



QLogic 16Gb Enhanced Gen5 FC Single-port and Dual-port HBA User's Guide



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Preface

This guide provides detailed instructions on installing, configuring, and troubleshooting the QLogic® adapters listed in [Table i](#) (collectively referred to as the *2600 Series Adapters*). It also provides details on the use of QLogic adapter features to enhance the value of server virtualization. Such features include virtual adapter configuration using node port ID virtualization (NPIV) and boot-from-SAN configuration.

Table i. Supported Adapter Models

Model Number	Port Quantity	Speeds			
		4Gb	8Gb	16Gb	32Gb
QLE2670	1	✓	✓	✓	—
QLE2672	2	✓	✓	✓	—
QLE2690	1	✓	✓	✓	—
QLE2692	2	✓	✓	✓	—
QLE2694	4	✓	✓	✓	—
QLE2694L	4	✓	✓	✓	—
QLE2694U	4	—	✓	✓	✓

NOTE

Forth code (FCode) and unified extensible firmware interface (UEFI) do not support 4Gb speed.

2600 Series Adapters run on the following operating systems:

- Microsoft® Windows®
- Linux®
- Oracle® Solaris®
- VMware® ESXi

- Citrix® XenServer®
- VMware vCenter™ Server

NOTE

For a detailed list of the currently supported operating systems, refer to the 2600 Series Adapter's *Read Me* and *Release Notes* on the QLogic Downloads and Documentation Web page:

driverdownloads.qlogic.com

Intended Audience

This guide is intended for those responsible for deploying 2600 Series Adapters on Windows, Linux, Solaris, VMware ESXi, VMware vCenter Server, and Citrix XenServer: from end users (such as data center managers and system administrators) to the test and development community.

What Is in This Guide

This preface specifies the intended audience, explains the typographic conventions used in this guide, lists related documents, and provides technical support, warranty, regulatory, and contact information.

The remainder of this guide is organized into the following chapters and appendices:

- [Quick Start](#) provides high-level hardware and software installation instructions for advanced users, as well as additional resources.
- [Chapter 1 Product Overview](#) provides a functional description of the 2600 Series Adapters and lists the features, supported operating systems, physical characteristics, and standards specifications.
- [Chapter 2 Software Installation and Initial Setup](#) provides information about the SuperInstaller, the multi-boot image (Fibre Channel Adapter Function Configuration Utility).
- [Chapter 3 Personality Configuration](#) provides information about configuring the interface type (personality configuration).
- [Chapter 4 Fibre Channel Configuration](#) describes installing the Fibre Channel driver and agent across OSs; setting 2600 Series Adapter parameters; persistent binding; configuring the boot device, NPIV, and driver parameters; reassembling out-of-order frames; enabling the fabric to assign a world-wide port name or boot LUN; and enabling end-to-end quality of service (QoS).

- [Appendix A Adapter LEDs](#) describes the 2600 Series Adapter LEDs and defines the LED behavior.
- [Appendix B Troubleshooting](#) helps solve issues by running Fibre Channel diagnostics using QConvergeConsole GUI, using D_Port diagnostics to identify and isolate link failures. It also provides a flowchart that walks you through troubleshooting problems that may occur with devices and LUNs on the 2600 Series Adapter.

Following the appendices are a glossary of terms and acronyms used, and an index to help you quickly find the information you need.

Related Materials

For additional information, refer to following documents that are available on the Downloads and Documentation page of the QLogic Web site:

driverdownloads.qlogic.com

- 2600 Series Adapter Read Me and Release Notes documents contain information about installation, OS support, and known issues.
- *Installation Guide—QConvergeConsole GUI* (part number SN0051105-00) covers general information about the QConvergeConsole GUI tool.
- *User's Guide—Efiutil Utility* (part number FE0054602-00) provides information about the Efiutil Utility.
- *User's Guide—Fibre Channel and Fibre Channel over Ethernet UEFI Configuration and Diagnostic Protocols* (part number FE0054601-00) covers information about the Fibre Channel and FCoE UEFI configuration and diagnostic protocols.
- *User's Guide—UEFI Human Interface Infrastructure, 2600 Series 16Gb Fibre Channel Adapters* (part number SN0054689-00) describes how to use the HII application to configure the QLogic 16Gb Fibre Channel Adapter parameters and boot-from-SAN settings.
- *User's Guide—QConvergeConsole Plug-ins for VMware vSphere* (part number SN0054677-00) provides procedures for using the two QLogic plug-in utilities: QConvergeConsole Plug-in for VMware vCenter Server and QConvergeConsole Plug-in for VMware vSphere Web Client.
- *User's Guide—QConvergeConsole CLI* (part number SN0054667-00) provides specific command line use in both interactive and noninteractive modes.

For information about downloading documentation from the QLogic Web site, see [“Downloading Software and Documentation” on page xviii](#).

Documentation Conventions

This guide uses the following documentation conventions:

- The QLE26xx adapters are collectively referred to as the *2600 Series Adapters*.
- **NOTE** provides additional information.
- **CAUTION** without an alert symbol indicates the presence of a hazard that could cause damage to equipment or loss of data.
- 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 **Start**, 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 then press the ENTER key.
 - Issue the following command: `# sh ./install.bin`
- Key names and key strokes are indicated with UPPERCASE:
 - Press the CTRL+P keys.
 - Press the UP ARROW key
- 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).

- Topic titles between quotation marks identify related topics either within this manual or in the online help, which is also referred to as *QConvergeConsole Help* throughout this document.
- QConvergeConsole CLI non-interactive command syntax conventions include the following:
 - Plain text indicates items that you must type as shown. For example:
 - `qaucli -pr nic -ei`
 - `< >` (angle brackets) indicate a variable whose value you must specify. For example:
 - `<hba instance>`

NOTE

For CLI commands only, variable names are always indicated using angle brackets instead of *italics*.

- `[]` (square brackets) indicate an optional parameter. For example:
 - `[<file_name>]` means specify a file name, or omit it to select the default file name.
- `|` (vertical bar) indicates mutually exclusive options; select one option only. For example:
 - `on|off`
 - `1|2|3|4`
- `...` (ellipsis) indicates that the preceding item may be repeated. For example:
 - `x...` means *one* or more instances of `x`.
 - `[x...]` means *zero* or more instances of `x`.
- `()` (parentheses) and `{ }` (braces) are used to avoid logical ambiguity. For example:
 - `a|b c` is ambiguous
 - `{(a|b) c}` means `a` or `b`, followed by `c`
 - `{a|(b c)}` means either `a`, or `b c`

License Agreements

Refer to the *QLogic Software End User License Agreement* for a complete listing 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:

<http://www.qlogic.com/services>

Downloading Software and Documentation

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

To download firmware, software, and documentation:

1. Go to the QLogic Downloads and Documentation page:
driverdownloads.qlogic.com
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 Read Me document.

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:

support.qlogic.com

Support Headquarters

QLogic Corporation
12701 Whitewater Driver, Suite 230
Minnetonka, MN 55343 USA

QLogic Web Site

www.qlogic.com

Technical Support Web Site

support.qlogic.com

Technical Support E-mail

support@qlogic.com

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:

support.qlogic.com

Warranty and Regulatory Information

This section provides warranty and regulatory information for the following products:

- QLE2670 (part number HD8310405-01)
- QLE2672 (part number HD8310405-02)
- QLE2690 (part number BK3210407-06)
- QLE2692 (part number BK3210407-05)
- QLE2694 (part number BK3210408-01)
- QLE2694L (part number BK3210405-02)
- QLE2694U (part number BK3210403-12)

Warranty

For warranty details, please check the QLogic Web site:

<http://www.qlogic.com/Support/Pages/Warranty.aspx>

Laser Safety—FDA Notice

This product complies with DHHS Rules 21CFR Chapter I, Subchapter J. This product has been designed and manufactured according to IEC60825-1 on the safety label of laser product.

CLASS I LASER

Class 1
Laser Product

Caution—Class 1 laser radiation when open
Do not view directly with optical instruments

Appareil laser
de classe 1

Attention—Radiation laser de classe 1
Ne pas regarder directement avec des instruments optiques

Produkt der
Laser Klasse 1

Vorsicht—Laserstrahlung der Klasse 1 bei geöffneter Abdeckung
Direktes Ansehen mit optischen Instrumenten vermeiden

Luokan 1 Laserlaite

Varoitus—Luokan 1 lasersäteilyä, kun laite on auki
Älä katso suoraan laitteeseen käyttämällä optisia instrumenttejä

Agency Certification

The following sections contain a summary of EMC and EMI test specifications performed on models HD8310405-01, HD8310405-02, BK3210407-06, BK3210407-05, BK3210408-01, BK3210405-02, and BK3210403-12 to comply with radiated emission, radiated immunity, and product safety standards.

EMI and EMC Requirements

FCC Rules, CFR Title 47, Part 15, Subpart B: Class A

Compliance information statement: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada, ICES-003:2012: Class A

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

CE Mark 2014/30/EU EMC Directive Compliance

EN55022:2010/CISPR 22:2009+A1:2010: Class A
EN61000-3-2:2006 A1+A2:2009 (for HD series)

EN61000-3-2:2006 A1+A2:2014 (for BK series)
EN61000-3-3:2008 (for HD series)
EN61000-3-3:2013 (for BK series)
EN55024:2010
EN61000-4-2 : ESD
EN61000-4-3 : RF Electro Magnetic Field
EN61000-4-4 : Fast Transient/Burst
EN61000-4-5 : Fast Surge Common/Differential
EN61000-4-6 : RF Conducted Susceptibility
EN61000-4-8 : Power Frequency Magnetic Field
EN61000-4-11 : Voltage Dips and Interrupt

VCCI: 2011-04; Class A

AS/NZS; CISPR 22:2009+A1:2010 Class A

Korea Certification

NRRA KN22 KN24 (2011 for HD series, 2014 for BK series) Class A



Product Name/Model—HD8310405-01, HD8310405-02,
BK3210407-06, BK3210407-05, BK3210408-01, BK3210405-02, and
BK3210403-12 Adapters
Certification Holder—QLogic Corporation
Manufactured Date—Refer to date code listed on product
Manufacturer/Country of Origin—QLogic Corporation/USA

A class equipment (Business purpose info/ telecommunications equipment)	As this equipment has undergone EMC registration for business purpose, the seller and/or the buyer is asked to beware of this point and in case a wrongful sale or purchase has been made, it is asked that a change to household use be made.
---	--

Korean Language Format—Class A

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니
판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약
잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기
바랍니다.

Taiwan

BSMI CNS 13438:2006 Class A for the BK3210407

警告使用者:

這是甲類的資訊產品, 在居住的環境中使用時, 可能會造成射
頻干擾, 在這種情況下, 使用者會被要求採取某些適當的對策.

Product Safety Compliance

UL, cUL Product Safety

UL60950-1 (2nd Edition), 2007

CSA C22.2 60950-1-07 (2nd Edition) 2007

Use only with listed ITE or equivalent.

Complies with 21 CFR 1040.10 and 1040.11.

2014/35/EU Low Voltage Directive

TUV:

TUV EN60950-1:2006+A11+A1+A12 2nd Edition

TUV IEC 60950-1:2005 2nd Edition CB

Quick Start

To help you quickly get started using the 2600 Series Adapters, this chapter provides installation steps and lists additional resources.

Installation Instructions

Install and configure your new 2600 Series Adapter in three simple steps:

- [Step 1. Install the Adapter Hardware](#)
- [Step 2. Install the Adapter Drivers](#)
- [Step 3. Install QConvergeConsole](#)

Step 1. Install the Adapter Hardware

To install the adapter hardware, you need to open the computer and locate the appropriate bus slot. If necessary, consult your computer system manual for instructions on how to remove the computer cover.

To install the adapter hardware:

1. Power off the computer and all attached devices such as monitors, printers, and external components.
2. Disconnect the power cable.
3. Remove the computer cover and find an empty PCIe® x8 (or larger) bus slot.

NOTE

The QLE2694U requires an empty PCIe x16 bus slot.

4. Pull out the slot cover (if any) by removing the screw or releasing the lever.
5. Install the low-profile bracket (if required).

6. Grasp the adapter by the top edge and seat it firmly into the appropriate slot (see [Figure i](#)).

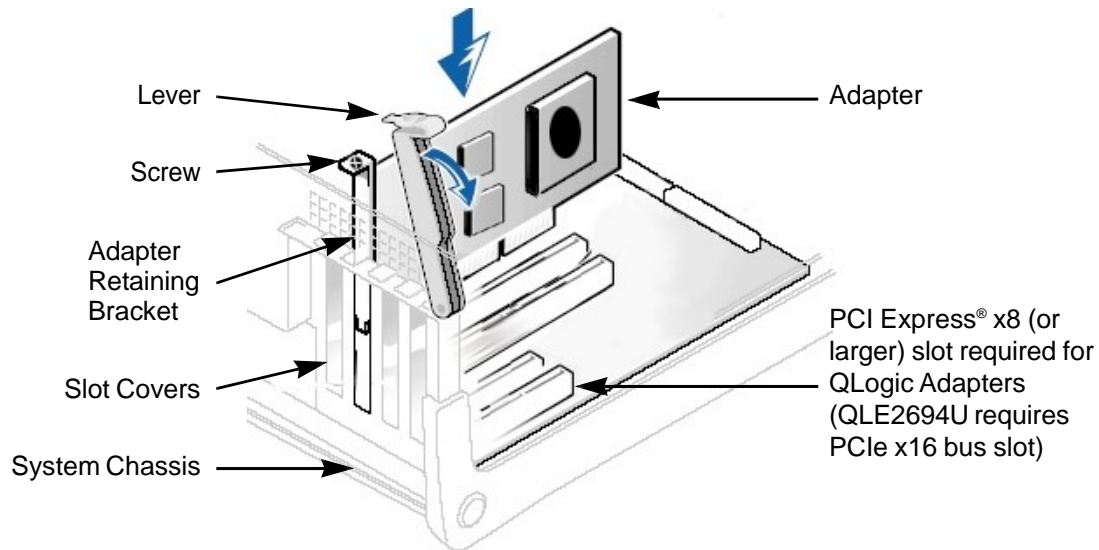


Figure i. Server Motherboard and Slots

7. Refasten the adapter's retaining bracket using the existing screw or lever.
8. Close the computer cover.
9. Plug the optical cable into the adapter.
10. Plug in the power cable and turn on the computer.

Step 2. Install the Adapter Drivers

Follow these steps to download and install adapter drivers.

To install the adapter drivers:

1. Go to the QLogic Downloads and Documentation page:
driverdownloads.qlogic.com
2. Under **QLogic Products**, type the model name of your QLogic 2600 Series Adapter in the search box.
3. In the search results list, locate and select the driver for your operating system.

4. View the product details Web page to ensure that you have the correct driver.

NOTE

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. Follow the installation instructions in the Read Me document.

Step 3. Install QConvergeConsole

Follow these steps to download and install versions of QConvergeConsole for various OSs.

NOTE

If you are using Windows, Linux, Solaris, or Citrix XenServer, install the QLogic utilities, QConvergeConsole GUI and QConvergeConsole CLI.
If you are using VMware ESXi (including vCenter Server Appliance for VMware ESXi 5.5), install the QLogic utilities: QConvergeConsole Plug-in for VMware vCenter Server or QConvergeConsole Plug-in for VMware vSphere Web Client.
For detailed information about using the utilities, see the documents specified in [“Related Materials” on page xv](#).

To install QConvergeConsole GUI or QConvergeConsole CLI:

1. Go to the QLogic Downloads and Documentation page:
driverdownloads.qlogic.com
2. Under **QLogic Products**, type the model name of your QLogic 2600 Series Adapter in the search box.
3. In the search results list, locate and select the QConvergeConsole version for your operating system.
4. View the product details Web page to ensure that you have the correct QConvergeConsole GUI or QConvergeConsole CLI version.

NOTE

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. Follow the installation instructions in the Read Me document.

To install QConvergeConsole Plug-in for VMware vCenter Server:

For detailed installation instructions, see the *User's Guide—QConvergeConsole Plug-ins for VMware vSphere* (part number SN0054677-00).

To install QConvergeConsole Plug-in for VMware vSphere Web Client:

For detailed installation instructions, see the *User's Guide—QConvergeConsole Plug-ins for VMware vSphere* (part number SN0054677-00).

Additional Resources

For more information on using the 2600 Series Adapter, QLogic provides these additional resources:

- To obtain the most current drivers, management tools, user instructions, and documentation, visit the QLogic Web site and download the latest versions:
driverdownloads.qlogic.com
- For descriptions of the user instructions provided in this document, see [“What Is in This Guide” on page xiv](#).
- For important product information, including warranty, laser safety, and agency certification, see the [“Warranty and Regulatory Information” on page xix](#).
- For descriptions and procedures related to QConvergeConsole GUI only, refer to the help system, *QConvergeConsole Help*.

1 Product Overview

This chapter describes the functionality and features of the QLogic 2600 Series Adapter, including:

- [Functional Description](#)
- [Features](#)
- [“Supported Operating Systems” on page 2](#)
- [“Physical Characteristics” on page 2](#)
- [“Standards Specifications” on page 3](#)

Functional Description

The *2600 Series Adapters* are QLogic’s sixth generation Fibre Channel Adapters. They boast industry-leading native Fibre Channel performance—achieving quad-port (QLE2694, QLE2694L, and QLE2694U) or dual-port (QLE2672 and QLE2692) line-rate, 16-gigabit Fibre Channel throughput—at extremely low CPU use with full hardware offloads.

The QLE2694U ships with pluggable 16Gb SFP+ optical transceivers. This adapter can be upgraded with 32Gb SFP+ optical transceivers for up to four ports of 32Gb Fibre Channel connectivity. This extreme performance eliminates potential I/O bottlenecks in today’s powerful multiprocessor, multicore servers. In addition, support for powerful virtualization features make this adapter ideal for virtualized environments that need excellent I/O performance to service growing numbers of virtual machines (VMs).

Features

The 2600 Series Adapters provide the following features:

- Device management for SAN
- QLE2670, QLE2672, QLE2690, QLE2692, QLE2694, and QLE2694L offer connectivity to 16Gb, 8Gb, and 4Gb Fibre Channel networks
- QLE2694U offers connectivity to 32Gb, 16Gb, and 8Gb Fibre Channel networks (with a 16G SFP, it supports only 16Gb and 8Gb)

- Physical PCIe characteristics:
 - ❑ PCIe 3.0 x8 (QLE2670 and QLE2672) with backward compatibility
 - ❑ PCIe 3.0 x8 (QLE2690, QLE2692, QLE2694 and QLE2694L)
 - ❑ PCIe 3.0 x16 (QLE2694U)
- Full hardware offload for the Fibre Channel protocol
- Message-signaled interrupts (MSI-X) and legacy interrupts (INT-X)
- Node port ID virtualization (NPIV)
- Buffer-to-buffer credit recovery (BB-CR) (QLE269x models only)
- Firmware and driver counter reset
- Boot from SAN
- Several advanced management features for the 2600 Series Adapter include:
 - ❑ The QLogic QConvergeConsole GUI and QConvergeConsole CLI management utilities are available if you are running Windows, Linux, Solaris, or Citrix XenServer.
 - ❑ The QLogic QConvergeConsole Plug-in for VMware vCenter Server and QConvergeConsole Plug-in for VMware vSphere Web Client management utilities are available if you are running VMware ESXi.
- Conversion to 10-gigabit Ethernet (GbE) Converged Network Adapter—QLE2672 and QLE2670 only
- Conversion to 32G Fibre Channel (Gen 6 Fibre Channel)—QLE2694U only

Supported Operating Systems

The 2600 Series Adapters support commonly used operating systems, including Windows, Linux, Solaris, VMware ESXi, and Citrix XenServer.

For a detailed list of the currently supported operating systems, refer to the adapter's Read Me and Release Notes on the QLogic Web site:

driverdownloads.qlogic.com

Physical Characteristics

Physical characteristics for the 2600 Series Adapters include the following:

- The QLE2670 and QLE2672 Adapters are implemented as low profile PCIe cards. The adapter ships with a full-height bracket for use in a standard PCIe slot or an optional spare low profile bracket for use in a low-profile PCIe slot. Low profile slots are typically found in compact servers.

- The QLE2690 and QLE2692 Adapters are implemented as low profile PCIe cards with standard-height brackets installed.
- The QLE2694 and QLE2694U Adapters are implemented as full-height PCIe cards with full-height brackets are installed.
- The QLE2694L Adapter is implemented as a low-profile PCIe card. The adapter ships with soldered-down small form factor (SFF) fixed optical transceivers and a low profile bracket.

Standards Specifications

The 2600 Series Adapter supports the following standards specifications:

- *Fibre Channel Tape (FC-TAPE) Profile*
- *SCSI Fibre Channel Protocol-4 (FCP-4)*
- *Second Generation Fibre Channel Generic Services (FC-GS-2)*
- *Third Generation Fibre Channel Generic Services (FC-GS-3)*

For more information on these specifications, refer to the Technical Committee T11 Web site:

<http://www.t11.org>

2 Software Installation and Initial Setup

This chapter provides the following information about installing and setting up the software:

- [Fibre Channel Adapter Installation with QLogic SuperInstallers](#)
- [“Multiboot Image for Fibre Channel Adapter Function Configuration Utility” on page 10](#)

NOTE

If you are using VMware ESXi, see the *User’s Guide—QConvergeConsole Plug-ins for VMware vSphere* (part number SN0054677-00) for details on installation and initial setup.

Fibre Channel Adapter Installation with QLogic SuperInstallers

The QLogic SuperInstallers are easy-to-use tools that install the following components:

- Fibre Channel, Fibre Channel over Ethernet (FCoE), iSCSI, and Ethernet networking drivers
- QConvergeConsole CLI management tool
- Fibre Channel, FCoE, iSCSI, and networking management agents to enable remote access using the QConvergeConsole GUI management tool

For installation instructions for the QLogic Windows SuperInstaller, refer to the *QLogic Windows SuperInstaller Read Me* document.

For installation instructions for the QLogic Linux SuperInstaller, refer to the *QLogic Linux SuperInstaller Read Me* document.

Installing the QLRemote Agent on Windows Nano Server

This section provides instructions for installing and uninstalling the QLRemote Agent on a Windows Nano Server.

To install the QLRemote Agent on a Nano Server:

1. From remote management server, create or add a PSSession to the Windows Nano Server.
2. Add a **TrustedHost** item by following the instructions located here:

<http://winintro.ru/windowspowershell2corehelp.en/html/f23b65e2-c608-485d-95f5-a8c20e00f1fc.htm>

For example:

```
PS C:\Users\Administrator> Set-Item WSMAN:\localhost\Client\TrustedHosts -Value 172.27.1.44
```

WinRM Security Configuration.

This command modifies the TrustedHosts list for the WinRM client. The computers in the TrustedHosts list might not be authenticated. The client might send credential information to these computers. Are you sure that you want to modify this list?

```
[Y] Yes [N] No [S] Suspend [?] Help (default is "Y"): Y
```

```
PS C:\Users\Administrator> Get-Item WSMAN:\localhost\Client\TrustedHosts
```

```
WSManConfig: Microsoft.WSMan.Management\WSMan::localhost\Client
Type          Name                               SourceOfValue Value
-----
System.String TrustedHosts                        172.27.1.44
```

```
PS C:\Users\Administrator> $cs=New-PSSession -ComputerName 172.27.1.44 -Credential Administrator
```

```
PS C:\Users\Administrator> Enter-PSSession $cs
```

```
[172.27.1.44]: PS C:\Users\Administrator\Documents>
```

3. Copy the QLogic package (script) to the Nano Server.
 - a. If necessary, disable the firewall on the Nano Server by issuing one of the following commands:

```
netsh advfirewall set allprofile state off
Set-NetFirewallProfile -Profile Domain,Public,Private
-Enabled false
```
 - b. Using File Explorer, copy the script (\\172.27.1.44\c\$).

4. To install the QLRemote agent:
 - a. Run the script by issuing the following command:

```
.\ InstallOrUpgradeQLRemoteAgent.ps1
```
 - b. Check for running service by issuing the following command.

```
Get-Service QLManagementAgentJava
```

Status	Name	DisplayName
Running	QLManagementAge...	QLogic Management Suite Java Agent
 - c. Start or restart services for the agent (QLManagementAgentJava). For example:

```
Restart-Service QLManagementAgentJava
```

```
WARNING: Waiting for service 'QLogic Management Suite Java Agent (QLManagementAgentJava)' to stop...
```
5. In QConvergeConsole GUI, connect to a Nano virtual hard disk (VHD) by adding a host and entering the IP address to the Nano Server.

