made a minor change to the Selective Login section. | — |
| Rev. 1.14, 10-24-06 | Minor changes:  
  - Removed S/N from the Info description.  
  - Updated the WWN Database section.  
  - Added more detail to the Hard Loop Id description.  
  - Added Appendix A. | — |
| Rev. 1.15, 02-05-07 | Minor changes:  
  - Updated the description of the POST feature. | — |
| Rev. 1.16, 06-07-07 | Minor changes:  
  - Added “Link Statistics” and “help” command in Manufacturing level diagnostics. | — |
| Rev. 1.17, 04-02-09 | Minor changes:  
  - Added UEFI info. Misc edits. | — |
| Rev. 1.18, 11-16-09 | Minor changes:  
  - Removed obsolete LED Mode feature. | — |
| Rev. 1.19, 03-06-12 | Minor changes:  
  - Added BIOS Selectable Boot and Disable Adapter options. | — |
| Rev. 1.20, 12-03-12 | Added new card info:  
  - Added 82xx and 83xx info. Misc edits. | — |
| Rev. A, 12-20-12 | Added Part Number  
  Added Preface | All  
  “Preface” on page ix |
| Rev. B, 03-08-13 | Changed title to “Fibre Channel and Fibre Channel over Ethernet UEFI Configuration and Diagnostics Protocols” | — |
| Rev. C, 03-04-15 | Updated Support address | “Contact Information” on page 1-xii |
### List of Tables

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<th>Table</th>
<th>Description</th>
<th>Page</th>
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<td>1-1</td>
<td>BIOS Selectable Boot Option</td>
<td>1-8</td>
</tr>
<tr>
<td>A-1</td>
<td>AL_PA to Loop ID Conversion Table</td>
<td>A-1</td>
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