To uninstall the QLRemote Agent on a Nano Server:

- Issue the following command:

```
[172.27.1.44]: PS C:\nanoapp>.\UninstallQLRemoteAgent.ps1
```

```
Stopping QLManagementAgentJava
```

```
WARNING: Waiting for service 'QLogic Management Suite Java Agent (QLManagementAgentJava)' to stop...
```

```
WARNING: Waiting for service 'QLogic Management Suite Java Agent (QLManagementAgentJava)' to stop...
```

```
Uninstalling QLRemote...
```

```
Done
```

```
Stopping oncportmap
```

```
Uninstalling ONCPortMap...
```

```
Done
```

```
[172.27.1.44]: PS C:\nanoapp>
```

Installing and Using the QLCFWUpdate on Windows Nano Server

QLCFWUpdate is QLogic's flash update utility, used to update the firmware and boot code on the QLE269x adapter. This section provides instructions for installing and using the QLCFWUpdate on a Windows Nano Server. For additional information, refer to the QLCFWUpdate support files—Read Me and Release Notes—available on the QLogic Downloads and Documentation page:

driverdownloads.qlogic.com

To install the QLCFWUpdate for a Nano Server:

1. Copy the `qlcfwupdate_x.xx.xx_nano.zip` file to the Windows Nano Server drive (where `x.xx.xx` indicates the package version number).
2. Extract files from the `qlcfwupdate` zipped package to a directory.

To use supported QLCFWUpdate commands for a Nano Server:

- To display a summary of adapters installed on the host, issue the following command:

```
<Qlcfwupdate Directory>.\qlcfwupdate_x64.exe -l
```

Example output:

```
-----  
Host Name           : Nano-srvr1  
OS Type             : Microsoft Windows Server 2016 64-bit x64  
OS Version          : Build 14291  
SDMAPI              : 1.28.0.134 QLSDM.DLL  
-----  
HBA Model QLE2692 (SN AFD1536Y03330):  
  Port 1 WWPN 21-00-00-24-FF-8F-D7-DC (HBA 0 SFP not installed)  
  Port 2 WWPN 21-00-00-24-FF-8F-D7-DD (HBA 0 SFP not installed)  
-----  
Total QLogic HBA(s) : 1
```

- To display information about a specific adapter, issue the following command:

```
<Qlcfwupdate Directory>.\qlcfwupdate_x64.exe -i [<hba instance> | <hba wwpn>]
```

Figure 2-1 shows an example.

```
[172.27.1.44]: PS C:\nanoapp\qlcfwupdate> .\qlcfwupdate_x64.exe -i
-----
Host Name                : Nano-srvr1
HBA Instance            : 0
HBA Model               : QLE2692
HBA Description         : QLE2692 Qlogic Dual Port 16Gb FC to PCIe Gen3 x8 Adapter
HBA ID                 : 0-QLE2692
HBA Port               : 1
Node Name              : 20-00-00-24-FF-8F-D7-DC
Port Name              : 21-00-00-24-FF-8F-D7-DC
Port ID               : 00-00-00
Serial Number          : AFD1536Y03330
Driver Version         : STOR Miniport 9.2.1.20 Alpha 1 DBG
BIOS Version          : 3.32
Firmware Version      : 8.02.01
Flash BIOS Version    : 3.32
Flash FCode Version   : 4.11
Flash EFI Version     : 6.08
Flash Firmware Version : 8.02.01
Actual Connection Mode : Loop
Actual Data Rate      : Unknown
Device ISP ID        : ISP2261
Chip Revision        : 0x1
PortType (Topology)  : NLPort
Target Count         : 0
PCI Bus Number       : 5
PCI Device Number    : 0
PCI Device Number    : 0
Subsystem Vendor ID  : 0x1077
Subsystem Device ID  : 0x029a
PCIe Max Bus Width   : x8
PCIe Negotiated Width : x8
PCIe Max Bus Speed   : 8.0 Gbps
PCIe Negotiated Speed : 8.0 Gbps
HBA Status          : SFP not installed
-----
Host Name                : Nano-srvr1
HBA Instance            : 1
HBA Model               : QLE2692
HBA Description         : QLE2692 Qlogic Dual Port 16Gb FC to PCIe Gen3 x8 Adapter
HBA ID                 : 0-QLE2692
HBA Port               : 2
Node Name              : 20-00-00-24-FF-8F-D7-DD
Port Name              : 21-00-00-24-FF-8F-D7-DD
Port ID               : 00-00-00
Serial Number          : AFD1536Y03330
Driver Version         : STOR Miniport 9.2.1.20 Alpha 1 DBG
BIOS Version          : 3.32
Firmware Version      : 8.02.01
Flash BIOS Version    : 3.32
Flash FCode Version   : 4.11
Flash EFI Version     : 6.08
Flash Firmware Version : 8.02.01
Actual Connection Mode : Loop
Actual Data Rate      : Unknown
Device ISP ID        : ISP2261
Chip Revision        : 0x1
PortType (Topology)  : NLPort
Target Count         : 0
PCI Bus Number       : 5
PCI Device Number    : 0
PCI Device Number    : 0
```

Figure 2-1. Displaying Adapter Info on a Nano Server

- To query the adapter's multiboot (MBI) version, issue the following command:

```
<Qlcfwupdate Directory>.\qlcfwupdate_x64.exe /q
```

For example:

```
[172.27.1.44]: PS C:\nanoapp\qlcfwupdate>  
.\qlcfwupdate_x64.exe /q
```

```
-----  
Host Instance           : 0  
HBA Model               : QLE2692  
Port Name               : 21-00-00-24-FF-8F-D7-DC  
Flash Image (MBI) Version : 01.30.07  
-----
```

```
-----  
Host Instance           : 1  
HBA Model               : QLE2692  
Port Name               : 21-00-00-24-FF-8F-D7-DC  
Flash Image (MBI) Version : 01.30.07  
-----
```

- To update the flash components on a specific adapter, issue the following command:

```
<Qlcfwupdate Directory>.\qlcfwupdate_x64.exe -b <hba  
instance> | <hba wwpn> <path to MBI file>
```

For example:

```
[172.27.1.44]: PS C:\nanoapp\qlcfwupdate>  
.\qlcfwupdate_x64.exe /b 0 .\bk010150.bin  
Validating Flash Image File... Success  
Updating Flash on HBA port(s) - QLE2692. Please wait...  
Updating Adapter FC Boot Code... Success  
Updating Adapter MPI Fw... Success  
Updating Adapter PEP Fw... Success  
Updating Adapter FC RISC Fw... Success  
Updating Adapter FC VPD 0... Success  
Updating Adapter FC VPD 1... Success  
Flash update complete. Changes have been saved to all ports of  
this HBA.  
You must reboot in order for the changes to become effective.
```

Multiboot Image for Fibre Channel Adapter Function Configuration Utility

This section contains the following information:

- [Multiboot Package Contents](#)
- [Fibre Channel Adapter Function Configuration Utility Package Contents](#)
- [Using QLflash \(QLE267x Adapters Only\)](#)
- [Fibre Channel Adapter Function Configuration Utility](#)
- [Fibre Channel Ping Testing](#)
- [CT Fibre Channel Trace Route Testing](#)
- [Link Cable Beacon Extended Link Service Command](#)
- [Read Diagnostic Parameters Extended Link Service Command](#)

Multiboot Package Contents

The multiboot package for the 2600 Series Adapter is a compressed file that contains the Host Bus Adapter BIOS, unified extensible firmware interface (UEFI) code, firmware, and the QLflash utility.

Fibre Channel Adapter Function Configuration Utility Package Contents

The following files are included for updating the adapter multiboot code:

- `update.bat`—DOS batch file that calls the executable files to update the adapter multiboot (supported on QLE267x Adapters only)
- `update.nsh`—UEFI batch file that calls the executable files to update the adapter multiboot
- `QLflash.exe`—Utility to update the multiboot code and firmware (supported on QLE267x Adapters only)
- `ql2xxxx.drv`—UEFI driver
- `efxxxx.efi`—UEFI utility
- `Readme`—Release notes in each boot code components
- `Read1st`—Component versions
- `DOS4GW.exe`—File required to use the `QLflash.exe`
- `/bkxxxx.bin`—Combined binary file, which includes the binaries for the BIOS, UEFI, FCode, and firmware
- `/hldxxxxx.bin`—For the QLE267x Adapters

NOTE

The files may be different for each model.

Using QLflash (QLE267x Adapters Only)

QLflash is a native DOS utility for QLE267x Adapters (it is not applicable to QLE269x Adapters). This section describes how to update the multiboot code and the QLflash command line options. Refer to the *Read Me* document for more information. To run this utility, boot to a DOS hard drive or a USB removable drive.

Utility version:

`/VER` = Display version of the QLflash utility

Help options:

`/?` = Display Help menu

QLflash Command Line Options

When you are running the `.exe`, type `/?` for help.

Updating the Multiboot Code

Use the appropriate update procedure for your adapter model.

To write the multiboot code to Flash memory for QLE267x Adapters:

1. Insert your QLE2670 or QLE2672 Adapter in the system.
 - a. Create a DOS-bootable USB or UEFI shell.
 - b. Copy the extracted multiboot code.
2. Boot to DOS or UEFI shell.
3. At the command prompt, run the appropriate update script:
 - From DOS: `update.bat`
 - From UEFI shell: `update.nsh`

This script program updates the multiboot image on the adapter.

4. Reboot the system.

NOTE

Depending on the OS, you can also use QConvergeConsole GUI, QConvergeConsole CLI, or QConvergeConsole Plug-in for VMware vCenter Server to update the multiboot image.

To write the multiboot code to Flash memory for QLE269x Adapters:

1. Boot to the OS with the latest driver and QConvergeConsole CLI installed.
2. Download the appropriate `Flash_Upgrade_Kit` for your adapter.
3. Run either `.\update_win` (for Windows OS) or `sh update_lnx.sh` (for Linux or Solaris OS). For more details, refer to the `Read1st.txt` file in the upgrade kit.
4. Reboot the system.

Fibre Channel Adapter Function Configuration Utility

This section provides detailed configuration information for advanced users who want to customize the configuration of the 2600 Series Adapter and the connected devices. You can configure the 2600 Series Adapter using *Fast!UTIL*, FCode, or UEFI:

- Use *Fast!UTIL* in a pre-OS environment (see [“Using Fast!UTIL for Custom Configuration” on page 12](#)).
- Use FCode for Oracle SPARC® systems (see [“Using FCode for Custom Configuration \(Oracle SPARC\)” on page 20](#)).
- Use UEFI for Cisco®, Dell®, HP®, IBM®, Lenovo®, and Oracle x64 OEM adapters where the platform supports UEFI (see [“Using UEFI for Custom Configuration” on page 23](#)).

Using *Fast!UTIL* for Custom Configuration

NOTE

The *Fast!UTIL* BIOS utility does not run on Oracle SPARC systems (which run FCode).

To use *Fast!UTIL* for custom configuration:

1. To access *Fast!UTIL*, press the ALT+Q or CTRL+Q keys during the Host Bus Adapter BIOS initialization (it may take a few seconds for the *Fast!UTIL* menu to appear).
2. In the Select Host Adapter window, select the adapter type.
3. In the Adapter Settings window, select the appropriate adapter settings.

CAUTION

If the configuration settings are incorrect, your 2600 Series Adapter may not function properly.

A message window indicates that the configuration settings have been modified.

4. To save the new settings, click **Save changes**.
Fast!UTIL reboots your system to load the new parameters.

The *Fast!UTIL* **Options** menu provides the following options:

- [Configuration Settings](#)
- [Scan Fibre Devices](#)
- [Fibre Disk Utility](#)
- [Loopback Data Test](#)
- [Select Adapter](#)
- [Personality](#)
- [Exit Fast!UTIL](#)

Configuration Settings

The following sections show and describe the 2600 Series Adapter configuration settings:

- [Adapter Settings](#)
- [Selectable Boot Settings](#)
- [Restore Default Settings](#)
- [Raw NVRAM Data](#)
- [Advanced Adapter Settings](#)

Adapter Settings

[Table 2-1](#) describes the adapter settings.

Table 2-1. Adapter Settings

Setting	Values	Default	Description
Host Bus Adapter BIOS	Enabled, Disabled	Disabled	Disabling this setting disables the ROM BIOS on the 2600 Series Adapter, which frees space in upper memory. If you are booting from a Fibre Channel disk drive attached to the 2600 Series Adapter, you must enable this setting. See “Selectable Boot Settings” on page 15 for details on specifying the boot device.
Frame Size	512, 1024, 2048	2048	Specifies the maximum frame payload size supported by the 2600 Series Adapter.

Table 2-1. Adapter Settings (Continued)

Setting	Values	Default	Description
Loop Reset Delay	0–60 seconds	5 seconds	After resetting the loop, the firmware refrains from initiating any loop activity for the number of seconds specified in this setting.
Adapter Hard Loop ID	Enabled, Disabled	Disabled	When this setting is enabled, the adapter attempts to acquire its arbitrated loop physical address (AL_PA) during the loop initialization hard address (LIHA) phase using the <code>Hard Loop ID</code> value (see next row).
Hard Loop ID	0–125	0	If the <code>Adapter Hard Loop ID</code> setting (see previous row) is enabled, the adapter attempts to acquire the loop ID specified in this setting during the LIHA or loop initialization previous address (LIPA) phase.
Connection Options	0, 1, 2	2	Defines the type of connection: <ul style="list-style-type: none"> ■ 0—Loop only (for the 4Gb and 8Gb data rates) ■ 1—Point-to-point only (for the 4Gb, 8Gb, and 16Gb data rates) ■ 2—Loop preferred, then point-to-point for the 4Gb and 8Gb data rates. Because the standard for 16Gb data rates does not support loop, it uses point-to-point only, even if the connection options is set to 2.
Fibre Channel Tape Support	Enabled, Disabled	Enabled	Enables FCP-2 recovery.
Data Rate	2, 3, 4, 5, 6	2	Determines the data rate: <ul style="list-style-type: none"> ■ 2—The adapter auto-negotiates and determines the data rate. ■ 3—The adapter runs at 4Gbps. This data rate is supported on QLE2694U Adapters <i>only</i> if they are configured with all 16G SFPs. ■ 4—The adapter runs at 8Gbps. ■ 5—The adapter runs at 16Gbps. Loop mode is not supported. ■ 6—The adapter runs at 32Gbps. Loop mode is not supported. This data rate is only supported on QLE2694U Adapters; see Figure 4-1 to view the QLE2694U Adapter data rate options.

Note: Loop support is only available at 8Gbps, but not at 16 or 32Gbps.

Selectable Boot Settings

The **Configuration Settings** menu provides access to the **Selectable Boot Settings** option. If you enable the Host Bus Adapter BIOS in the adapter settings, you can select the boot device, as shown in [Table 2-2](#).

Table 2-2. Selectable Boot Settings

Enable Selectable Boot	Boot WWPN or LUN	Device Boot
No	—	The BIOS configures the first disk drive it finds as the boot device.
Yes	None specified	The BIOS configures the first disk drive it finds that is also LUN 0 as the boot device.
Yes	Specified	The BIOS scans through the specified boot worldwide port name (WWPN) or LUN list until it finds a disk drive. This drive is configured as the boot device.

The **Selectable Boot Settings** option allows you to specify up to four WWPNs or LUNs as boot devices.

To enable the Selectable Boot option and insert devices into boot device locations:

1. On the **Configuration Settings** menu, select **Host Adapter Settings**.
2. Enable the **Host Bus Adapter BIOS**, and then press the ESC key to return to the **Configuration Settings** menu.
3. On the **Configuration Settings** menu, select **Selectable Boot Settings**.
4. To enable or disable (toggle) the **Selectable Boot** option, press the ENTER key. To move to the Primary location of the **Selectable Boot List** menu, press the DOWN ARROW key.
5. To see a list of accessible devices (in the **Select Fibre Channel Device** menu), press ENTER.
6. To select a drive to put into the **Selectable Boot** list, press the UP ARROW and DOWN ARROW keys or the PAGE UP and PAGE DOWN keys to scroll to the device. To load the device into the **Selectable Boot** list, press ENTER.

7. To specify an alternate boot device (maximum of three) on the 2600 Series Adapter:
 - a. Move to the next available alternate entry by pressing the UP ARROW or DOWN ARROW.
 - b. Press ENTER.
 - c. Select the disk drive you want.
 - d. Press ENTER again.

NOTE

- **System BIOS compatibility:** To boot from a QLogic host 2600 Series Adapter in a computer system with a multiboot system BIOS, the 2600 Series Adapter must be included in the list of bootable devices in the system's **Boot** menu.
- **Solaris x86 boot from a SAN:** To boot from a Fibre Channel drive connected to the QLogic host 2600 Series Adapter, reboot the system and enter *Fast!UTIL*. Before performing the OS (Solaris x86) installation, access the **Selectable Boot** menu, enable the selectable boot, and then insert the boot drive in the primary location of the **Selectable Boot** menu.
- For these boot-from-SAN configurations, the Solaris x86 QLogic Corporation (QLC) driver supports booting only from the Primary location. The driver does not attempt to boot from the Alternate 1, Alternate 2, and Alternate 3 entries.

Restore Default Settings

The **Restore Defaults** option restores the BIOS settings to the defaults.

Raw NVRAM Data

The **Raw NVRAM Data** option shows the 2600 Series Adapter NVRAM contents in hexadecimal format. This option is a QLogic troubleshooting tool; you cannot modify the raw NVRAM data.

Advanced Adapter Settings

On the **Configuration Settings** menu in *Fast!UTIL*, select **Advanced Adapter Settings**. [Table 2-3](#) describes the default settings for the 2600 Series Adapters.

Table 2-3. Advanced Adapter Settings

Setting	Values	Default	Description
LUNs per Target	0–256	128	Specifies the number of LUNs supported per target if the target does not support the Report LUN command. Multiple LUN support is typically for redundant array of independent disks (RAID) boxes that use LUNs to map drives.
Enable LIP Reset	Yes, No	No	Determines the type of LIP reset used when the OS initiates a bus reset routine as follows: <ul style="list-style-type: none"> ■ Yes—The driver initiates a global LIP reset to reset the target devices. ■ No—The driver initiates a global LIP reset with full login.
Enable LIP Full Login	Yes, No	Yes	When this setting is Yes , the 2600 Series Adapter' reduced instruction set computer (RISC) controller logs in to all ports after any LIP.
Enable Target Reset	Yes, No	Yes	When this setting is Yes , the drivers issue a Target Reset command to all devices on the loop when a SCSI Bus Reset command is issued.
Login Retry Count	0–65535	8	Specifies the number of times the software tries to log in to a device.
Port Down Retry Count	0–65535 seconds	30 seconds	Specifies the number of seconds the software waits before resending a command to a port whose status indicates that the port is down.
Link Down Timeout	0–65535 seconds	30 seconds	Specifies the number of seconds the software waits for a link that is down to come up.
Operation Mode	0, 5, 6	6	Specifies the reduced interrupt operation (RIO) modes if they are supported by the software driver. The RIO modes allow posting multiple command completions in a single interrupt. This setting supports the following modes: <ul style="list-style-type: none"> ■ 0—Interrupt for every I/O completion ■ 5—Interrupt when the interrupt delay timer expires ■ 6—Interrupt when the interrupt delay timer expires or when there are no active I/Os

Table 2-3. Advanced Adapter Settings (Continued)

Setting	Values	Default	Description
Interrupt Delay Timer	0–255 (100µs units)	2 (200µs)	Contains the value used by a timer to set the wait time before generating an interrupt.
Fabric Assigned WWPN	Enabled, Disabled	See table footnote a	Fabric-assigned worldwide name (WWN) allows you to enable an adapter port to use a switch-assigned WWN rather than the physical adapter port WWN for communication.
Fabric Assigned Boot LUN	Enabled, Disabled	See table footnote a	Fabric-based boot LUN discovery (F-BLD) allows you to eliminate the manual boot LUN configuration process of each adapter from individual servers. Instead, the adapters can query the SAN fabric at boot time to retrieve boot LUN configuration information. When the boot LUN configuration is available from the fabric, the server retrieves the information and boots from the SAN.
FEC Enable	Enabled, Disabled	Disabled	Forward error correction (FEC) improves performance and link integrity to support higher end-to-end data rates by automatically recovering from transmission errors. See table footnote b.
BB_CR Enable	Enabled, Disabled	Enabled	Buffer-to-buffer credit recovery (BB-CR) enables two FC peer ports (N_Port, F_Port, or E_Port) to periodically send and receive the quantity of receiver ready (R_RDY) signals transmitted. Enable the BB-CR feature to allow the peer port to recover from possible R_RDY signals lost over a lossy link. See table footnote b.
BB_CR Count	0–15	8	Specifies the quantity of frame RX/TX counters maintained by the port to track R_RDYs and frames received. See table footnote b.

Table Footnotes

- a. This feature is enabled by default in adapters that are built with this release factory installed. Adapters upgraded from earlier releases retain the setting (enabled or disabled) that they had prior to upgrading to this release.
- b. Applies to QLE269x adapters only. For field adapters, this feature is user defined and adapters settings are not restored to defaults when you select [Restore Default Settings](#). New 2016 adapters have default values.

Scan Fibre Devices

The **Scan Fibre Devices** option scans the Fibre Channel loop and lists all the connected devices by loop ID. For each device, it lists information such as the vendor name, product name, and revision. This information helps when configuring your 2600 Series Adapter and attached devices.

Fibre Disk Utility

The **Fibre Disk Utility** option scans the Fibre Channel loop and lists all the connected devices by loop ID. You can select a Fibre Channel hard disk and do one of the following tasks:

- Perform a low-level format
- Verify the disk media
- Verify the disk data (most targets do not support this feature)
- Select a disk device

CAUTION

Performing a low-level format destroys all data on the disk.

Loopback Data Test

The **Loopback Data Test** option allows you to perform both external and internal loopback data tests. Loop support is only available at 8Gbps, but not at 16 or 32Gbps.

NOTE

When running an external loopback test, do one of the following:

- Insert a loopback connector to the 2600 Series Adapter. The connector runs at one speed, 16Gbps. During this test, the adapter LEDs are off.
- Connect the 2600 Series Adapter to a Brocade switch, which will run an echo test. To determine which other switch types support the echo test, consult your switch documentation.

Do not run an internal loopback test at the OS if the target device is the SAN target from which the system boots.

Select Adapter

If you have a multiport or multiple 2600 Series Adapters in your system, use the **Select Adapter** option to select and then configure or view the settings of a specific 2600 Series Adapter or one of its ports.

Personality

The **Personality** option changes the interface type (personality) between Fibre Channel Adapter (QLE267x models only) and Converged Network Adapter. See the [Glossary](#) for a definition of *personality*.

For more information, see “[Changing the Personality with BIOS \(Fast!UTIL\)](#)” on [page 30](#).

Exit *Fast!UTIL*

Select the **Exit *Fast!UTIL*** option to exit the utility and reboot the system. After making changes to the 2600 Series Adapter in *Fast!UTIL*, make sure you save the changes before you reboot the system.

Using FCode for Custom Configuration (Oracle SPARC)

For additional information, see the *FCode for ORACLE_SPARC FC and FCoE Adapters* Read Me document.

You can use FCode to select the 2600 Series Adapter device, set and view NVRAM parameters, and run diagnostic commands.

When booting using FCode within a logical domain’s (LDOM’s) environment, see the *Oracle VM Server for SPARC* documentation.

When booting a SPARC virtual function (VF) using FCode, the NVRAM parameters and diagnostics shown in the following sections are available only to the primary function (PF).

Setting and Viewing NVRAM Parameters

[Table 2-4](#) describes the NRAM parameters that you can set and view.

Table 2-4. NVRAM Parameters (Oracle SPARC)

Command	Values	Description
show-commands	N/A	Lists all NVRAM and diagnostic commands.
show-settings	N/A	Shows the current value of all of the NVRAM parameters, as well as the version, serial number, and adapter worldwide name.
set-connection-mode	0, 1, 2	Allows you to change or view the current host adapter Fibre Channel connection mode: <ul style="list-style-type: none">■ 0—Loop only■ 1—Point-to-point only (do not select for 16G and above)■ 2—Loop preferred; otherwise, point-to-point

Table 2-4. NVRAM Parameters (Oracle SPARC) (Continued)

Command	Values	Description
<code>set-data-rate</code>	2, 3, 4, 5, 6	Allows you to change or view the current host adapter Fibre Channel data rate: <ul style="list-style-type: none"> ■ 2—Auto-negotiated ■ 3—4Gbps (not supported on the QLE2694U Adapter) ■ 4—8Gbps ■ 5—16Gbps ■ 6—32Gbps (only supported on the QLE2694U Adapter)
<code>set-fapwwn-ena</code>	N/A	The FCode supports the Fabric-Assigned Worldwide Port Name (FA-WWPN) feature in a Brocade® switch running Fabric OS (FOS) 7.3.0 or later. Issue the <code>set-fapwwn-ena</code> FCode command to enable and disable this feature on the adapter. (For details, refer to your switch documentation.) For example: <pre>{0} ok set-fapwwn-ena</pre> Current Fabric-Assign-WWPN: DISABLED Do you want to change it? (y/n) y Current Fabric-Assign-WWPN: ENABLED This feature must also be enabled on the switch using the following command sequence: <pre>portdisable #</pre> <pre>fapwwn -- enable - port #</pre> <pre>portenable #</pre> Where # is the switch port number that is attached to the adapter.
<code>set-login-count</code>	1h–FFh	Sets the Login Retry Count field in the initialize firmware control block (IFCB). This field specifies the number of login retries attempted by the firmware. The default value is 8h.
<code>set-link-timeout</code>	2h–FFh	Determines the number of seconds to wait for the link to come up. The default value is 30 seconds (1Eh).
<code>set-port-down-count</code>	1h–FFh	Determines the number of retries for the Start, Read, and Write SCSI commands. The default value is 30h.
<code>set-max-frame-size</code>	1, 2, 3	Sets the Maximum Payload Length field in the IFCB: <ul style="list-style-type: none"> ■ 1—512 ■ 2—1024 ■ 3—2048. This setting is the default.

Table 2-4. NVRAM Parameters (Oracle SPARC) (Continued)

Command	Values	Description
set-boot-wait-time	8–65535	Adjusts the time to wait (in seconds) for the boot device to become online. The default value is DISABLED, which sets it to 8 seconds. The maximum value is 65,535 seconds (18 hours, 6 minutes). The minimum value is 8 seconds, same as when disabled. Because this wait time can be very long, the boot process can be aborted at any time by pressing the ESC key.
restore-default-settings	N/A	Restores the default values of all NVRAM parameters used by the FCode, except the fc-mode (FCode operation mode) and the boot-wait-time.
set-personality	FC, CNA	Sets or clears bits in the feature configuration section of the Flash memory, which controls the 2600 Series Adapter's personality. A reboot is required for a change to take effect. <ul style="list-style-type: none"> ■ FC—Fibre Channel only ■ CNA—Converged Network Adapter

Note: Loop support is only available at 8Gbps, but not at 16 or 32Gbps.

Running Diagnostic Commands

Table 2-5 describes the diagnostic commands.

Table 2-5. Diagnostic Commands (Oracle SPARC)

Command	Description
version	Lists the FCode version.
beacon	Flashes the 2600 Series Adapter's LED.
selftest	Tests the 2600 Series Adapter's memory and loopback.
selftest-loop	Tests the 2600 Series Adapter's memory and loopback; it runs continuously until the Break Key is sent.
ext-loopback-test	Tests the external loopback.
ext-loopback-test-loop	Tests the external loopback; it runs continuously until the Break Key is sent.
show-children	Lists all attached targets.
disk-test	Tests a selected target.
sel-dev	Selects a device for disk test.

Table 2-5. Diagnostic Commands (Oracle SPARC) (Continued)

Command	Description
<code>sel-lun</code>	Selects the LUN for disk test.

Note: Loop support is only available at 8Gbps, but not at 16 or 32Gbps.

Using UEFI for Custom Configuration

For details on how to use UEFI to perform custom configuration, refer to the relevant server vendor documentation. For additional information, see the latest UEFI files under **Boot Code** on the QLogic Downloads and Documentation Web pages for 2600 Series Adapter models. See also the *User's Guide—UEFI Human Interface Infrastructure, 2600 Series 16Gb Fibre Channel Adapters* (part number SN0054689-00), which describes how to use the HII application to configure QLogic 16Gb Fibre Channel Adapter parameters and boot-from-SAN settings. For download assistance, see [“Downloading Software and Documentation”](#) on [page xviii](#).

Fibre Channel Ping Testing

QConvergeConsole supports Fibre Channel ping testing. The Fibre Channel ping test sends a SCSI Inquiry command to each selected target, measuring the time it takes for the target to respond.

NOTE

Before and after each SCSI command, the link statistics are collected to verify that no counters are incremented during each pass.

For more information on performing general diagnostic tests and viewing the diagnostic test results, refer to the help system, *QConvergeConsole Help*,

CT Fibre Channel Trace Route Testing

QConvergeConsole supports common transport (CT) Fibre Channel trace route (FTR) testing. The CT FTR test traces the route to each device attached to the port.

NOTE

All inter-link switches between the initiator and the target must have the Brocade switch firmware 7.1.1 or later and must support CT FTR for the test to work end-to-end. To confirm if your target is supported, contact QLogic Support.

For more information on performing general diagnostic tests and viewing the diagnostic test results, refer to the help system, *QConvergeConsole Help*.

Link Cable Beacon Extended Link Service Command

NOTE

This feature is supported only on QLE2690, QLE2692, QLE2694, QLE2694U, and QLE2694L Adapters. Run the LCB test only from a switch with FOS version 7.4.x or later.

The link cable beacon (LCB) extended link service command locates the corresponding ends of a cable by flashing the specific LEDs (see [“Adapter LEDs” on page 93](#) for more information) on the corresponding ports of a link. The LCB command can be sent through a Brocade switch using the following commands, which show examples of enabling, disabling, or verifying the LCB. For details, refer to your switch documentation.

```
SW6505:admin> portpeerbeacon --enable 12
SW6505:admin> portpeerbeacon --show -all
portPeerBeacon is enabled on port :12
SW6505:admin> portpeerbeacon --disable 12
```

Read Diagnostic Parameters Extended Link Service Command

The read diagnostic parameters (RDP) extended link service (ELS) command is a powerful diagnostic tool that can be used while a link is up and passing traffic. When the adapter port receives an RDP command, it responds with a comprehensive diagnostic report containing several blocks of data useful for monitoring the fabric or trouble-shooting. The report includes:

- SFP Diagnostic Parameters: temperature, V_{CC} , and Tx and Rx power
- Port Speed Descriptor: speed capabilities and operating speed
- Link Error Status Block Descriptor
- Port Names Descriptor: WWNN and WWPN
- FEC Status Descriptor: corrected and uncorrectable blocks

NOTE

This feature is supported only on QLE2690, QLE2692, QLE2694, QLE2694U, and QLE2694L Adapters. You must run the RDP test from a switch with FOS version 7.4.x or later.

The following example shows the RDP ELS command output for Port 13 on a Brocade 16G switch:

```
SW6505:admin> sfpshow 13 -link -force
Identifier: 3      SFP
Connector: 7      LC
Transceiver: 7004404000000000 4,8,16_Gbps M5 sw Short_dist
Encoding: 6       64B66B
Baud Rate: 140    (units 100 megabaud)
Length 9u: 0      (units km)
Length 9u: 0      (units 100 meters)
Length 50u (OM2): 3    (units 10 meters)
Length 50u (OM3): 0    (units 10 meters)
Length 62.5u:0     (units 10 meters)
Length Cu: 0      (units 1 meter)
Vendor Name: HP-F      BROCADE
Vendor OUI: 00:05:1e
Vendor PN: QK724A
Vendor Rev: A
Wavelength: 850    (units nm)
Options: 003a Loss_of_Sig,Tx_Fault,Tx_Disable
BR Max: 0
BR Min: 0
Serial No: HAF314370000B7F
Date Code: 140909
DD Type: 0x68
Enh Options: 0xfa
Status/Ctrl: 0x30
Pwr On Time: 0.30 years (2666 hours)
E-Wrap Control: 0
O-Wrap Control: 0
Alarm flags[0,1] = 0x0, 0x0
Warn Flags[0,1] = 0x0, 0x0
```

		Alarm		Warn	
		low	high	low	high
Temperature:	60 Centigrade	-5	85	0	75
Current:	8.430 mAmps	2.500	12.000	2.000	11.500
Voltage:	3322.2 mVolts	3000.0	3600.0	3100.0	3500.0
RX Power:	-3.1 dBm (495.3uW)	31.6 uW	1258.9 uW	31.6 uW	794.3 uW
TX Power:	-3.2 dBm (481.6 uW)	125.9 uW	1258.9 uW	251.2 uW	794.3 uW

2-Software Installation and Initial Setup

Multiboot Image for Fibre Channel Adapter Function Configuration Utility

State transitions: 5

Port Speed Capabilities 4Gbps 8Gbps 16Gbps

PEER Port Gbic Info

Laser Type: Short Wave Laser

SFP Type: Optical Port Type

Connector Type: Other

Following SFP Parameters are Valid

Temperature: 35 Centigrade [Range -128 - +128 C]

Current: 8.176 mAmps [Range 0 - 131 mAmps]

Voltage: 3463.2 mVolts [Range 0 - 3600 mVolts]

Rx Power: 460.4 uW [Range 0 - 6550 uW]

Tx Power: 504.7 uW [Range 0 - 6550 uW]

Signal Loss (Upstream) : -16.7 dBm (21.2 uW)

Signal Loss (Downstream): -20.3 dBm (9.4 uW)

Port Speed Capabilities 4Gbps 8Gbps 16Gbps

Last poll time: 03-24-2015 UTC Tue 18:03:14

3 Personality Configuration

This chapter describes the personality configuration features of the QLE2670 and QLE2672 Adapters, including:

- [Preparing for a Personality Change](#)
- [“Changing the Adapter Personality” on page 29](#)

The QLE2670 and QLE2672 Adapters allow you to change the interface type (personality) from a Fibre Channel Adapter to a Converged Network Adapter. This chapter covers the information that you need to know prior to changing the adapter personality, as well as the steps for performing a personality change in various interfaces.

Preparing for a Personality Change

To ensure that your 2600 Series Adapter supports a personality change, confirm the part number and revision, update the firmware, and replace the optical transceivers.

Confirming the Part Number and Revision

Confirm that your 2600 Series Adapter supports the personality change feature by determining the model name, part number, and revision letter.

Supported Models

The 2600 Series Adapter models listed in [Table 3-1](#) support personality change.

Table 3-1. 2600 Series Adapters That Support Personality Change

Model Name	Part Number
QLE2670	HD8310405-01
QLE2672	HD8310405-02

To determine if your 2600 Series Adapter supports personality change:

Use one of the following methods:

- Locate the physical label on the adapter that has the part number (see [Figure 3-1](#)), and then check to see if it is listed in [Table 3-1](#).

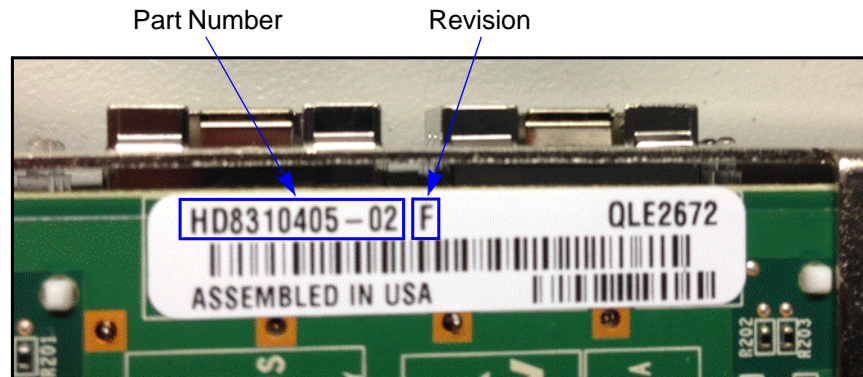


Figure 3-1. 2600 Series Adapter Part Number Location—Physical

- In QConvergeConsole GUI, select a 2600 Series port in the left pane, and then click the **VPD** tab in the right pane. Under **Port Vital Product Data (VPD)**, view the **Engineering Date Code** for the part number, and then check to see if it is listed in [Table 3-1](#).

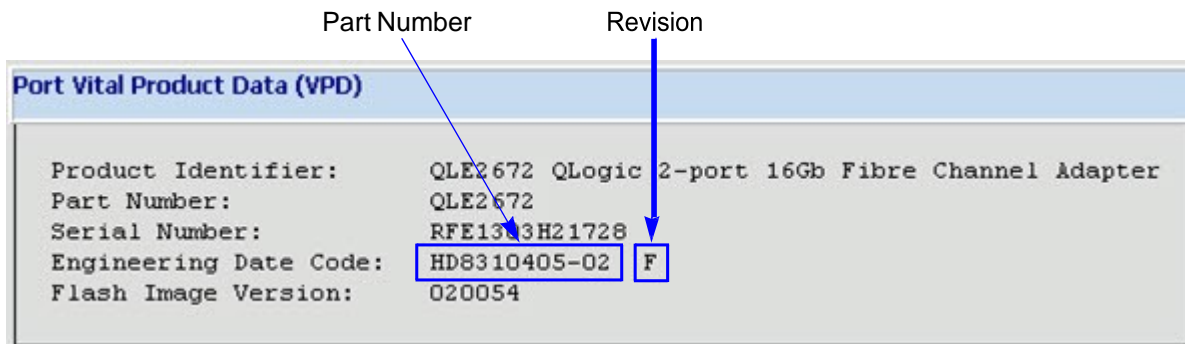


Figure 3-2. 2600 Series Adapter Part Number Location—QConvergeConsole GUI

Supported Revisions

Some 2600 Series Adapters that support personality change require an *enablement kit* (available on the QLogic Web site) for the change to work. For the adapters listed in [Table 3-1](#), revisions A, B, C, D, E, F, and G require the enablement kit; revisions H and later do not. The adapter revision is printed on a label on the adapter (see [Figure 3-1](#)) and displayed in QConvergeConsole GUI (see [Figure 3-2](#)).

If your adapter requires an enablement kit, refer to the knowledge base article, *Enabling CNA Functionality on QLogic 2600 Series Adapters*, available on the QLogic Downloads page. To download documentation, follow the instructions in “[Downloading Software and Documentation](#)” on page xviii.

Updating the Firmware

To enable a personality change, supported 2600 Series Adapters must have the latest firmware installed. To download the latest firmware, follow the instructions in “[Downloading Software and Documentation](#)” on page xviii.

Replacing the Optical Transceivers

To operate the 2600 Series Adapter in Converged Network Adapter mode, replace the 16Gb optical transceivers with one of the following:

- QLogic-branded 10GbE optical transceivers. Contact QLogic’s approved suppliers for purchase.
- SFP+ direct-attach copper cables. For a list of supported cables, go to: http://www.qlogic.com/Resources/Documents/LineCards/CopperCables_Support_Matrix_Line_Card.pdf

Be sure to have the new optics or copper cables available on-site before switching the 2600 Series Adapter’s personality. Also, keep your 16Gb optical transceivers in a safe place in case you want to change the adapters back to Fibre Channel mode in the future.

NOTE

After the 2600 Series Adapters are converted to Converged Network Adapter mode, the adapters can no longer be connected to native Fibre Channel fabric or storage.

For instructions on converting the 2600 Series Adapter back to Fibre Channel mode, see the *User’s Guide—Converged Network Adapter 8300 Series* (part number HD8354601-00), available on the QLogic Web site.

Changing the Adapter Personality

NOTE

After changing the personality of a QLE267x Adapter, it is functionally equivalent to an 8300 Series Adapter.

You can configure the adapter personality in the following ways:

- “[Changing the Personality with BIOS \(Fast!UTIL\)](#)” on page 30

- “Changing the Personality with UEFI or EFI” on page 35
- “Changing the Personality with FCode” on page 38
- “Changing the Personality with QConvergeConsole GUI” on page 39
- “Changing the Personality with Interactive QConvergeConsole CLI” on page 41
- “Changing the Personality with Noninteractive QConvergeConsole CLI” on page 43
- “Changing the Personality with QConvergeConsole Plug-in for VMware vCenter Server” on page 44
- “Changing the Personality with QConvergeConsole Plug-in for VMware vSphere Web Client” on page 45

Changing the Personality with BIOS (*Fast!UTIL*)

To change the 2600 Series Adapter’s personality mode using the BIOS *Fast!UTIL* utility on legacy x86 systems:

1. During system power-on initialization, press the CTRL+Q or ALT+Q keys. [Figure 3-3](#) shows an example.

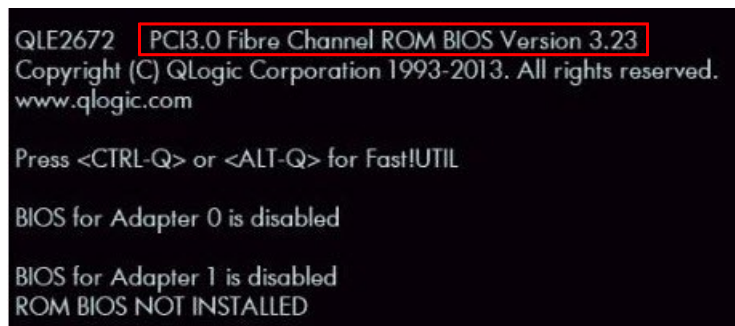


Figure 3-3. System Power-on Initialization

If you have more than one 2600 Series Adapter, the utility prompts you to select the adapter that you want to configure. [Figure 3-4](#) shows an example.

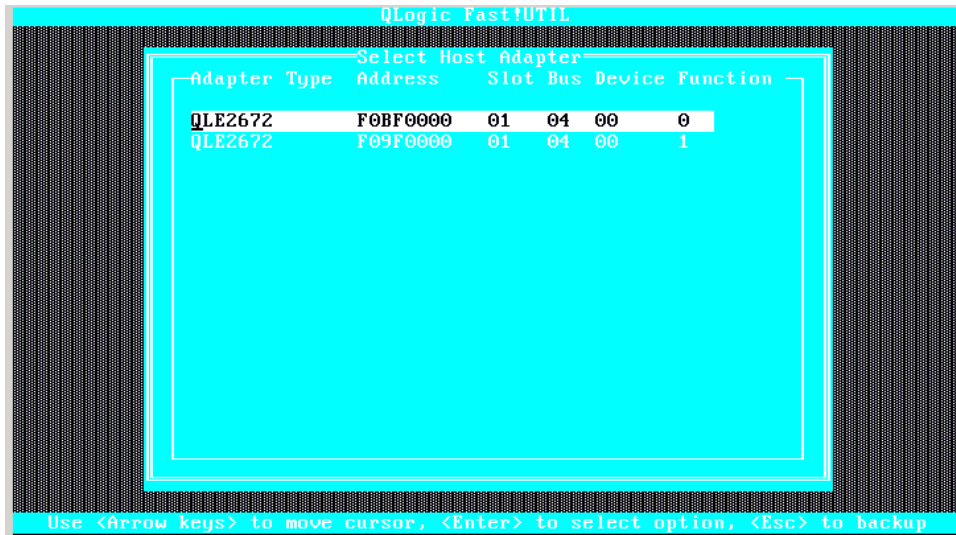


Figure 3-4. Fast!UTIL Select Host Adapter Menu

2. Select the 2600 Series Adapter that you want to configure, and then press the ENTER key.

The **Fast!UTIL Options** menu appears, as shown in [Figure 3-5](#).

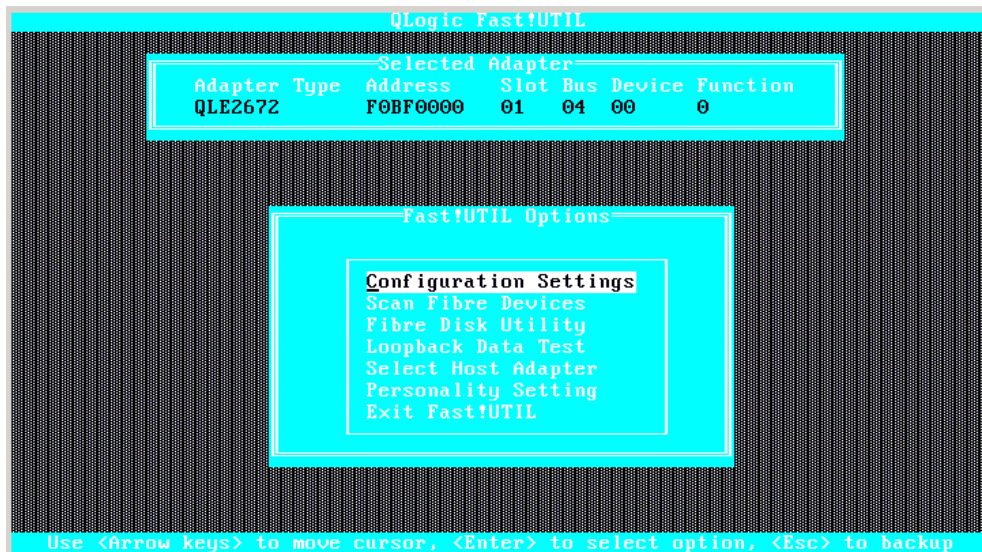


Figure 3-5. Fast!UTIL Options Menu

3. Press the arrow keys to select **Personality Setting**, and then press ENTER as shown in [Figure 3-6](#).



Figure 3-6. Selecting Personality Setting

The 2600 Series Adapter's current personality is displayed, as shown in [Figure 3-7](#).

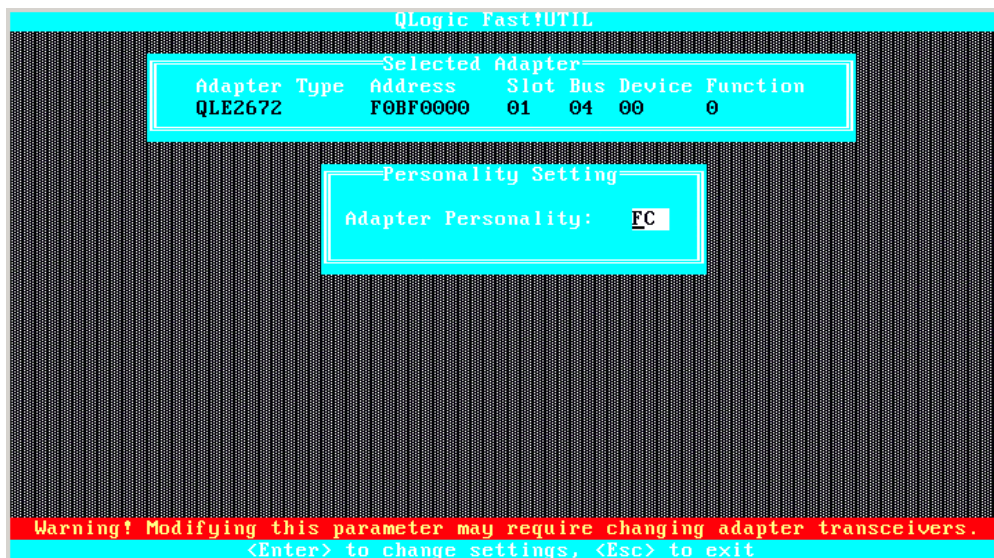


Figure 3-7. Changing the Personality from FC

4. To change the personality of the selected 2600 Series Adapter, press ENTER, and then press ESC to exit the menu. [Figure 3-8](#) shows an example.

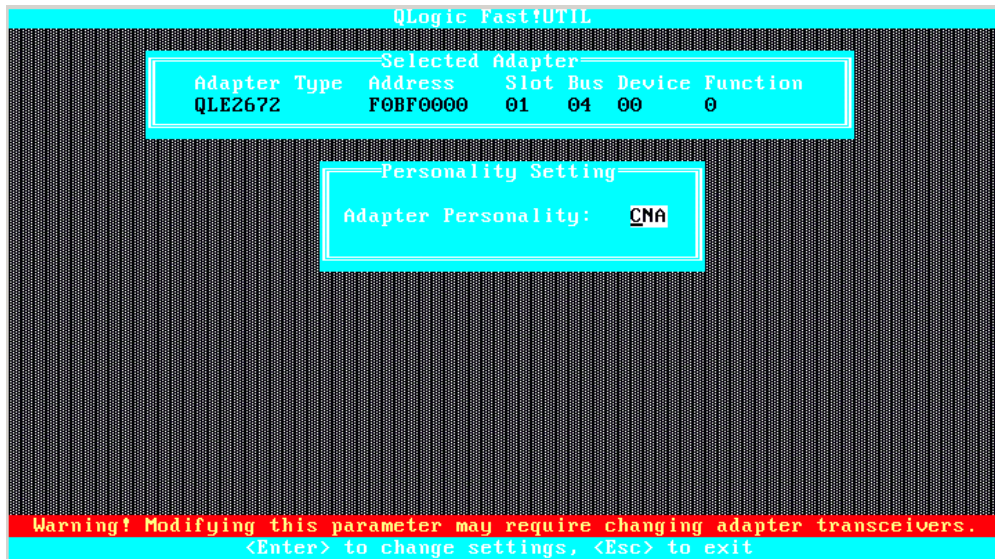


Figure 3-8. Changing the Adapter's Personality

5. Select **Save changes**, and then press ENTER, as shown in [Figure 3-9](#).



Figure 3-9. Save Your Changes

The **Fast!UTIL Options** menu appears. [Figure 3-10](#) shows an example.



Figure 3-10. Fast!UTIL Options Menu

6. To exit the menu, do one of the following:
 - Select **Exit Fast!UTIL**, and then press ENTER.
 - Press ESC.

The **Exit Fast!UTIL** menu appears, as shown in [Figure 3-11](#).

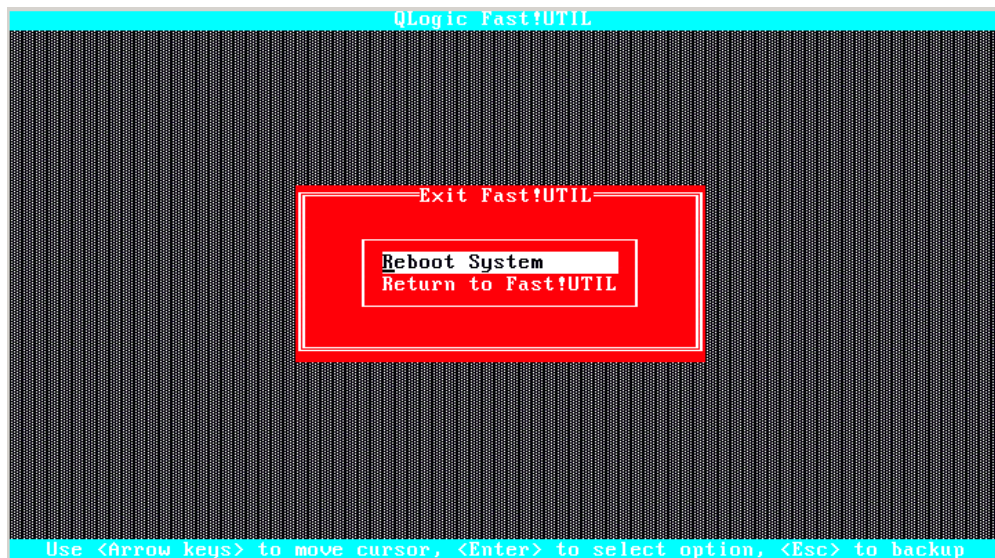


Figure 3-11. Exit Fast!UTIL Menu

7. To reboot the system, select **Reboot System**, and then press ENTER.

After you reboot the system, the new personality takes effect, as shown in [Figure 3-12](#).

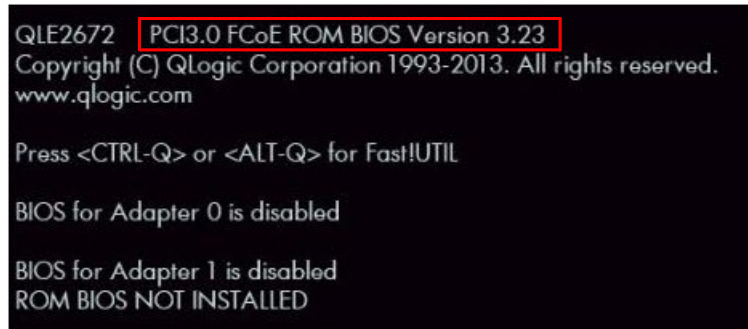


Figure 3-12. Personality Change Complete

NOTE

After the 2600 Series Adapter's mode has been changed to Converged Network Adapter, remove the 16Gb optical transceivers. You can replace these transceivers with one of the following:

- QLogic-branded 10GbE optical transceivers. Contact QLogic's approved suppliers for purchase.
- SFP+ direct-attach copper cables. For a list of supported cables, go to: http://www.qlogic.com/Resources/Documents/LineCards/Copper_Cables_Support_Matrix_Line_Card.pdf

For instructions on using the 2600 Series Adapter as a Converged Network Adapter, refer to the *User's Guide—Converged Network Adapter 8300 Series* (part number HD8354601-00), available on the QLogic Web site. To access the guide, see “[Downloading Software and Documentation](#)” on [page xviii](#) and select one of the 8300 Series Converged Network Adapter model numbers on the QLogic Downloads and Documentation Web page.

Changing the Personality with UEFI or EFI

To change the 2600 Series Adapter's personality using the UEFI on x86 systems:

1. Enter the server's UEFI setup. (For instructions on how to enter the UEFI configuration menus, refer to your server manufacturer's documentation.)
2. To view the UEFI Driver Control page, select the **UEFI Driver Control** tab.

3. In the left pane, select a QLogic 16Gb Fibre Channel Adapter. [Figure 3-13](#) shows an example.

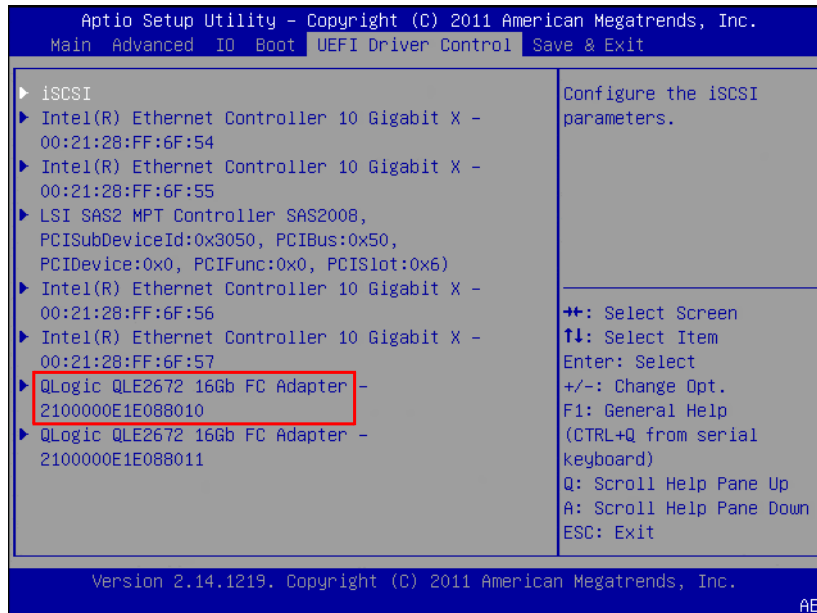


Figure 3-13. UEFI Driver Control Page in UEFI Setup

4. In the left pane, select **Advanced Settings**, as shown in [Figure 3-14](#).

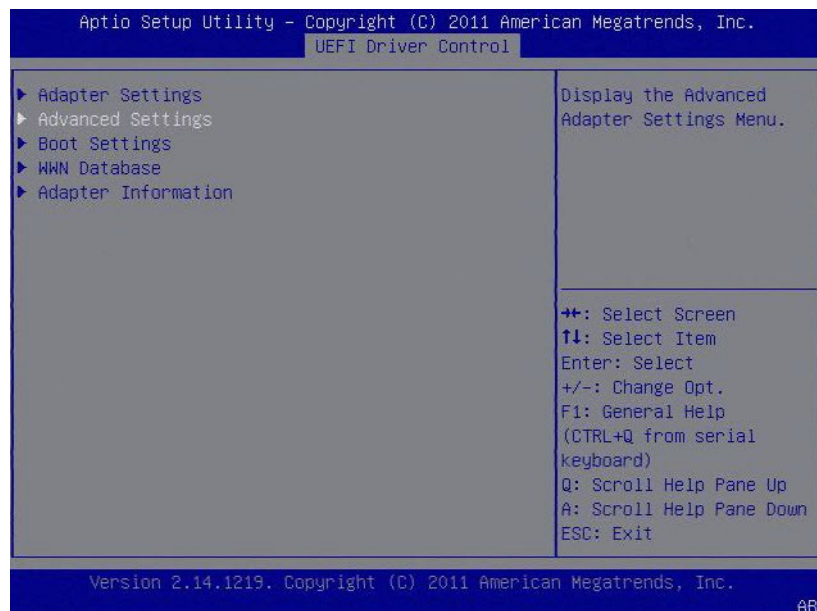


Figure 3-14. Selecting Advanced Settings

5. Select **Adapter Personality**, and then in the Adapter Personality box, select the mode, either **FC** or **CNA** (Fibre Channel or Converged Network Adapter) as required. [Figure 3-15](#) shows an example.

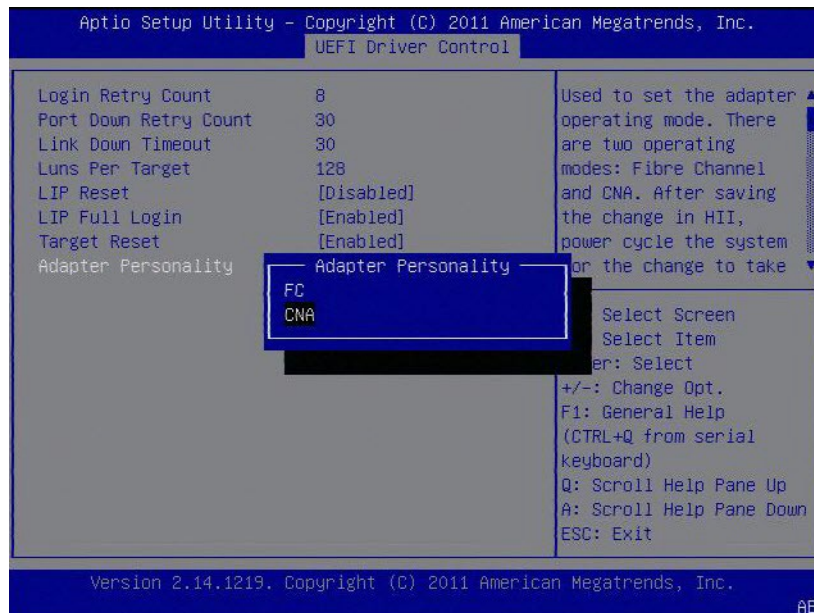


Figure 3-15. Selecting the Personality

6. Reboot the server.

NOTE

After the 2600 Series Adapter's mode has been changed to Converged Network Adapter, remove the 16Gb optical transceivers. You can replace these transceivers with one of the following:

- QLogic-branded 10GbE optical transceivers. Contact QLogic's approved suppliers for purchase.
- SFP+ direct-attach copper cables. For a list of supported cables, go to: http://www.qlogic.com/Resources/Documents/LineCards/CopperCables_Support_Matrix_Line_Card.pdf

For instructions on using the 2600 Series Adapter as a Converged Network Adapter, refer to the *User's Guide—Converged Network Adapter 8300 Series* (part number HD8354601-00), available on the QLogic Web site. To access the guide, see "[Downloading Software and Documentation](#)" on [page xviii](#) and select one of the 8300 Series Converged Network Adapter model numbers on the QLogic Downloads and Documentation Web page.

Changing the Personality with FCode

NOTE

The path names shown in the examples might differ from the path names in your system. Look for the `QLGC,qlc@` section that identifies QLogic adapters.

The personality feature with FCode within the logical domain (LDOM) environment is available only to the primary function (PF).

To change the 2600 Series Adapter's personality using FCode on SPARC systems:

1. To list the QLogic Fibre Channel and FCoE device path, at the `ok` prompt, issue the `show-disks` command.

```
{0} ok show-disks
a) /pci@400/pci@1/pci@0/pci@c/LSI,sas@0/disk
b) /pci@400/pci@1/pci@0/pci@4/QLGC,qlc@0,1/fp@0,0/disk
c) /pci@400/pci@1/pci@0/pci@4/QLGC,qlc@0/fp@0,0/disk
d) /pci@400/pci@1/pci@0/pci@0/pci@0/usb@0,2/hub@3/storage@2/disk
e) /iscsi-hba/disk
q) NO SELECTION
Enter Selection, q to quit: q
{0} ok
```

2. At the `ok` prompt, issue the `select` command.

```
{0} ok select /pci@400/pci@1/pci@0/pci@4/QLGC,qlc@0
QLogic QLE2672 FC Host Adapter FCode(SPARC): x.xxxx yyyy-mm-dd
08:51
ISP Firmware version x.xx.xx
```

3. To change the 2600 Series Adapter's personality, at the `ok` prompt, issue the `set-personality` command.

The following example shows the mode being changed (in this case, from Fibre Channel to Converged Network Adapter):

```
{0} ok set-personality
Current Personality : FC
Do you want to change it? (y/n) y
Choose Personality :
0 - FC
1 - CNA
enter: 1
.
.
.
{0} ok reset-all
```

NOTE

After the 2600 Series Adapter's mode has been changed to Converged Network Adapter, remove the 16Gb optical transceivers. You can replace these transceivers with one of the following:

- QLogic-branded 10GbE optical transceivers. Contact QLogic's approved suppliers for purchase.
- SFP+ direct-attach copper cables. For a list of supported cables, go to: http://www.qlogic.com/Resources/Documents/LineCards/CopperCables_Support_Matrix_Line_Card.pdf

For instructions on using the 2600 Series Adapter as a Converged Network Adapter, refer to the *User's Guide—Converged Network Adapter 8300 Series* (part number HD8354601-00), available on the QLogic Web site. To access the guide, see “[Downloading Software and Documentation](#)” on [page xviii](#) and select one of the 8300 Series Converged Network Adapter model numbers on the QLogic Downloads and Documentation Web page.

Changing the Personality with QConvergeConsole GUI

For information about downloading and installing QConvergeConsole GUI, see “[Step 3. Install QConvergeConsole](#)” on [page xxv](#).

To change the personality of a 2600 Series Adapter:

1. On the QConvergeConsole GUI main window, select a 2600 Series Adapter in the tree pane on the left.
2. In the content pane on the right, click the **Personality** tab.

3. On the Personality page, click either **FC Only** (Figure 3-16) or **CNA** (Figure 3-17), as appropriate, to change the current adapter type.

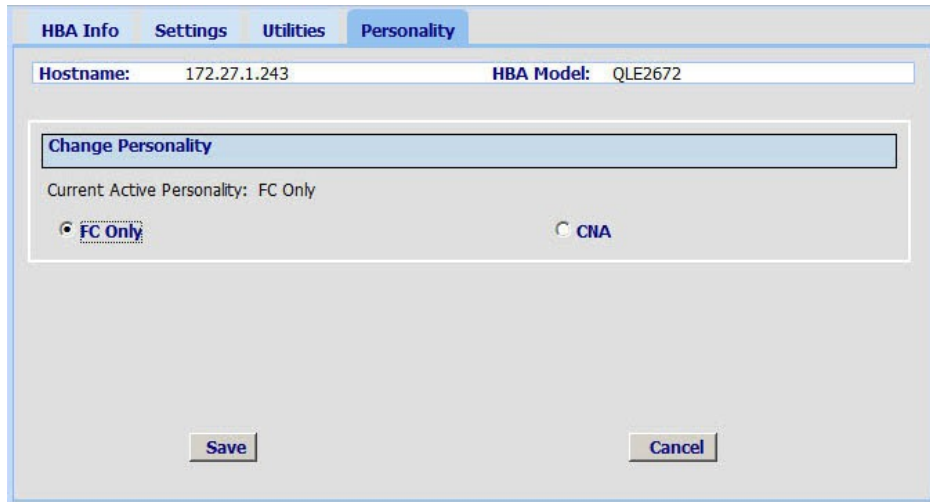


Figure 3-16. Personality Page—Current Personality Set to FC Only

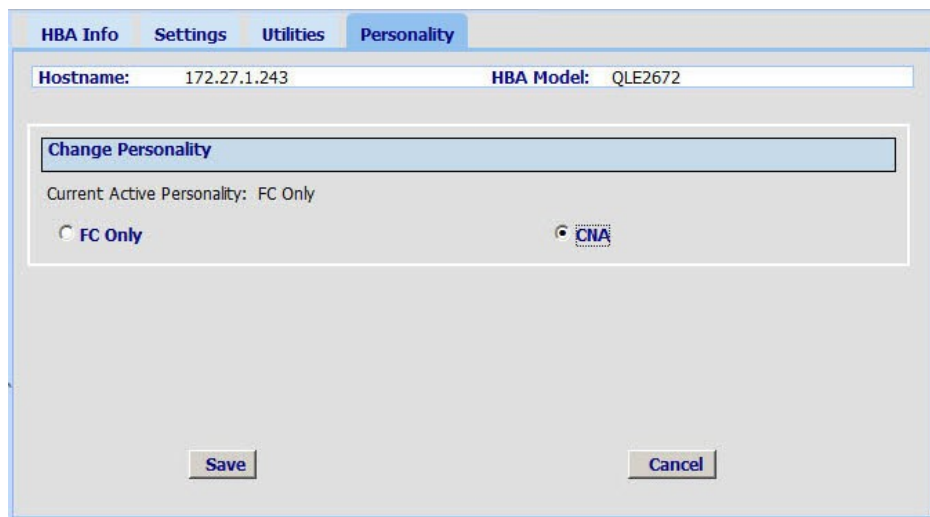


Figure 3-17. Personality Page—Changing to from FC to CNA

4. Click **Save** to activate the personality change, or click **Cancel** to cancel the personality change.
5. If prompted, in the Security Check for Host dialog box, type the password and then click **OK**.

6. Do one of the following:
 - For all systems except Solaris, reboot the system for the changes to take effect.
 - For Solaris systems, issue the `reboot -p` command for the changes to take effect.

NOTE

After the 2600 Series Adapter's mode has been changed to Converged Network Adapter, remove the 16Gb optical transceivers. You can replace these transceivers with one of the following:

- QLogic-branded 10GbE optical transceivers. Contact QLogic's approved suppliers for purchase.
- SFP+ direct-attach copper cables. For a list of supported cables, go to: http://www.qlogic.com/Resources/Documents/LineCards/CopperCables_Support_Matrix_Line_Card.pdf

For instructions on using the 2600 Series Adapter as a Converged Network Adapter, refer to the *User's Guide—Converged Network Adapter 8300 Series* (part number HD8354601-00), available on the QLogic Web site. To access the guide, see “[Downloading Software and Documentation](#)” on [page xviii](#) and select one of the 8300 Series Converged Network Adapter model numbers on the QLogic Downloads and Documentation Web page.

Changing the Personality with Interactive QConvergeConsole CLI

For information about downloading and installing QConvergeConsole CLI, see “[Step 3. Install QConvergeConsole](#)” on [page xxv](#).

To change the personality of a 2600 Series Adapter:

1. On the **Main Menu**, select **Adapter Configuration**.
2. On the **Adapter Type Selection** menu, select **Fibre Channel Adapter**.
3. On the **Fibre Channel Adapter Configuration** menu, select **Personality**.
4. On the adapter menu, select the 2600 Series Adapter whose personality is to be changed.
5. To change the personality, type `y`.

Example of changing a Fibre Channel Adapter to a Converged Network Adapter:

```
QConvergeConsole GUI
CLI - Version 1.0.3 (Build 37)
Fibre Channel Adapter Configuration
```

3–Personality Configuration

Changing the Adapter Personality

```
1: HBA Model: QLE2672  SN: AFE1224F05259
    Port  1 WWPN: 21-00-00-0E-1E-08-F2-00 Link Down
    Port  2 WWPN: 21-00-00-0E-1E-08-F2-01 Online
(p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit)
Please Enter Selection: 1
```

Change personality to CNA? (y/n): **y**

Personality type of HBA instance 1 (QLE2672) has been changed successfully. Please reboot machine. Make sure to change the SFP module to a compatible one (CNA) before reboot.

Hit <Enter> to continue:

Example of changing a Converged Network Adapter to Fibre Channel Adapter:

```
QConvergeConsole GUI
CLI - Version 1.0.3 (Build 37)
Converged Network Adapter (CNA) FCoE Configuration
1: HBA Model: QLE2672 SN: AFE1224F05259
    Port  1 [Protocol(s): FCoE]
    Port  2 [Protocol(s): FCoE]
(p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit)
Please Enter Selection: 1
```

Change personality to FC? (y/n): **y**

Personality type of HBA instance 1 (QLE2672) has been changed successfully. Please reboot machine. Make sure to change the SFP module to a compatible one (FC) before reboot.

Hit <Enter> to continue:

NOTE

After the 2600 Series Adapter's mode has been changed to Converged Network Adapter, remove the 16Gb optical transceivers. You can replace these transceivers with one of the following:

- QLogic-branded 10GbE optical transceivers. Contact QLogic's approved suppliers for purchase.
- SFP+ direct-attach copper cables. For a list of supported cables, go to: http://www.qlogic.com/Resources/Documents/LineCards/Copper_Cables_Support_Matrix_Line_Card.pdf

For instructions on using the 2600 Series Adapter as a Converged Network Adapter, refer to the *User's Guide—Converged Network Adapter 8300 Series* (part number HD8354601-00), available on the QLogic Web site. To access the guide, see “[Downloading Software and Documentation](#)” on [page xviii](#) and select one of the 8300 Series Converged Network Adapter model numbers on the QLogic Downloads and Documentation Web page.

Changing the Personality with Noninteractive QConvergeConsole CLI

To display the current adapter personality type in the noninteractive mode of QConvergeConsole CLI, issue the following command:

```
gauccli -pr fc -pc <hba instance|hba wwpn|all> --info
```

To change the personality of a 2600 Series Adapter:

- Issue the following command:

```
gauccli -pr fc -pc <hba instance|hba wwpn|all> --type <mode>
```

Where:

`hba instance` = Fibre Channel Adapter instance number of a Fibre Channel Adapter port (issue the `-g` command to find)

`hba wwpn` = Worldwide port name of a Fibre Channel Adapter port

`all` = All adapter ports

`mode` = Personality type:

`fc` or `0` = Change the adapter personality to Fibre Channel

`cna` or `1` = Change the adapter personality to Converged Network Adapter

NOTE

After the 2600 Series Adapter's mode has been changed to Converged Network Adapter, remove the 16Gb optical transceivers. You can replace these transceivers with one of the following:

- QLogic-branded 10GbE optical transceivers. Contact QLogic's approved suppliers for purchase.
- SFP+ direct-attach copper cables. For a list of supported cables, go to: http://www.qlogic.com/Resources/Documents/LineCards/CopperCables_Support_Matrix_Line_Card.pdf

For instructions on using the 2600 Series Adapter as a Converged Network Adapter, refer to the *User's Guide—Converged Network Adapter 8300 Series* (part number HD8354601-00), available on the QLogic Web site. To access the guide, see “[Downloading Software and Documentation](#)” on [page xviii](#) and select one of the 8300 Series Converged Network Adapter model numbers on the QLogic Downloads and Documentation Web page.

Changing the Personality with QConvergeConsole Plug-in for VMware vCenter Server

To change the personality of a 2600 Series Adapter:

1. In the tree pane on the left side of the QConvergeConsole pane, select a 2600 Series Adapter.
2. In the content pane under **Configuration**, select an **Adapter Personality Type** as shown in [Figure 3-18](#).

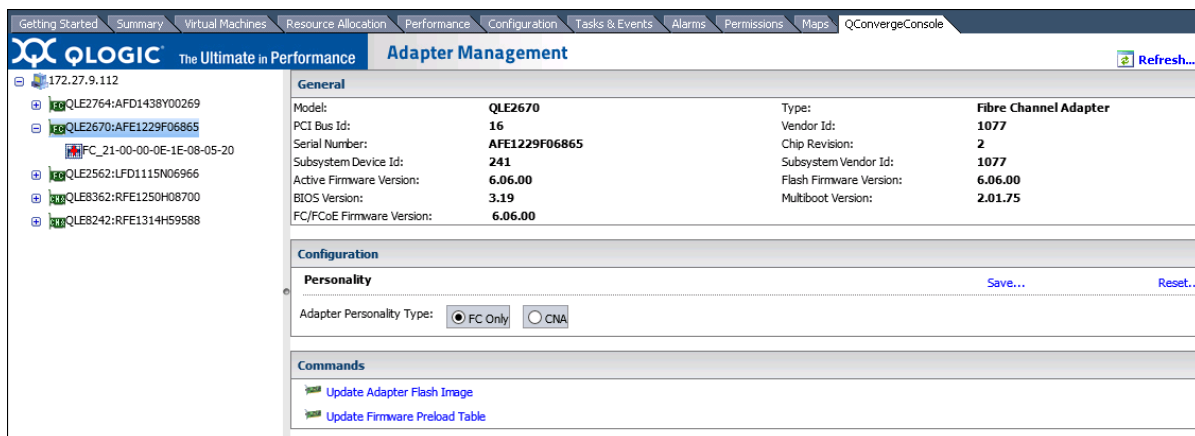


Figure 3-18. Changing Personality Type Using QConvergeConsole Plug-in for VMware vCenter Server

3. Click **Save**.

Changing the Personality with QConvergeConsole Plug-in for VMware vSphere Web Client

For information about downloading and installing QConvergeConsole Plug-in for VMware vSphere Web Client, see [“Step 3. Install QConvergeConsole” on page xxv](#).

To change the personality of a 2600 Series Adapter:

1. In the tree pane on the left side of the VMware vSphere Web Client window, select a host.
2. In the content pane on the right, click the **Manage** tab.
3. On the Manage page, click the **QConvergeConsole GUI** tab.

The QConvergeConsole GUI Adapter Management window appears in the VMware vSphere Web Client’s content pane. The QConvergeConsole GUI Adapter Management window also contains two panes: a tree pane on the left and a content pane on the right.

4. In the Adapter Management’s left pane, click a node corresponding to a 2600 Series Adapter to view information pertaining to that adapter in the right pane.

Under **Personality Type**, the plug-in indicates whether each adapter type (personality), **FC Only** and **CNA**, is enabled or disabled.

5. To change the adapter type:
 - a. Click **Edit**.
 - b. In the <Adapter_Name> Personality Type dialog box, click either **FC Only** or **CNA** as the new type.
 - c. To change the adapter type, click **OK**.

3–Personality Configuration

Changing the Adapter Personality

Figure 3-19 shows an example.

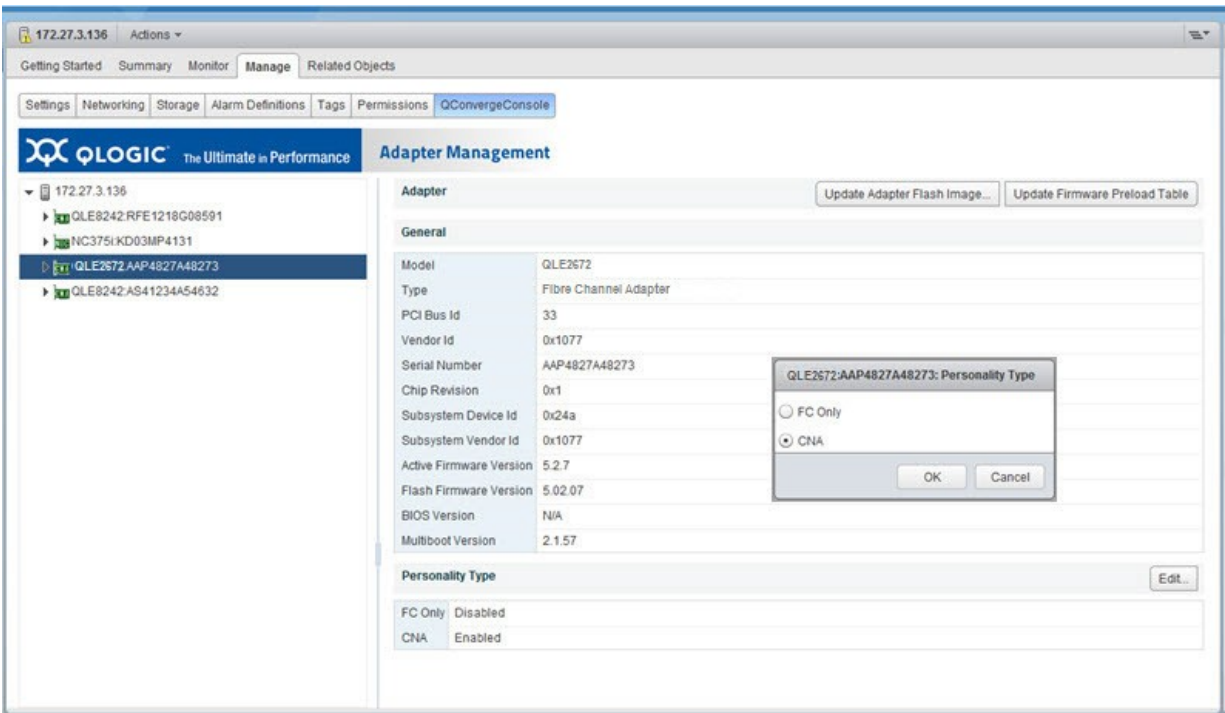


Figure 3-19. Changing Personality Type Using QConvergeConsole Plug-in for VMware vSphere Web Client

4 Fibre Channel Configuration

This chapter describes the driver and agent installation, configuration, operation, and troubleshooting of the Fibre Channel function of the 2600 Series Adapters, including:

- [“Installing Fibre Channel” on page 48](#)
- [“Setting Fibre Channel Adapter Parameters” on page 51](#)
- [“Configuring Target Persistent Binding” on page 52](#)
- [“Configuring Boot Devices” on page 54](#)
- [“Configuring Virtual Ports \(NPIV\)” on page 58](#)
- [“Configuring Driver Parameters” on page 65](#)
- [“Configuring Selective LUNs” on page 67](#)
- [“Configuring Out-of-Order Frame Reassembly” on page 69](#)
- [“Setting Queue Depth” on page 70](#)
- [“Enabling Fabric-Assigned World Wide Port Name” on page 71](#)
- [“Using Fabric-Assigned Boot LUN” on page 76](#)
- [“Configuring End-to-End \(CS_CTL\) QoS” on page 79](#)
- [“Enabling Forward Error Correction” on page 86](#)
- [“Upgrading QLE2694U Adapters to 32Gbps” on page 90](#)
- [“Using Buffer-to-Buffer Credit Recovery” on page 91](#)
- [“Resetting Driver and Firmware Counters” on page 91](#)

Installing Fibre Channel

This section provides information on installing Fibre Channel on the following platforms:

- [Installing Fibre Channel in Linux](#)
- [Installing Fibre Channel in VMware ESXi](#)
- [Installing Fibre Channel in Windows](#)
- [Installing Fibre Channel in Solaris](#)

Installing Fibre Channel in Linux

For more information, refer to the *Fibre Channel Adapter and Converged Network Adapter Inbox Driver Update for Linux Kernel 2.6.x and 3.x* Read Me document.

Linux OS Support

To obtain the latest information about supported Linux operating systems, visit the QLogic Web site and download the associated Read Me and Release Notes documents:

driverdownloads.qlogic.com

Supported Features

The Fibre Channel Adapter and Converged Network Adapter Inbox Driver for Linux Kernel 2.6.x and 3.x support the following:

- FCAL—direct attach loop, point-to-point, and fabric topologies
- Initiator mode only
- Fibre Channel tape
- MSI-X
- NPIV
- Device mapper
- Support for block SG (BSG) interface
- Support for sysfs interface
- Support for an adapter API

Deploying the Driver

For information on deploying the driver, refer to the *Fibre Channel Adapter and Converged Network Adapter Inbox Driver Update for Linux Kernel 2.6.x and 3.x* Read Me document.

Driver System Parameters

For information on setting driver system parameters, refer to the *Fibre Channel Adapter and Converged Network Adapter Inbox Driver Update for Linux Kernel 2.6.x and 3.x* Read Me document.

Boot from SAN

Booting from SAN means booting the OS from a Fibre Channel target device. QLogic recommends using the QLogic inbox driver to install the OS to the Fibre Channel target device that is attached to a 2600 Series Adapter. If there is no QLogic inbox driver that supports the 2600 Series Adapter, you should use a DD-Kit¹ to boot from SAN.

NOTE

The following procedure is only for RHEL 5.0 and later distributions.

To boot from SAN when installing to a LUN other than LUN 0 and LUN 0 is present:

1. On the Boot Loader Configuration window, select **Configure Advance Boot Loader**, and then click **Next**.
2. On the Advanced Boot Loader Configuration window, select **Change Drive Order**.
3. On the Edit Drive Order window, move the entry for the boot LUN.
4. To continue, click **OK**.
5. Continue with the OS installation as usual.

Installing Fibre Channel in VMware ESXi

For information on installing Fibre Channel in VMware ESXi, refer to the Read Me and Release Notes documents for VMware ESXi 5.x and 6.x.

NOTE

For specific service packs (SPs) and OS updates, refer to the descriptions where this software version is posted on the QLogic Web site:

driverdownloads.qlogic.com

ESXi OS Support

To obtain the latest information about supported ESXi operating systems, visit the QLogic Web site and download the associated Read Me and Release Notes documents:

driverdownloads.qlogic.com

Using the Driver

For information on how to install and remove the driver, refer to the Read Me document for VMware ESXi 5.x and ESXi 6.x.

¹ QLogic provides DD-Kits (driver update disks) for Linux platforms.

Installing Fibre Channel in Windows

For information on how to install Fibre Channel in Windows, refer to the *Fibre Channel Adapter STOR Miniport Driver Read Me* document.

Windows OS Support

To obtain the latest information about supported Windows operating systems, visit the QLogic Web site and download the associated Read Me and Release Notes documents:

driverdownloads.qlogic.com

Using the Driver

For information on how to create the driver disk, install the driver, and remove the driver, refer to the *Fibre Channel Adapter STOR Miniport Driver Read Me* document.

Installing Fibre Channel in Solaris

The Solaris drivers for this adapter are in box in the Solaris OS. For additional Solaris-specific information, refer to the OS documentation.

NOTE

For a detailed list of the currently supported operating systems, refer to the adapter's Read Me and Release Notes on the QLogic Web site:

driverdownloads.qlogic.com.

Solaris OS Support

To obtain the latest information about supported Solaris operating systems, visit the QLogic Web site and download the associated Read Me and Release Notes documents:

driverdownloads.qlogic.com

Updating the Driver

Refer to the Solaris OS documentation for information on how to create the driver disk, install the driver, and remove the driver.

Setting Fibre Channel Adapter Parameters

You can set parameters for Fibre Channel using the QConvergeConsole GUI, QConvergeConsole CLI, or QConvergeConsole Plug-ins.

Setting Fibre Channel Adapter Parameters with QConvergeConsole GUI

For details about how to set Fibre Channel Adapter parameters using QConvergeConsole GUI, refer to the “HBA Parameters” and “Advanced HBA Parameters” topics in the *QConvergeConsole Help*.

For example, [Figure 4-1](#) shows the data rate options for a QLE2694U Adapter.

The screenshot shows the 'Parameters' tab in the QConvergeConsole GUI. The 'HBA Parameters' sub-tab is active, displaying configuration for a QLE2694U adapter. The 'Configure Port General Parameters' dialog is open, showing the following settings:

- Connection Options:** 2 - Loop Preferred, Otherwise Point to Point
- Data Rate:** Auto (dropdown menu is open showing options: Auto, 8 Gbps, 16 Gbps, 32 Gbps)
- Frame Size:** 2048
- Hard Loop ID:** 0
- Loop Reset Delay (seconds):** 5
- Enable HBA Port Hard Loop ID
- Enable HBA Port BIOS
- Enable Fibre Channel Tape Support

Buttons for 'Save' and 'Restore Defaults' are located at the bottom of the dialog.

Figure 4-1. Data Rate Options for QLE2694U Adapter

Setting Fibre Channel Adapter Parameters with Interactive QConvergeConsole CLI

To set Fibre Channel Adapter parameters with interactive QConvergeConsole CLI:

1. On the **Fibre Channel Adapter Configuration** menu, select **HBA Parameters**.
2. On the port menu, select a port to open the **HBA Parameters** menu.
3. On the **HBA Parameters** menu, select the **Configure HBA Parameters** option to open the Configure Parameters menu.

For more information, refer to the section about the Fibre Channel interactive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Setting Fibre Channel Adapter Parameters with Noninteractive QConvergeConsole CLI

For information on setting Fibre Channel Adapter parameters using the noninteractive mode of QConvergeConsole CLI, refer to the section about Fibre Channel noninteractive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Setting Fibre Channel Adapter Parameters with QConvergeConsole Plug-in for VMware vCenter Server

For information on setting Fibre Channel Adapter parameters using the QConvergeConsole Plug-in for VMware vCenter Server, refer to the section “Configure Fibre Channel Port Parameters” in the *User's Guide—QConvergeConsole Plug-ins for VMware vSphere* (part number SN0054677-00).

Configuring Target Persistent Binding

You can configure target persistent binding using either the QConvergeConsole GUI or QConvergeConsole CLI tool.

NOTE

Target persistent binding is supported only for Windows.

Configuring Persistent Binding with QConvergeConsole GUI

To bind target devices attached to an adapter port using QConvergeConsole GUI:

1. In the QConvergeConsole GUI system tree, expand a Fibre Channel node.
2. For a 2600 Series Adapter, select the physical port number in the system tree.
3. Click the **Targets** tab.
4. On the Target page, click the **Target Persistent Binding** tab.
5. To bind all the devices listed to adapter ports, select the **Bind All** check box.

6. To configure a specific port and bind it to the target ID that you have selected from the **Target ID** list, select the **Bind** check box. If you do not want to configure the port, clear the check box. If you clear the check box, the corresponding port is unconfigured.
7. To save the configuration changes, click **Save**.
8. If the Security Check dialog box appears, type the password in the **Enter Password** box, and then click **OK**.

The system overwrites any previously saved configuration for the current adapter and opens a message box.
9. To close the message box, click **OK**.

For more information, refer to the topic about binding target devices in the *QConvergeConsole Help*.

Configuring Persistent Binding with Interactive QConvergeConsole CLI

In the interactive mode of QConvergeConsole CLI, follow these steps to bind a selected target to a specific adapter.

To bind a target using interactive QConvergeConsole CLI:

1. On the **Fibre Channel Adapter Configuration** menu, select **Target Persistent Bindings**.
2. On the port menu, select a port and then select **Bind Target(s)** to bind a target to a port.
3. Select a target and specify a target ID to open the **Target Persistent Binding – FC Port Configuration** menu with options to select more targets, save changes, or cancel the binding operation.

For more information, refer to the section about Fibre Channel interactive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Configuring Persistent Binding with Noninteractive QConvergeConsole CLI

In the noninteractive mode of QConvergeConsole CLI, bind a selected target to a specific adapter by issuing the following command:

```
# qaucli -pr fc -p (<hba instance> | <hba wwpn>) (<target wwnn>  
<target wwpn> <target port id> <target id>)
```

Where:

`hba instance` = Adapter number (issue the `-g` command to find)
`hba wwpn` = Worldwide port name of the adapter
`target wwnn` = Worldwide node name of the target
`target wwpn` = Worldwide port name of the target
`target port id` = Port ID of the target
`target id` = ID to which the target is bound

For more information, refer to the section about Fibre Channel noninteractive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Configuring Boot Devices

You can configure boot devices using QConvergeConsole GUI, QConvergeConsole CLI, QConvergeConsole Plug-ins, or the BIOS utility.

Configuring Boot Devices with QConvergeConsole GUI

To configure the adapter boot device with QConvergeConsole GUI:

1. In the tree pane on the left, select a 2600 Series adapter port.
2. Click the **Parameters** tab.
3. On the Parameters page, click **Boot Device Selection**.
4. On the Boot Device Selection page, configure the port boot parameters as needed. For details, refer to the “Boot Device Selection” topic in the *QConvergeConsole Help*.
5. To save any changes to the boot device, click **Save**.
6. If the Save HBA Parameter Changes dialog box appears, click **Yes** to confirm.
7. If the Security Check dialog box appears, type the password, and then click **OK**.

Any previously saved configuration for the current adapter is overwritten.

Configuring Boot Devices with Interactive QConvergeConsole CLI

In the interactive mode of QConvergeConsole CLI, open the **Fibre Channel Adapter Configuration** menu, and then select **Boot Devices Configuration**. The **Boot Device Settings** menu shows options for viewing and configuring boot devices.

For more information on configuring boot devices with the interactive mode of QConvergeConsole CLI, refer to the section about the Fibre Channel interactive commands in the QConvergeConsole.

Configuring Boot Devices with Noninteractive QConvergeConsole CLI

In the noninteractive mode of QConvergeConsole CLI, set a specific target as the boot device for a specific adapter by issuing the following command:

```
# qauccli -pr fc -e (<hba instance> | <hba wwpn>) <target wwnn>  
<target wwpn> <target id> <lun id>
```

Where:

hba instance = Adapter number (issue the `-g` command to find)

hba wwpn = Worldwide port name of the adapter

target wwnn = Worldwide node name of the target

target wwpn = Worldwide port name of the target

target id = ID to which the target is bound

lun id = ID of the LUN

For more information, refer to the section about the Fibre Channel noninteractive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Configuring Boot Devices with QConvergeConsole Plug-in for VMware vCenter Server

Follow these steps to configure boot devices with QConvergeConsole Plug-in for VMware vCenter Server.

To configure boot devices:

1. In the QConvergeConsole left pane, expand the tree and then select a port.
2. In the content pane on the right, click the **Boot** tab.
3. Enable boot from the port by setting the appropriate settings:
 - a. Select the appropriate check box options.
 - b. For each applicable **Boot Name**, enter the information in the **Target-WWN** and **LUN ID** boxes.
4. Click **Save Configuration**.

Figure 4-2 shows an example.

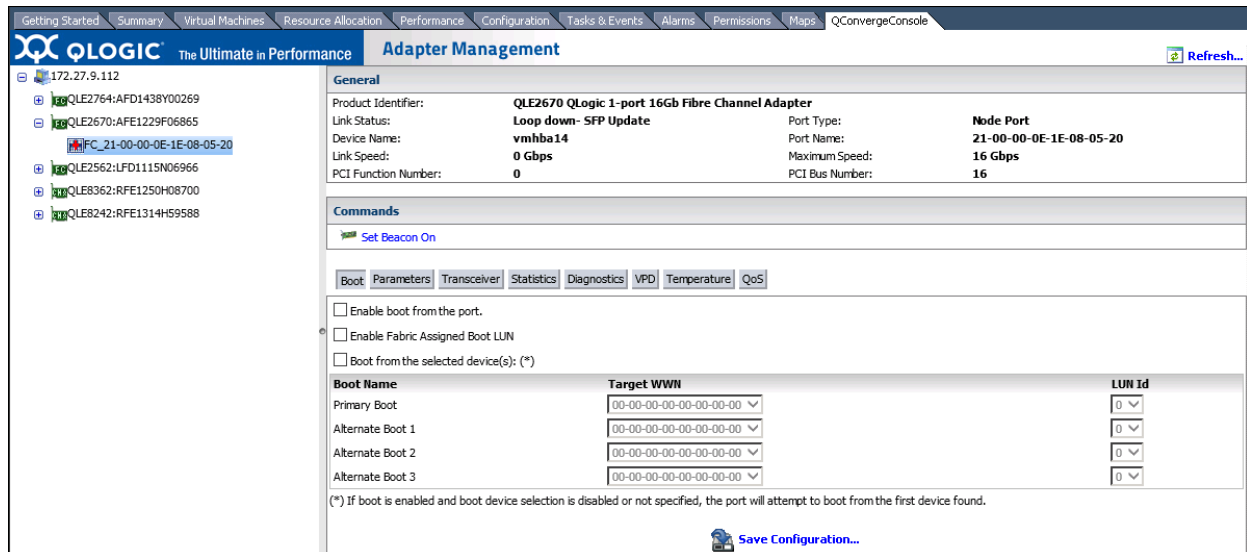


Figure 4-2. Configuring Boot Devices with QConvergeConsole Plug-in for VMware vCenter Server

Configuring Boot Devices with QConvergeConsole Plug-in for VMware vSphere Web Client

Follow these steps to configure boot devices with QConvergeConsole Plug-in for VMware vSphere Web Client.

To configure boot devices:

1. In the tree pane on the left side of the VMware vSphere Web Client window, select a host.
2. In the content pane on the right, click the **Manage** tab.
3. On the Manage page, click the **QConvergeConsole GUI** tab.

The QConvergeConsole GUI Adapter Management window appears in the VMware vSphere Web Client's content pane. The QConvergeConsole GUI Adapter Management window also contains two panes: a tree pane on the left and a content pane on the right.

4. In the Adapter Management's left pane, click a node corresponding to a 2600 Series Adapter, and then click a Fibre Channel port node to view general information pertaining to that port in the right pane.
5. On the General page, click the **Boot** tab.
6. On the Boot page under **Boot**, click **Edit**.

7. Complete the FC Boot dialog box to specify the primary and alternate boot devices, and then click **OK** to save your changes.

Figure 4-3 shows an example.

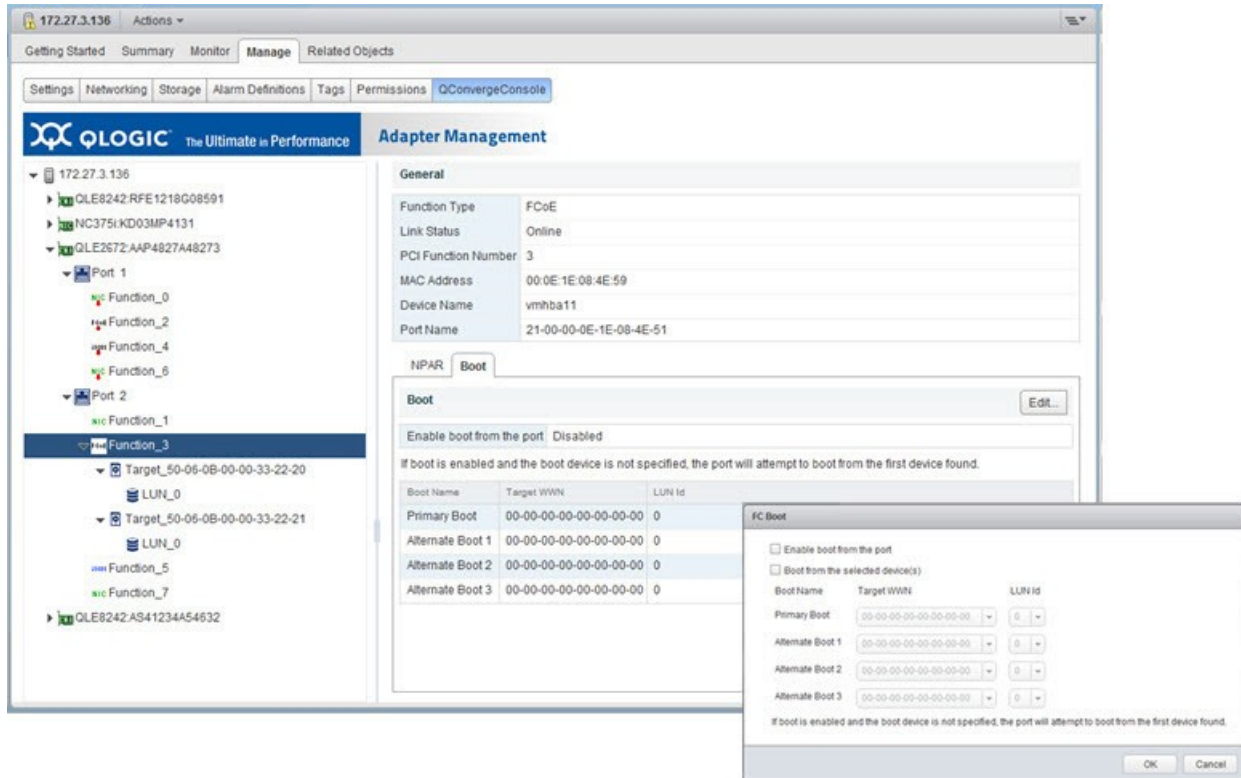


Figure 4-3. Configuring Boot Devices with QConvergeConsole Plug-in for VMware vSphere Web Client

Configuring Boot Devices with the BIOS

For information on configuring boot devices with BIOS, refer to [“Fibre Channel Adapter Installation with QLogic SuperInstallers”](#) on page 4.

Configuring Virtual Ports (NPIV)

You can configure NPIV using either the QConvergeConsole GUI or QConvergeConsole CLI tool. This section also covers NPIV quality of service (QoS).

NOTE

To configure NPIV on VMware ESXi, refer to the *Configure Fibre Channel NPIV Settings in the vSphere Client* page located here:

http://pubs.vmware.com/vsphere-50/index.jsp?topic=%2Fcom.vmware.vsphere.vm_admin.doc_50%2FGUID-C713BCA5-71B4-4539-A4AE-8E781330755C.html

Refer also to the *User's Guide—QLogic Fibre Channel and Converged Network Adapters for VMware ESXi 5.0, 5.1, 5.5, and 6.0* (part number SN0154529-00), “Deploying NPIV for VMware ESXi 5.x and 6.0” section, available on the QLogic Web site, Downloads page:

driverdownloads.qlogic.com

Configuring NPIV with QConvergeConsole GUI

For information about configuring NPIV with QConvergeConsole GUI, refer to the *QConvergeConsole Help*, “Using Virtualization (NPIV)” topic.

Configuring NPIV with Interactive QConvergeConsole CLI

In the interactive menu of QConvergeConsole CLI, open the **Fibre Channel Adapter Configuration** menu, and then select **Virtual Ports (NPIV)**. The **vPorts** menu shows options for viewing and configuring virtual ports.

For more information about configuring NPIV with interactive QConvergeConsole CLI, refer to the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Configuring NPIV with Noninteractive QConvergeConsole CLI

You can configure a virtual port in the noninteractive mode of QConvergeConsole CLI with either an automatic or a specific WWPN.

To create a virtual port with an automatic WWPN:

- Issue the following command:

```
# gaucli -pr fc -vp (<hba instance> | <hba wwpn>) create auto
```

Where:

hba instance = Adapter number (issue the `-g` command to find)
hba wwpn = Worldwide port name of the adapter

To create a virtual port with a specific WWPN:

1. Issue the following command:

```
# qaucli -pr fc -vp (<hba instance> | <hba wwpn>) create  
<vport hex>
```

Where:

hba instance = Adapter number (issue the `-g` command to find)
hba wwpn = Worldwide port name of the adapter
vport hex = World wide port name of the virtual port with the two
hexadecimal digits in byte three supplied by the user

2. When prompted, type two hexadecimal digits. The system checks these digits to ensure that they are unique and, if they are, puts them into byte 1 of the WWPN.

For more information, refer to the section about Fibre Channel noninteractive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

NPIV Quality of Service

For information about end-to-end (CS_CTL) quality of service (QoS), see [“Configuring End-to-End \(CS_CTL\) QoS” on page 79](#).

The QLogic 2600 Series Adapter solution provides for standards-based QoS, ensuring high-quality performance for applications that require preferential delivery. The QLogic QoS solution is based on assigning QoS levels to virtual ports (NPIV ports). You can configure the QoS using the **priority method** or the **bandwidth method**, as shown in [Figure 4-4](#).

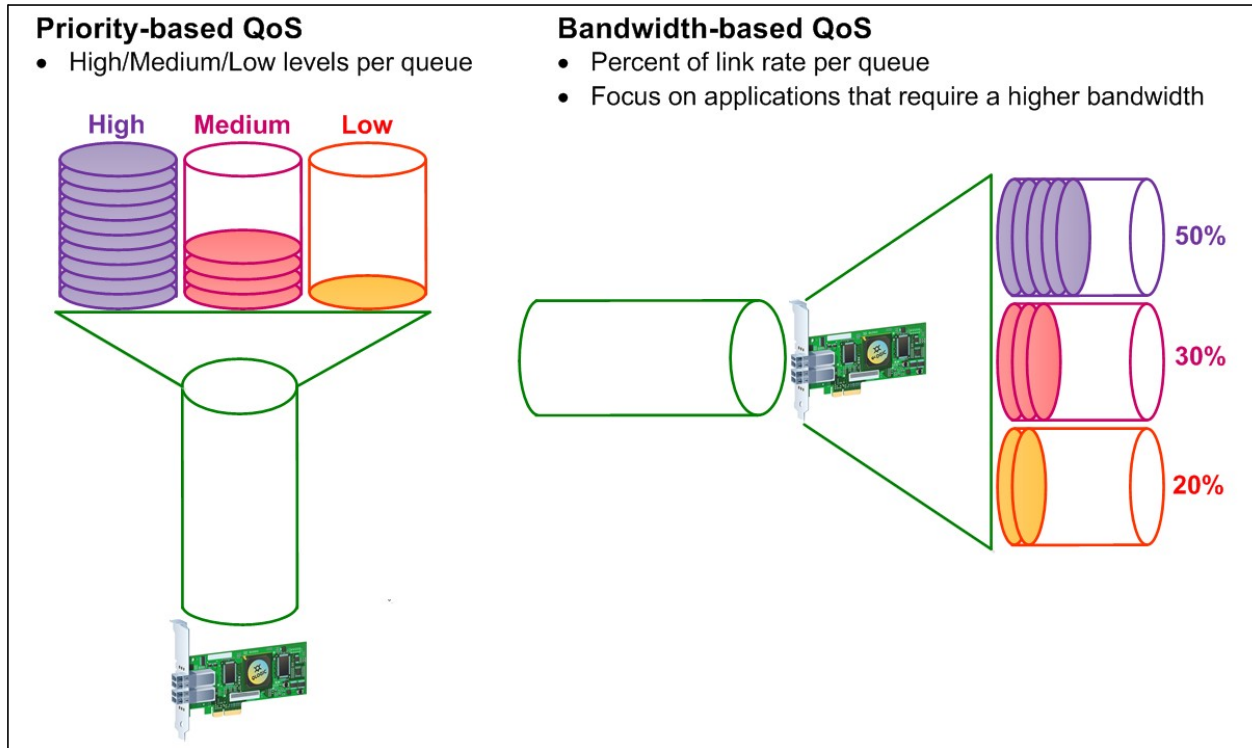


Figure 4-4. Priority- and Bandwidth-based QoS

On a single physical port, you can configure QoS using the priority method or the bandwidth method but not both.

- The **priority method** assigns priority levels (low, medium, or high) to virtual ports based on the QoS required for the applications or VMs using the virtual port. This method provides for various levels of latency requirements across virtual ports. See [“Setting QoS by Priority” on page 61](#).
- The **bandwidth method** assigns a bandwidth percentage (0–100) or a bandwidth rate (16Gb) to applications or VMs that are using a virtual port. This method provides a minimum bandwidth guarantee. The bandwidth-based QoS configuration applies only when the total bandwidth requirement of the applications exceeds the available bandwidth. The bandwidth is not reserved for a specific virtual port, and unused bandwidth is shared among the other virtual ports. See [“Setting QoS by Bandwidth” on page 62](#).

The physical port or world-wide name (WWN) always has high priority, independent of the bandwidth or priority scheme chosen for created virtual ports. You need not assign a QoS level to every virtual port that you create. If a QoS level is not assigned to a virtual port, the default is low priority (best effort), independent of the bandwidth or priority scheme. This flexibility allows you to focus on critical applications to ensure that the highest service level is provided. You can modify QoS levels for virtual ports using QConvergeConsole CLI.

To modify QoS levels, the configuration must meet the following hardware and software requirements:

- Server operating system: Microsoft Windows Server® 2008 or later
- Server support for MSI-X
- A QLogic 2600 Series Adapter
- Latest version of the QLogic STOR miniport driver available from the Downloads and Documentation page:
driverdownloads.qlogic.com
- Fibre Channel switch that supports NPIV
- Physical port attached in a point-to-point connection

Setting QoS by Priority

To set the QoS by priority with QConvergeConsole GUI:

1. In the QConvergeConsole GUI system tree in the left pane, expand a 2600 Series Adapter.
2. Select a physical port.
3. In the content pane on the right, click the **QoS** tab.
4. On the QoS page in the **QoS Type** box, select **Priority**.

5. For each virtual port, move the slider to select a low, medium, or high priority, as shown in [Figure 4-5](#).

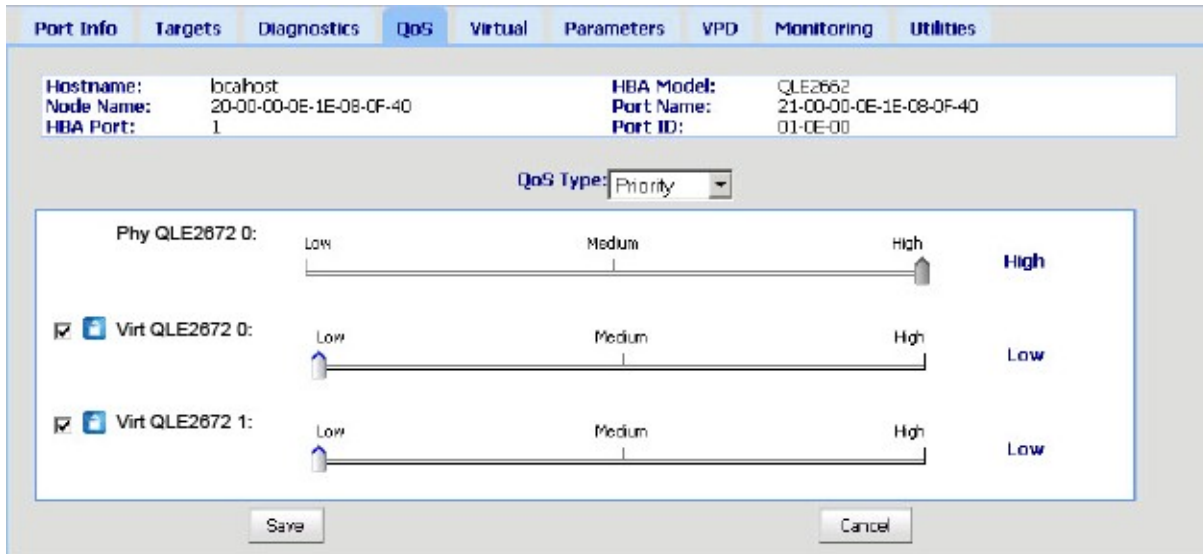


Figure 4-5. Setting the QoS by Priority

6. To preserve QoS priority changes, click **Save**.

Setting QoS by Bandwidth

Setting the QoS by bandwidth allocates up to 80 percent of the physical port's bandwidth to its virtual ports. The remaining 20 percent is reserved to handle non-QoS applications and virtual ports.

Setting QoS by bandwidth guarantees bandwidth for each virtual port and to the application or VM associated with that virtual port. The proper QoS setting can prevent bottlenecks that occur when VMs contend for port bandwidth.

Consider how much bandwidth is required to maximize application or VM performance and set the QoS level to 105 percent of that value. For example, if a mission-critical application on a VM requires 1Gb of bandwidth to transmit its data over the fabric, the recommended bandwidth for the virtual port would be 1.05Gb.

Alternatively, the virtual port QoS values can be set as a percentage of the total available bandwidth.

NOTE

Setting QoS by bandwidth guarantees a minimum bandwidth to a virtual port but not a maximum limit. If the application/virtual port requires more bandwidth than the QoS bandwidth value allows and the physical port has available bandwidth, the application receives the additional bandwidth. The port allocates additional bandwidth on demand up to the port capacity or until there is contention for bandwidth among the virtual ports.

When the physical port is partitioned into four virtual ports, the port bandwidth is divided between the virtual ports according to traffic demands.

QConvergeConsole GUI lets you set QoS for each virtual port by setting minimum and maximum percentages of the physical port's bandwidth for each virtual port. Using this feature lets you guarantee a transmission rate for each port that requires a specific bandwidth to run mission-critical applications for business continuity using virtual ports. The setting for a specific QoS can resolve bottlenecks that exist when VMs contend for port bandwidth.

To set the QoS by bandwidth percentage with QConvergeConsole GUI:

1. In the QConvergeConsole GUI system tree in the left pane, expand a 2600 Series Adapter.
2. Select a physical port.
3. In the content pane on the right, click the **QoS** tab.
4. On the QoS page, select **Bandwidth** as the **QoS Type**.
5. For **View By**, select **Bandwidth Percentage**.
6. For each virtual port, move the slider to select between 1 percent and 100 percent bandwidth to guarantee for data transferred over the selected virtual port.

Figure 4-6 shows an example.

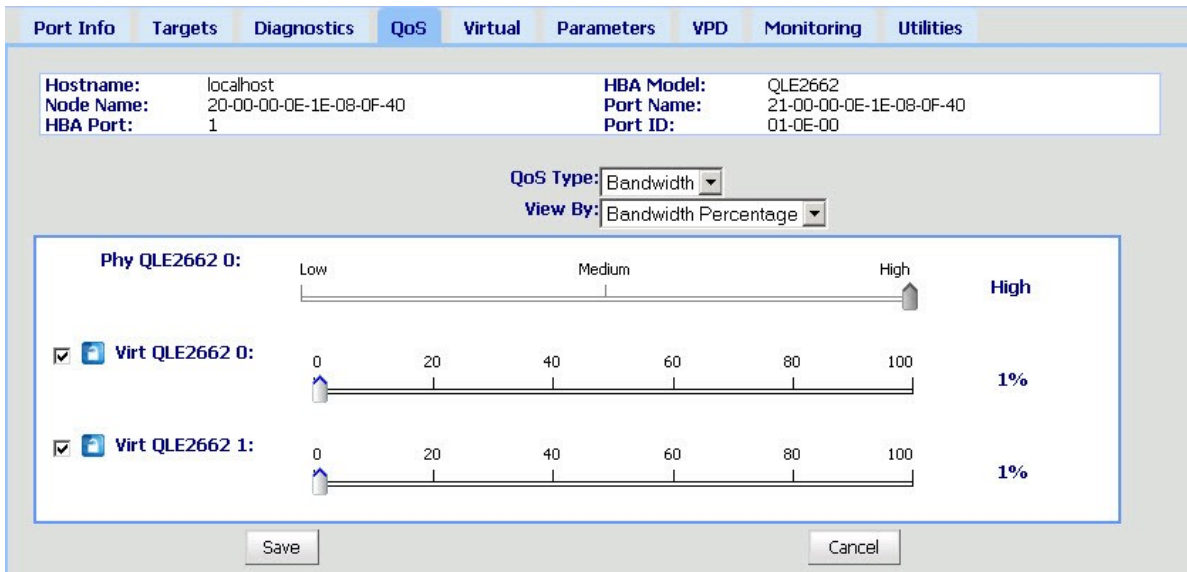


Figure 4-6. Setting the QoS by Bandwidth Percentage

7. To preserve QoS bandwidth changes, click **Save**.

To set the QoS by bandwidth speed with QConvergeConsole GUI:

1. In the QConvergeConsole GUI system tree in the left pane, expand a 2600 Series Adapter.
2. Select a physical port.
3. In the content pane on the right, click the **QoS** tab.
4. On the QoS page, select **Bandwidth** as the **QoS Type**.
5. For **View By**, select **Bandwidth Speed**.
6. Move the slider to set the bandwidth speed.

Figure 4-7 shows an example.

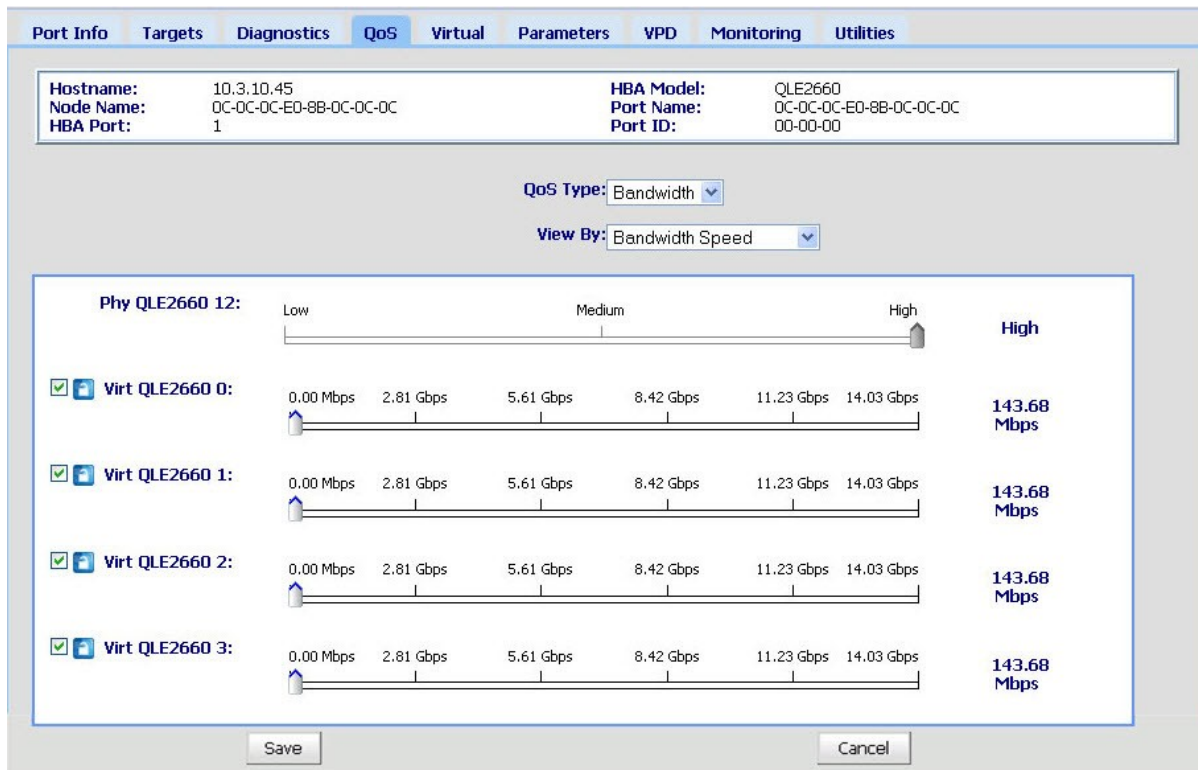


Figure 4-7. Setting the QoS by Bandwidth Speed

7. To preserve QoS bandwidth changes, click **Save**.

Configuring Driver Parameters

You can configure driver parameters for Fibre Channel using any of these tools: QConvergeConsole GUI, QConvergeConsole CLI, or QConvergeConsole Plug-in for VMware vCenter Server.

Configuring Fibre Channel Driver Parameters with QConvergeConsole GUI

For information on configuring Fibre Channel driver parameters with QConvergeConsole GUI, refer to the topics about HBA parameters and viewing or modifying port parameters in the *QConvergeConsole Help*.

Configuring Fibre Channel Driver Parameters with Interactive QConvergeConsole CLI

To configure Fibre Channel driver parameters using interactive QConvergeConsole CLI:

1. On the QConvergeConsole CLI **Fibre Channel Adapter Configuration** menu, select **Driver Parameters**.
2. On the port menu, select a port to open the **Driver Settings** menu.
3. Select options on the **Driver Settings** menu to present persistently bound targets plus new targets with driver default, present persistently bound targets only, bind devices by WWPN, and bind devices by port ID.

For more information, refer to the section about the Fibre Channel interactive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Configuring Fibre Channel Driver Parameters with Noninteractive QConvergeConsole CLI

To configure the driver settings in the noninteractive mode of QConvergeConsole CLI, issue the following command:

```
# qauccli -pr fc -fs (<hba instance> | <hba wwpn>)  
{(<param name> | <param alias>) <param value>}
```

Where:

`hba instance` = Adapter port instance number (issue the `-g` command to find)

`hba wwpn` = Worldwide port name of the adapter

`param name` = Name of the parameter

`param alias` = Alias of the parameter, either:
PO Persistently bound targets only
PN Present persistently bound targets plus any new targets with driver default
NO Present targets with driver default
BW Bind devices by WWPN
BP Bind devices by port ID

`param value` = New value of the parameter

For more information, refer to the section about the Fibre Channel noninteractive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Configuring Fibre Channel Driver Parameters with QConvergeConsole Plug-in for VMware vCenter Server

For details on how to configure the Fibre Channel driver parameters with the VMware plug-in, see the *User's Guide—QConvergeConsole Plug-ins for VMware vSphere* (part number SN0054677-00).

Configuring Selective LUNs

You can configure selective LUNs using QConvergeConsole CLI on Windows. QConvergeConsole GUI cannot be used to configure selective LUNs. To enable selective LUNs of a target, the selected target must be currently persistently bound. See [“Configuring Target Persistent Binding” on page 52](#) for more additional information.

To configure selective LUNs with interactive QConvergeConsole CLI:

1. On the QConvergeConsole CLI **Fibre Channel Adapter Configuration** menu, select **Selective LUNs**.
2. On the port menu, select a port to open the **Selective LUN Menu**.

The **Selective LUN Menu** contains options for displaying LUN configuration, manually configuring LUNs, and auto-configuring LUNs.

Figure 4-8 shows the **Selective LUN Menu (Display)** and the general view of selective LUNs.

```

Administrator: Command Prompt - qaucli -pr fc
QConvergeConsole
Version 1.1.3 <Build 49>
Selective LUN Menu <Display>
=====
HBA          : 0 Port: 1
SN           : RFE1305H32151
HBA Model    : QLE8362
HBA Desc.    : QLE8362 QLogic 2-port 16Gb Fibre Channel Adapter
FW Version   : 132.00.00
WWPN         : 21-00-00-0E-1E-13-49-A0
WWNN         : 20-00-00-0E-1E-13-49-A0
Link         : Online
=====

1: Display LUN Configuration
2: Manual Configure LUNs
3: Auto Configure LUNs

<p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: 1

QConvergeConsole
Version 1.1.3 <Build 49>
Selective LUN Menu <Display>
=====
HBA          : 0 Port: 1
SN           : RFE1305H32151
HBA Model    : QLE8362
HBA Desc.    : QLE8362 QLogic 2-port 16Gb Fibre Channel Adapter
FW Version   : 132.00.00
WWPN         : 21-00-00-0E-1E-13-49-A0
WWNN         : 20-00-00-0E-1E-13-49-A0
Link         : Online
=====

1: Details View
2: General View

<p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: 2
-----
HBA Instance 0: QLE8362 Port 1 WWPN 21-00-00-0E-1E-13-49-A0 PortID 01-07-00
Link: Online
-----
Enable Type      Target/LUN Info          Port Name                LUN ID
-----
Yes   Disk       ST336607FC             22-00-00-11-C6-2D-5A-3F 0
Yes   Disk       ST336607FC             22-00-00-0C-50-68-1E-9A 0
Yes   Disk       ST336607FC             22-00-00-0C-50-68-24-D9 0
-----
Press <Enter> to continue:
    
```

Figure 4-8. Selective LUN, General View

For more information, refer to the section about the Fibre Channel interactive commands in the *User’s Guide—QConvergeConsole CLI* (part number SN0054667-00).

To configure selective LUNs with noninteractive QConvergeConsole CLI:

- To enable (select) or disable (deselect) a LUN for a specific target on a specific adapter, issue the following command:

```
# qaucli -pr fc -m (<hba instance> | <hba wwpn>) {<target wwnn> <target wwpn>} <lun id> (select | deselect)
```

Where:

`hba instance` = Adapter instance number (issue the `-g` command to find)

`hba wwpn` = Worldwide port name of the adapter

`param name` = Name of the parameter

`target wwnn` = Worldwide node name of the target

`target wwpn` = Worldwide port name of the parameter

`lun id` = ID of the LUN

- To enable (select) or disable (deselect) all LUNs for a specific target on a specific adapter, issue the following command:

```
# qaucli -pr fc -m (<hba instance> | <hba wwpn>) (select | deselect) {<target wwnn> <target wwpn>}
```

- To enable (select) or disable (deselect) all LUNs of all targets on a specific adapter, issue the following command:

```
# qaucli -pr fc -m (<hba instance> | <hba wwpn>) (select | deselect) all
```

For more information, refer to the section about the Fibre Channel noninteractive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Configuring Out-of-Order Frame Reassembly

Out-of-order frame reassembly (OoOFR) reassembles out-of-order frames as they are received, which minimizes network congestion by eliminating the re-transmission of frames and exchanges. Use either QConvergeConsole GUI or QConvergeConsole CLI to configure OoOFR.

Configuring OoOFR with QConvergeConsole GUI

To enable OoOFR with QConvergeConsole GUI:

1. In the QConvergeConsole GUI system tree, select a Fibre Channel port.
2. In the content pane on the right, click the **Parameters** tab.
3. On the Parameters page, click the **Advanced HBA Parameters** subtab.
4. Select the **Enable Receive Out of Order Frame** check box.

Configuring OoOFR with Interactive QConvergeConsole CLI

To enable OoOFR with interactive QConvergeConsole CLI:

1. On the **Fibre Channel Adapter Configuration** menu, select **HBA Parameters**.
2. On the port menu, select a port to open the **HBA Parameters** menu.
3. On the **HBA Parameters** menu, select **Configure HBA Parameters**.
4. On the **Configure Parameters** menu, select **Enable Receive Out Of Order Frame**.

Configuring OoOFR with Noninteractive QConvergeConsole CLI

To enable OoOFR in the noninteractive mode of QConvergeConsole CLI, issue one of the following commands:

```
# qauccli -pr fc -n <hba instance> | <hba wwpn>  
EnableReceiveOutOfOrderFrame 1
```

```
# qauccli -pr fc -n <hba instance> | <hba wwpn> EO 1
```

Where:

`hba instance` = Adapter instance number (issue the `-g` command to find)

`hba wwpn` = Worldwide port name of the adapter

To disable OoOFR in the noninteractive mode of QConvergeConsole CLI, issue one of the following commands:

```
# qauccli -n <hba instance> | <hba wwpn> EnableReceiveOutOfOrderFrame 0
```

```
# qauccli -n <hba instance> | <hba wwpn> EO 0
```

Setting Queue Depth

Queue depth refers to the maximum LUN queue depth to report for target devices. Values range from 0–65535; the default value for ESXi 5.x and 6.x is 64.

For a detailed explanation of queue depth, including “Setting the Host Bus Adapter Queue Depth,” refer to the *Best Practices Guide—Fibre Channel Host Bus Adapters on Microsoft Windows 2012 and VMware ESXi 5.x, 2500 Series and 2600 Series* (part number SN0454502-00), available for download from the QLogic Web site.

Enabling Fabric-Assigned World Wide Port Name

This section describes how to enable the fabric to assign the 2600 Series Adapter WWPN (FA-WWPN) on the following platforms:

- [Enabling FA-WWPN with QConvergeConsole GUI](#)
- [Enabling FA-WWPN with Interactive QConvergeConsole CLI](#)
- [Enabling FA-WWPN with Noninteractive QConvergeConsole CLI](#)
- [Enabling FA-WWPN with QConvergeConsole Plug-ins](#)

When using the FA-WWPN feature:

- FA-WWPN must be enabled on both the initiator (2600 Series Adapter) and the Brocade switch for the FA-WWPN to be assigned to the 2600 Series Adapter.
- If FA-WWPN is disabled on the 2600 Series Adapter and enabled on the Brocade switch, the FA-WWPN cannot be assigned to the 2600 Series Adapter.
- If FA-WWPN is enabled on the 2600 Series Adapter and disabled on the Brocade switch, the FA-WWPN cannot be assigned to the 2600 Series Adapter.

NOTE

In the figures in the following sections, the 2600 Series Adapter may appear as an 8300 Series Adapter.

Enabling FA-WWPN with QConvergeConsole GUI

To enable FA-WWPN with QConvergeConsole GUI:

1. In the tree pane on the left, select a 2600 Series Adapter port.
2. In the content pane on the right, click the **Parameters** tab.
3. On the Parameters page, click the **Advanced HBA Parameter** tab.
4. On the Advanced HBA Parameter page, select the **Enable Fabric Assigned WWN** check box.

Alternately, clear this check box to disable FA-WWPN. [Figure 4-9](#) shows an example.

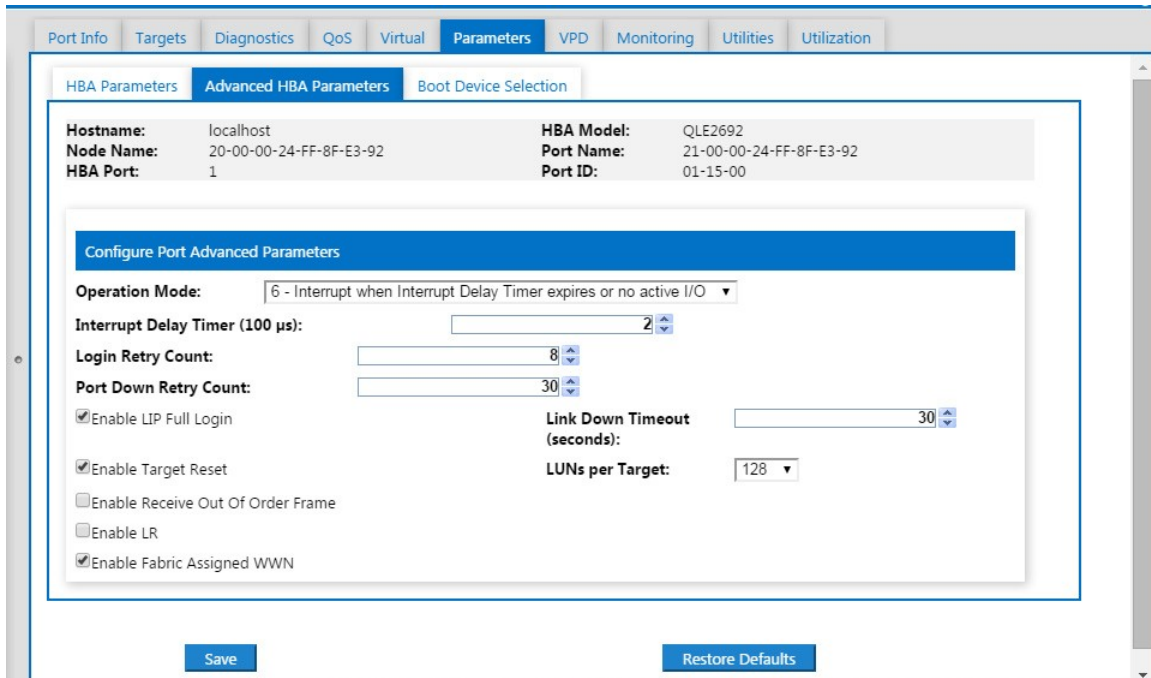


Figure 4-9. Enabling FA-WWPN Using QConvergeConsole GUI

5. Click **Save**.
6. If the Save HBA Parameter Changes dialog box appears, click **Yes** to confirm.
7. If the Security Check dialog box appears, type the password, and then click **OK**.

Any previously saved configuration for the current adapter is overwritten.

Enabling FA-WWPN with Interactive QConvergeConsole CLI

To enable FA-WWPN with interactive QConvergeConsole CLI:

1. From the main menu, select the adapter type (**Fibre Channel Adapter**).
2. On the **Fibre Channel Adapter Configuration** menu, select **HBA Parameters**.
3. On the port menu, select a port to open the **HBA Parameters Menu**.
4. Select **EnableFabricAssignWWN**.

5. Under **Enable Fabric Assigned WWN Menu**:
 - Type 1 to enable FA-WWPN.
 - Type 2 to disable FA-WWPN.

Enabling FA-WWPN with Noninteractive QConvergeConsole CLI

To enable FA-WWPN with noninteractive QConvergeConsole CLI, issue the following command:

```
# qaucli -pr fc -n <hba instance> | <hba WWPN>
{<EnableFabricAssignWWN> | <FN> 1}
```

Where:

hba instance = Adapter number (issue the `-g` command to find)
hba wwpn = Worldwide port name of the adapter
EnableFabricAssignWWN = 1 enables the fabric to assign a WWN to this port
or FN 0 disables the fabric from assigning WWN to this port

To disable FA-WWPN with noninteractive QConvergeConsole CLI, issue the following command:

```
# qaucli -pr fc -n <hba instance> | <hba WWPN>
{<EnableFabricAssignWWN> | <FN> 0}
```

For more information, refer to the section about the Fibre Channel noninteractive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Enabling FA-WWPN with QConvergeConsole Plug-ins

To enable FA-WWPN with QConvergeConsole Plug-ins:

1. In either the QConvergeConsole Plug-in for VMware vCenter Server or QConvergeConsole Plug-in for VMware vSphere Web Client, click the **QConvergeConsole** tab.
2. In the tree pane on the left, select a 2600 Series Adapter port.
3. In the content pane on the right, click the **Parameters** tab.
4. Follow the instructions for your system:

QConvergeConsole Plug-in for VMware vCenter Server

In QConvergeConsole Plug-in for VMware vCenter Server, the parameters appear and can be edited. Figure 4-10 shows an example.



Figure 4-10. Enabling FA-WWPN Using QConvergeConsole Plug-in for VMware vCenter Server

- a. To enable FA-WWPN, select the **Enable Fabric Assigned WWN** check box.
- b. Click **Save Configuration**.

QConvergeConsole Plug-in for VMware vSphere Web Client

In QConvergeConsole Plug-in for VMware vSphere Web Client, the current parameter values appear (see [Figure 4-11](#)).

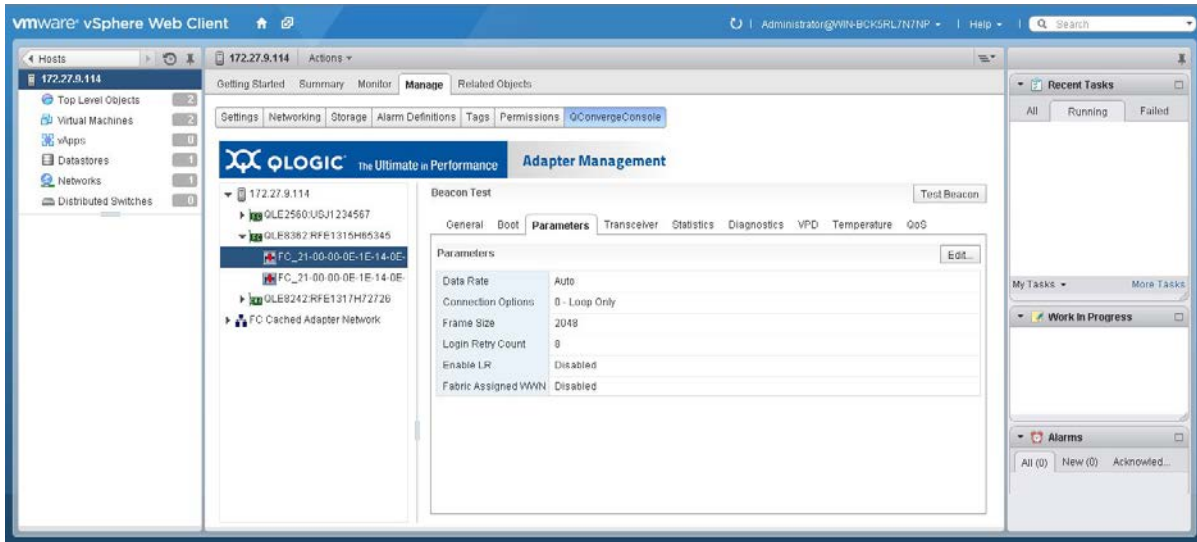


Figure 4-11. Enabling FA-WWPN Using QConvergeConsole Plug-in for VMware vSphere Web Client

- a. Click **Edit**.

The Fibre Channel Port Parameter dialog box opens; [Figure 4-12](#) shows an example.

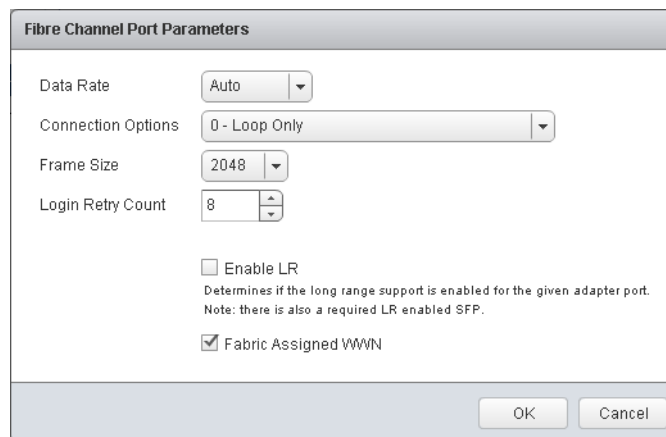


Figure 4-12. Fibre Channel Port Parameters Dialog Box

- b. To enable FA-WWPN, select the **Fabric Assigned WWN** check box.
- c. Click **OK**.

Any previously saved configuration for the current adapter is overwritten.

Using Fabric-Assigned Boot LUN

This section describes how to enable a fabric-assigned boot LUN on the following platforms:

- [Using a Fabric-Assigned Boot LUN in QConvergeConsole GUI](#)
- [Using a Fabric-Assigned Boot LUN with Interactive QConvergeConsole CLI](#)
- [Using a Fabric-Assigned Boot LUN with Noninteractive QConvergeConsole CLI](#)
- [Using a Fabric-Assigned Boot LUN with QConvergeConsole Plug-ins](#)

Using a Fabric-Assigned Boot LUN in QConvergeConsole GUI

For details about how to use a fabric-assigned LUN using QConvergeConsole GUI, refer to the “Fabric-Assigned Boot LUN” topic in the *QConvergeConsole Help*.

Using a Fabric-Assigned Boot LUN with Interactive QConvergeConsole CLI

To use a fabric-assigned boot LUN with interactive QConvergeConsole CLI:

1. From the main menu, select the adapter type (**Fibre Channel Adapter**).
2. On the **Fibre Channel Adapter Configuration** menu, select **Boot Devices Configuration**.
3. On the **Boot Device Settings** menu, select **Configure Boot Device(s)**, and then press ENTER.
4. Select **Enable Fabric Assigned Boot LUN**, and then press ENTER.
5. To enable this feature, on the **Enable Fabric Assign Boot LUN** menu, type 1.

Using a Fabric-Assigned Boot LUN with Noninteractive QConvergeConsole CLI

In noninteractive QConvergeConsole CLI, set a target as the fabric-assigned boot LUN for a specific adapter by issuing the following command:

```
# qaucli -pr fc -e <hba instance>|<hba wwpn> enable|disable  
FabricAssignBootLUN|fb
```

Where:

hba instance = Adapter number (issue the `-g` command to find)

hba wwpn = Worldwide port name of the adapter
FabricAssignBootLUN or fb = Configure enable fabric assign boot LUN setting

Using a Fabric-Assigned Boot LUN with QConvergeConsole Plug-ins

To configure the boot device with QConvergeConsole Plug-in for VMware vCenter Server:

1. In the QConvergeConsole Plug-in for VMware vCenter Server, click the **QConvergeConsole** tab.
2. In the tree pane on the left, select a 2600 Series Adapter port.
3. In the content pane on the right, click the **Boot** tab.
4. On the Boot page, select the **Enable Fabric Assigned Boot LUN** check box. [Figure 4-13](#) shows an example.

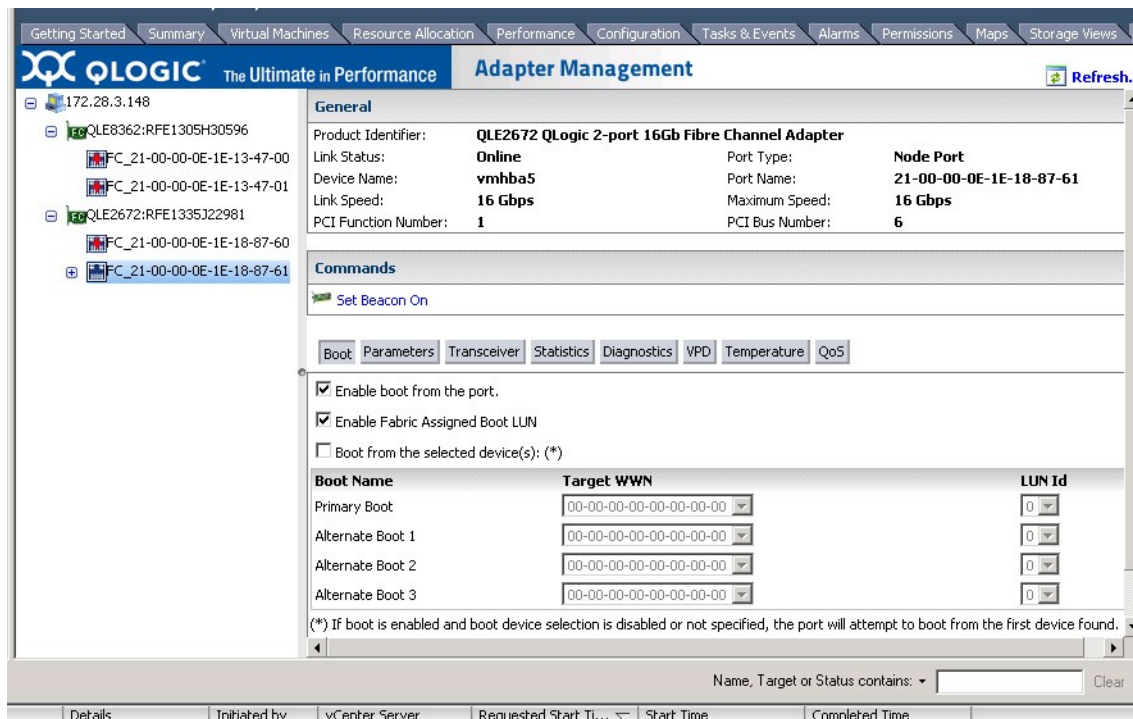


Figure 4-13. Fabric-Assigned Boot LUN in QConvergeConsole Plug-in for VMware vCenter Server

For details, refer to the “Boot Device Selection” topic in *QConvergeConsole Help*.

5. Click **Save**.

Any previously saved configuration for the current 2600 Series Adapter is overwritten.

To configure the boot device with QConvergeConsole Plug-in for VMware vSphere Web Client:

1. In the tree pane in the left side of the vSphere Web client, select the host to be configured.
2. In the content pane on the right, click the **Manage** tab.
3. On the Manage page, click the **QConvergeConsole** tab.
4. In the adapter tree in the QConvergeConsole pane, select the port to be configured.
5. In the content pane for the port, click the **Boot** tab.
6. On the Boot page, click **Edit**.
7. In the FC/FCoE Boot dialog box (see [Figure 4-14](#)), enable the fabric assigned boot LUN feature by selecting the **Fabric Assigned Boot LUN** check box.
8. Click **OK**.

Boot Name	Target WWN	LUN Id
Primary Boot	00-00-00-00-00-00-00-00	0
Alternate Boot 1	00-00-00-00-00-00-00-00	0
Alternate Boot 2	00-00-00-00-00-00-00-00	0
Alternate Boot 3	00-00-00-00-00-00-00-00	0

Figure 4-14. Web Client Plug-in Fabric Assigned Boot

QLogic's class specific control (CS_CTL) QoS implementation is an end-to-end solution, encompassing the initiator (2600 Series Adapter), the switches, and the target (storage). The 2600 Series Adapter stamps the priority value (high, medium, low) in the CS_CTL field of the Fibre Channel frame. All three entities (initiator, switch, and target) honor this priority value at their respective levels.

This feature is enabled by default in the 2600 Series Adapter Windows and VMware drivers. Therefore, when all three entities support QoS (and it is enabled on the switch and the target), a default priority value is populated in all FCP_CMND, FCP_DATA, FCP_XFER_RDY, FCP_RSP, and FCP_CONFIRM frames.

The following sections describe how to configure CS_CTL QoS and change the default priority levels:

- [Configuring CS_CTL QoS on the Switch](#)
- [Configuring CS_CTL QoS on the Storage Device](#)
- [Changing the QoS Priority Levels](#)

Configuring CS_CTL QoS on the Switch

To enable CS_CTL QoS on the Brocade SW6510 switch:

1. From the switch, issue the following command:

```
root> configurechassis  
Configure...
```

2. A list of attributes appear one at a time. After either accepting the default or entering a different value, the next attribute appears.
 - a. To accept the default for `cfgload` attributes, Custom attributes, and system attributes, press the ENTER key.
 - b. For `fos` attributes, type `y`.
 - c. For the CSCTL QoS Mode attribute, type `1`.

For example:

```
cfgload attributes (yes, y, no, n): [no]  
Custom attributes (yes, y, no, n): [no]  
system attributes (yes, y, no, n): [no]  
fos attributes (yes, y, no, n): [no] y  
CSCTL QoS Mode (0 = default; 1 = auto mode): (0..1) [0] 1
```

3. Reboot the switch.
4. To verify that CS_CTL QoS is enabled, issue the following command:

```
root> configshow -all | grep fos.csctlMode
```


This command should return the following response:

```
fos.csctlMode:1
```

5. To enable QoS on a switch-port basis, issue the following command:

```
portcfgqos --enable [slot/]port csctl_mode
```

Configuring CS_CTL QoS on the Storage Device

For QoS configuration instructions, see your device's user guide.

Changing the QoS Priority Levels

The QoS priority levels are set in the 2600 Series Adapter vPorts. The Windows and VMware adapter drivers assign default vPort priority levels. The following sections describe how to change the default vPort priority levels in Windows and VMware ESXi systems.

Changing the Priority Levels on Windows

To change the vPort priority levels in Windows, you must first assign the vPorts, and then change the priority levels. Both procedures can be accomplished using either QConvergeConsole GUI or interactive QConvergeConsole CLI, as described in the following sections.

For more detailed information, see the *QConvergeConsole Help* and the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

To create a vPort in QConvergeConsole GUI:

1. In the QConvergeConsole GUI left pane, connect to the host that has the 2600 Series Adapter where you want to create the vPorts.
2. Expand the host in the left pane by clicking the plus icon (+).
3. Locate and expand the 2600 Series Adapter where you want to create the vPorts.
4. In the right pane, click the **Virtual** tab.
5. On the Virtual page, select a valid value for the **Number of vPort to create** option, and then click **Update**.
6. To create the vPorts, click **Create**.

Figure 4-15 shows an example. (The 2600 Series Adapter appears as an 8300 Series Adapter.)

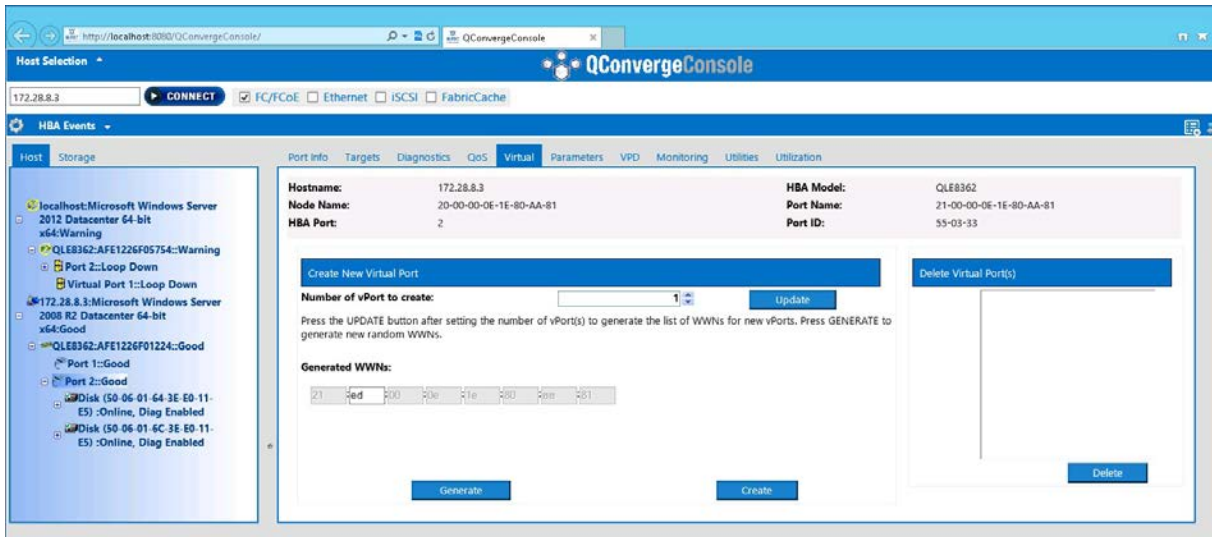


Figure 4-15. Creating vPorts Using QConvergeConsole GUI

To create a vPort in interactive QConvergeConsole CLI:

1. On the **Main Menu**, select **Adapter Configuration**.
2. On the **Adapter Type Selection** menu, select **Virtual Ports (NPIV)**.
3. On the **Virtual Ports** menu, select **Adapter Port**.
4. On the **Adapter Port** menu, select **Create vPorts**.
5. On the **Create vPorts** menu, select **Generate**.
6. To create the vPorts, select the **Commit** option.

To change the vPort priority level using QConvergeConsole GUI:

1. In the QConvergeConsole GUI tree pane on the left, connect to the host that contains the 2600 Series Adapter whose vPort levels you want to change.
2. Expand the host in the left pane by clicking the plus icon (+).
3. Locate and expand the 2600 Series Adapter whose vPort levels you want to change.
4. In the content pane on the right, click the **QoS** tab.
5. For the **QoS Type**, select **Priority**.
6. Ensure that the check box for the vPort you want to change is selected.
7. Set the QoS priority value for the vPort by moving the corresponding slider.

8. For each vPort whose priority you want to change, repeat [Step 6](#) and [Step 7](#).
9. Click **Save**.

[Figure 4-16](#) shows an example. (The 2600 Series Adapter appears as an 8300 Series Adapter.)

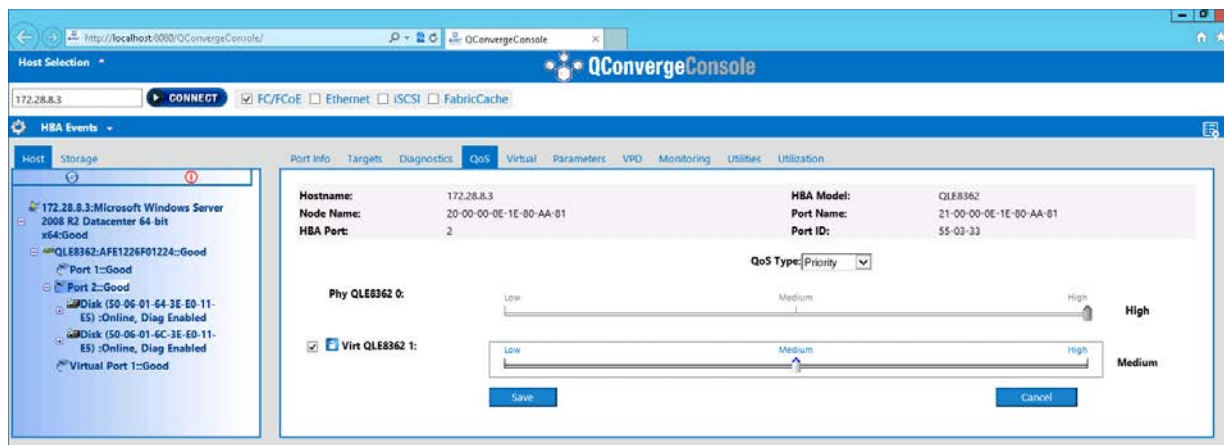


Figure 4-16. Changing vPort Priority Using QConvergeConsole GUI

To change the vPort priority level using interactive QConvergeConsole CLI:

1. On the **Main Menu**, select **Adapter Configuration**.
2. On the **Adapter Type Selection** menu, select **QoS**.
3. On the **QoS** menu, select **Adapter Port**.
4. On the **Adapter Port** menu, select **QoS Priority**.
5. On the **QoS Priority** menu, select **Modify QoS Settings**.
6. Choose the priority value for the vPorts.
7. Select **Apply QoS**.

Changing the Priority Levels on VMware ESXi

This section provides steps for changing priority levels and removing vPort priority on VMware ESXi systems.

To change the priority levels using the QConvergeConsole Plug-in for VMware vCenter Server:

1. In the tree pane on the left side of the plug-in, select a host.
2. Expand the host in the left pane by clicking the plus icon (+).
3. Locate and expand the 2600 Series Adapter whose priority levels you want to change.

4. Select a port in the 2600 Series Adapter.
5. In the right pane, click the **QoS** tab.
6. On the QoS page, set the vPort priority.
If the vPort is listed under **QoS**:
 - a. Select the vPort.
 - b. Set the QoS **Priority** value for the vPort by moving the slider.
 - c. Click **Save**.

Figure 4-17 shows an example, where the 2600 Series Adapter appears as an 8300 Series Adapter.

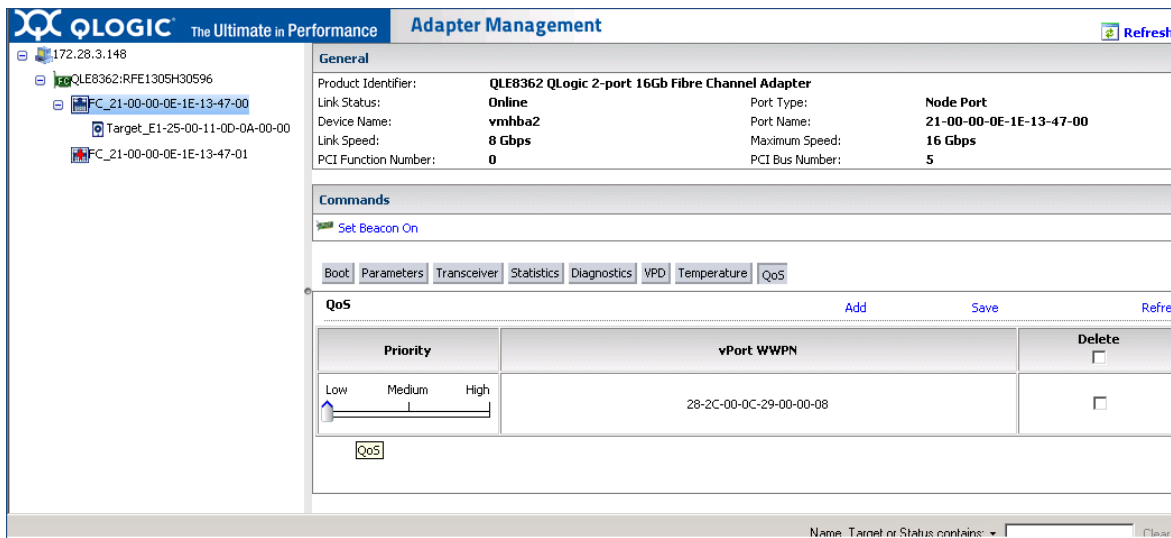


Figure 4-17. Changing vPort Priority Using QConvergeConsole Plug-in for VMware vCenter Server

- If vPort is *not* listed under **QoS**:
- a. Next to **QoS**, click **Add**.
 - b. Set the QoS **Priority** value by moving the slider.
 - c. Type a value for the **vPort WWPN**.
 - d. Click **Save**.
7. To see the new QoS settings, click **Refresh**.

To remove a vPort priority:

1. Under **QoS**, locate the vPort whose priority you want to remove.
2. Do one of the following:
 - Select the **Delete** check box of the vPort you want to remove.
 - Select the **Delete** check box in the header to select or clear all of the vPorts.
3. Click **Save**.

To change the priority level using the QConvergeConsole Plug-in for VMware vSphere Web Client:

1. Navigate to the host that contains the adapter to configure.
2. In the content pane of the vSphere Web Client, click the **Manage** tab.
3. In the content pane of the Manage page, click the **QConvergeConsole** tab.
4. In the adapter tree where the quality of service (QoS) is to be configured, select the port.
5. In the content pane, click the **QoS** tab.
6. After the QoS table refreshes, click **Edit**.
7. Complete the QoS dialog box by following the appropriate steps:
 - If the vPort is listed in the QoS dialog box:
 - a. Set the QoS priority **Value** for the vPort by moving the slider.
 - b. After the settings are completed, click **OK**.
 - If the vPort is *not* listed in the QoS dialog box:
 - a. To add a row to the table, click the **+** icon.
 - b. In the **vPort WWN** box, type the vPort WWN.
 - c. Set the QoS **Priority** value by moving the slider.
 - d. After the settings are completed, click **OK**.

To remove a vPort priority:

1. On the QoS page, click **Edit**.
2. In the QoS dialog box, select the check box corresponding to the QoS vPort to be deleted.
3. Click **OK**.

Figure 4-18 shows the QoS dialog box in the QConvergeConsole Plug-in for VMware vSphere Web Client.

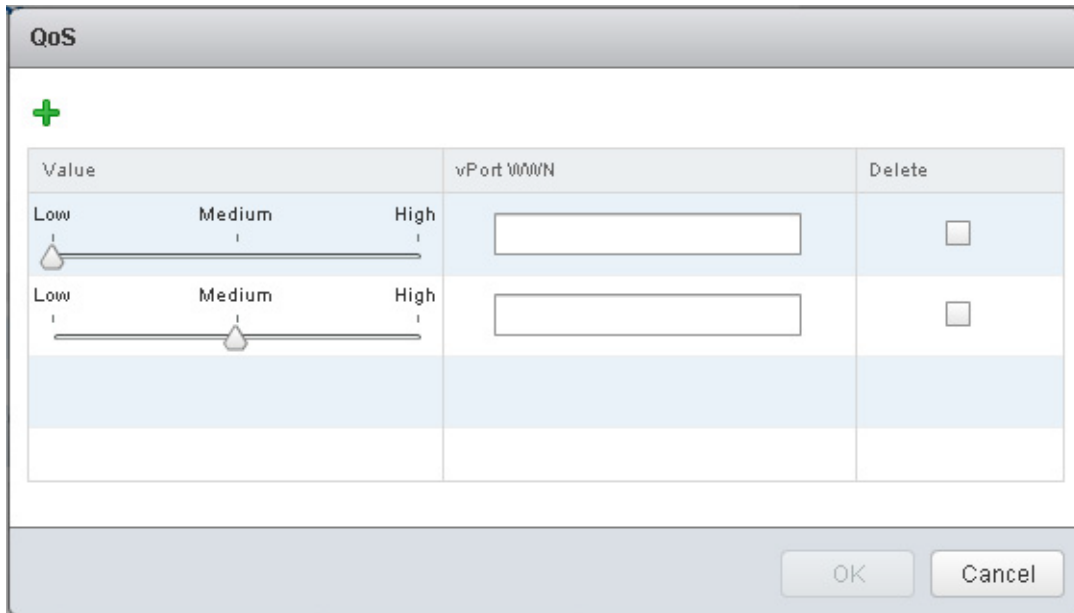


Figure 4-18. Web Client QoS

Enabling Forward Error Correction

QConvergeConsole supports forward error correction (FEC), which is a correction technique used for high-speed telecommunications devices to control errors in data transmission over unreliable or noisy communication channels.

NOTE

The FEC feature is supported only if the current adapter port is connected to a Brocade switch with FEC support. For more information, refer to the section about setup tips in the QLogic *Application Note—Enabling Forward Error Correction* (part number 83830-514-03).

FEC Process Overview

The following highlights how the FEC process works between the transmitting and receiving device:

1. Transmitting device:
 - a. Takes the incoming data stream.
 - b. Inserts a redundant amount of parity bits of information on the data stream.

- c. Sends the data stream.
2. Receiving device:
 - a. Receives the data stream.
 - b. Checks for missing or corrupt data:
 - If there are no corrupt or missing bits of information, proceeds with normal process.
 - If there are corrupt or missing bits of information, reconstructs the original data by using pieces of the original data stream (that are still intact) and combining those with the parity bits of information.

NOTE

Instead of having to request re-transmission of the entire data frame, the receiving device can recreate or reconstruct the data stream itself. This process prevents multiple CRC errors from being triggered and causing application performance issues.

Enabling and Disabling FEC

Use the appropriate procedure to enable or disable FEC:

- [Enabling and Disabling FEC on ESXi](#)
- [Enabling and Disabling FEC on Linux and Windows](#)

Enabling and Disabling FEC on ESXi

To enable or disable FEC using the QConvergeConsole Plug-in for VMware vCenter Server:

1. In the QConvergeConsole tree pane on the left, select an adapter port.
2. In the content pane on the right, click the **Parameters** tab.
3. On the Parameters page:
 - To enable FEC, select the **Enable FEC Support** check box.
 - To disable FEC, clear the **Enable FEC Support** check box.
4. Click **Save Configuration**.

To enable or disable FEC using the QConvergeConsole Plug-in for VMware vSphere Web Client:

1. In the QConvergeConsole tree pane on the left, select an adapter port.
2. Click **Edit**.

3. In the Fibre Channel Port Parameters dialog box:
 - To enable FEC, select the **Enable FEC** check box.
 - To disable FEC, clear the **Enable FEC** check box.
4. Click **OK**.

Enabling and Disabling FEC on Linux and Windows

To enable FEC using QConvergeConsole GUI, follow the instructions provided in the *Installation Guide—QConvergeConsole GUI* (part number SN0051105-00).

To enable FEC using QConvergeConsole CLI, follow the instructions in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Both guides are available on the QLogic Web site, Downloads page:

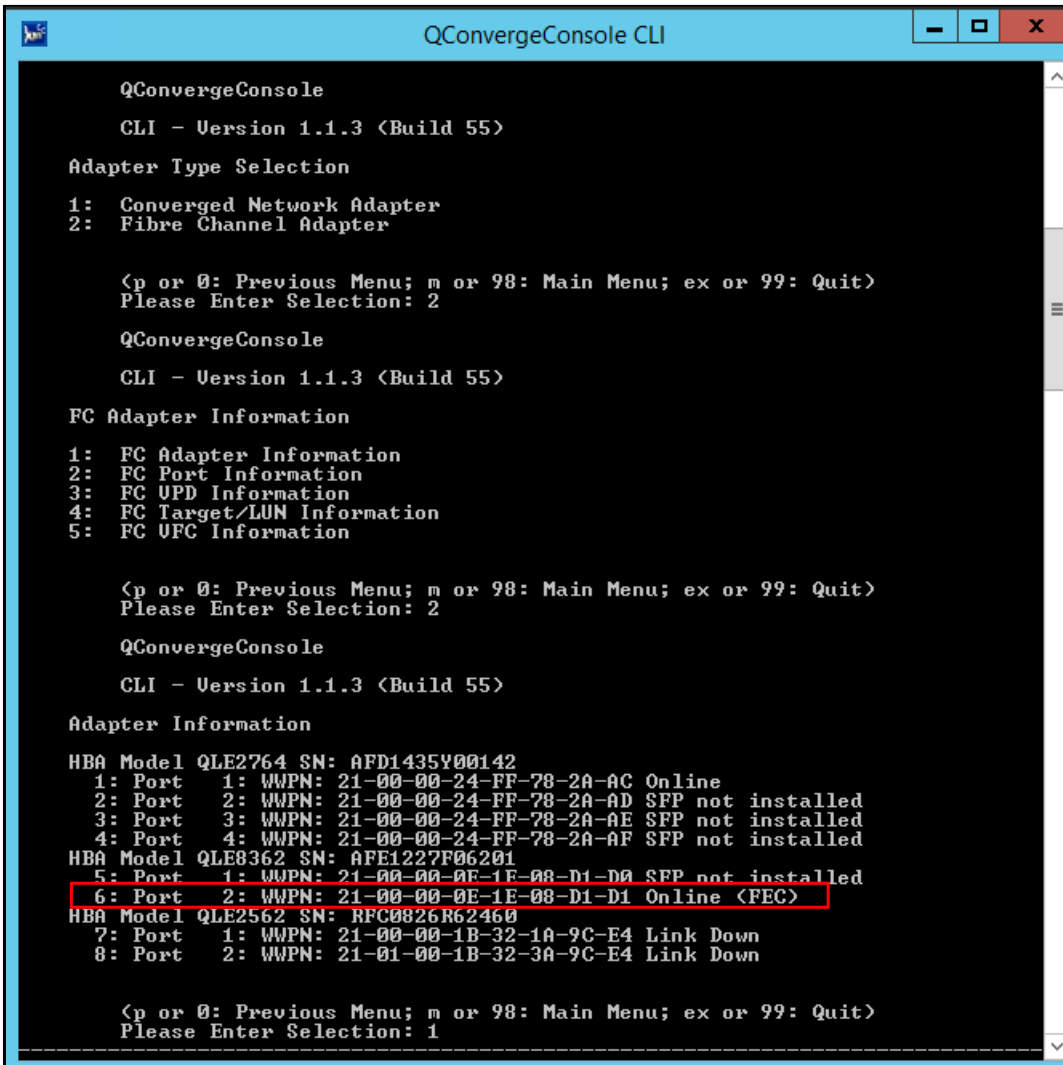
driverdownloads.qlogic.com

Figure 4-19 shows the FEC in the QConvergeConsole GUI with the initial Fibre Channel Adapter port status, along with alarm support.



Figure 4-19. QConvergeConsole FEC Support

Figure 4-20 shows the FEC status on the QConvergeConsole CLI **Adapter Information** menu.



```
QConvergeConsole
CLI - Version 1.1.3 <Build 55>

Adapter Type Selection

1: Converged Network Adapter
2: Fibre Channel Adapter

<p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: 2

QConvergeConsole
CLI - Version 1.1.3 <Build 55>

FC Adapter Information

1: FC Adapter Information
2: FC Port Information
3: FC UPD Information
4: FC Target/LUN Information
5: FC UFC Information

<p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: 2

QConvergeConsole
CLI - Version 1.1.3 <Build 55>

Adapter Information

HBA Model QLE2764 SN: AFD1435Y00142
1: Port 1: WWPN: 21-00-00-24-FF-78-2A-AC Online
2: Port 2: WWPN: 21-00-00-24-FF-78-2A-AD SFP not installed
3: Port 3: WWPN: 21-00-00-24-FF-78-2A-AE SFP not installed
4: Port 4: WWPN: 21-00-00-24-FF-78-2A-AF SFP not installed
HBA Model QLE8362 SN: AFE1227F06201
5: Port 1: WWPN: 21-00-00-0E-1E-08-D1-D0 SFP not installed
6: Port 2: WWPN: 21-00-00-0E-1E-08-D1-D1 Online <FEC>
HBA Model QLE2562 SN: RFC0826R62460
7: Port 1: WWPN: 21-00-00-1B-32-1A-9C-E4 Link Down
8: Port 2: WWPN: 21-01-00-1B-32-3A-9C-E4 Link Down

<p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: 1
```

Figure 4-20. QConvergeConsole CLI Information Menu: FEC Status

Upgrading QLE2694U Adapters to 32Gbps

CAUTION

Upgrading the QLE2694U to 32Gbps and inserting one or more 32G SFPs will disable 4Gbps support. Currently, these adapters can support a maximum of three Fibre Channel speeds.

To upgrade QLE2694U Adapters to 32Gbps:

1. Download the latest driver and firmware for QLE2694U from the Downloads and Documentation page of the QLogic Web site:
driverdownloads.qlogic.com
2. Determine or schedule an appropriate time for performing the maintenance upgrade to the QLogic adapter and any other products on the system.
3. Update the driver and firmware on the QLE2694U.
4. To run at 32Gb speed, ensure that 32Gb Fibre Channel transceivers are installed on both the QLE2694U adapter ports and the Fibre Channel switch ports.

NOTE

Ensure that the Fibre Channel switch's software is capable of supporting 32Gb. If not, update the switch software to an appropriate version.

5. After the links are back up, check the QConvergeConsole management utility to ensure that:
 - The updated information to the QLE2694U has been applied.
 - The 32Gbps links are running.

NOTE

If 32G transceivers are used, the adapter can support speeds of 32G, 16G, and 8G.

Using Buffer-to-Buffer Credit Recovery

Buffer-to-buffer credit recovery (BB-CR) enables two FC peer ports (N_Port, F_Port, or E_Port) to periodically send and receive the quantity of receiver ready (R_RDY) signals transmitted. The BB-CR feature allows the peer port to recover from possible R_RDY signals lost over a lossy link. BB-CR enables two FC ports logged in with each other to recover lost buffer-to-buffer credits. These lost credits can impact throughput, cause link resets, and disrupt traffic flow.

During the login process, the peer ports exchange a nonzero BB_SC_N value. During frame transmission/reception, one port maintains counters to track the R_RDY and frames received. Based on a periodic exchange of BB_SC_N values, the receiving port determines how many R_RDYs should have been received. BB-CR compares this value with the actual counters maintained at the receiving port, from which the receiver can compute the actual quantity of credits lost, and thus recover without incurring a link reset.

By default, BB-CR functionality is enabled on the QLogic 269x Series Adapters that are operating at 16Gbps or higher, and that integrate with Brocade Fabric OS Manager and Brocade Network Advisor. You can disable this feature using either the boot code (BIOS or UEFI), QConvergeConsole GUI, or QConvergeConsole CLI.

For details about how to recover buffer credits, refer to the appropriate QConvergeConsole documentation.

If you are using...	Refer to...
QConvergeConsole GUI	<i>QConvergeConsole Help</i>
QConvergeConsole CLI	<i>User's Guide—QConvergeConsole CLI</i> (part number SN0054667-00)
QConvergeConsole Plug-in for VMware vCenter Server	<i>User's Guide—QConvergeConsole Plug-ins for VMware vSphere</i> (part number SN0054677-00)
QConvergeConsole Plug-in for VMware vSphere Web Client	<i>User's Guide—QConvergeConsole Plug-ins for VMware vSphere</i> (part number SN0054677-00)

Resetting Driver and Firmware Counters

When QLogic Fibre Channel Adapters are running I/Os, they collect and display many driver and firmware counters, which are an accumulation of normal traffic statistics or error conditions. These counters can help you assess the traffic flow, identify I/O bottlenecks, and isolate link issues that affect the SAN performance.

Some counters are accumulated in the adapter’s hardware and persist throughout the life of the adapter. Other counters are transient in memory and are reset after a reload or re-initialization. QLogic provides the ability to reset counters as needed. For example, you may want to see if counters or rates change as a result of taking corrective actions in response to issues or after changing configuration parameters.

For details about how to reset counters, refer to the appropriate QConvergeConsole documentation.

If you are using...	Refer to...
QConvergeConsole GUI	<i>QConvergeConsole Help</i>
QConvergeConsole CLI	<i>User’s Guide—QConvergeConsole CLI</i> (part number SN0054667-00)
QConvergeConsole Plug-in for VMware vCenter Server	<i>User’s Guide—QConvergeConsole Plug-ins for VMware vSphere</i> (part number SN0054677-00)
QConvergeConsole Plug-in for VMware vSphere Web Client	<i>User’s Guide—QConvergeConsole Plug-ins for VMware vSphere</i> (part number SN0054677-00)

A Adapter LEDs

This appendix describes the LEDs on these 2600 Series Adapters:

- [“QLE2670 and QLE2672 16Gb Adapter LEDs” on page 94](#)
- [“QLE2690, QLE2692, QLE2694, and QLE2694L 16Gb Adapter LEDs” on page 95](#)
- [“QLE2694U 32Gb Adapter LEDs” on page 96](#)

QLE2670 and QLE2672 16Gb Adapter LEDs

The QLE2670 and QLE2672 16Gb Adapter ports have three LEDs (see [Figure A-1](#)):

- The amber LED on the left is 16Gb.
- The green LED in the middle is 8Gb.
- The amber LED on the right is 4Gb.

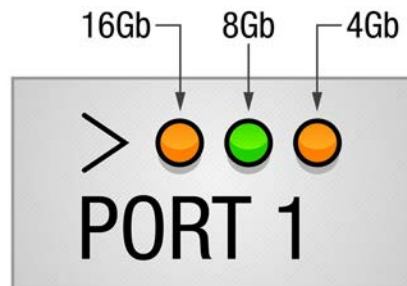


Figure A-1. QLE2670 and QLE2672 16Gb Adapter LEDs

[Table A-1](#) defines the LED behavior for the QLE2670 and QLE2672 16Gb Adapters.

Table A-1. QLE2670 and QLE2672 16Gb Adapter LED Scheme

LED	Power Off	Power On (Before Firmware Initialization)	Power On (After Firmware Initialization)	Firmware Fault	4Gbps Link Up and Active	8Gbps Link Up and Active	16Gbps Link Up and Active	Beaconing
Amber LED (16Gbps)	Off	On	Flashing	Flashing in sequence	Off	Off	On or flashing	Flashing
Green LED (8Gbps)	Off	On	Flashing	Flashing in sequence	Off	On or flashing	Off	Off
Amber LED (4Gbps)	Off	On	Flashing	Flashing in sequence	On or flashing	Off	Off	Flashing

QLE2690, QLE2692, QLE2694, and QLE2694L 16Gb Adapter LEDs

The QLE2690, QLE2692, QLE2694, and QLE2694L 16Gb Adapter ports have three LEDs (see [Figure A-2](#)):

- The green LED on the left is 16Gb.
- The green LED in the middle is 8Gb.
- The green LED on the right is 4Gb.

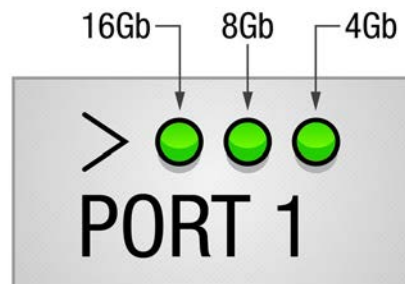


Figure A-2. QLE2690, QLE2692, QLE2694, and QLE2694L 16Gb Adapter LEDs

[Table A-2](#) defines the LED behavior for the QLE2690, QLE2692, QLE2694, and QLE2694L 16Gb Adapters.

Table A-2. QLE2690, QLE2692, QLE2694, and QLE2694L 16Gb Adapter LED Scheme

LED	Power Off	Power On (Before Firmware Initialization)	Power On (After Firmware Initialization)	Firmware Fault	4Gbps Link Up and Active	8Gbps Link Up and Active	16Gbps Link Up and Active	Beaconing
Green LED (16Gbps)	Off	On	Flashing	Flashing in sequence	Off	Off	On or flashing	Flashing
Green LED (8Gbps)	Off	On	Flashing	Flashing in sequence	Off	On or flashing	Off	Off
Green LED (4Gbps)	Off	On	Flashing	Flashing in sequence	On or flashing	Off	Off	Flashing

QLE2694U 32Gb Adapter LEDs

The QLE2694U 32Gb Adapter port has three LEDs (see [Figure A-3](#)):

- The green LED on the left is 32Gb.
- The green LED in the middle is 16Gb.
- The green LED on the right is 8Gb.

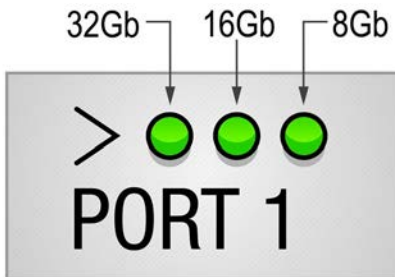


Figure A-3. QLE2694U 32Gb Adapter LEDs

[Table A-3](#) defines the LED behavior for the QLE2694U 32Gb Adapter.

Table A-3. QLE2694U 32Gb Adapter LED Scheme

LED	Power Off	Power On (Before Firmware Initialization)	Power On (After Firmware Initialization)	Firmware Fault	8Gbps Link Up and Active	16Gbps Link Up and Active	32Gbps Link Up and Active	Beaconing
Green LED (32Gbps)	Off	On	Flashing	Flashing in sequence	Off	Off	On or flashing	Flashing
Green LED (16Gbps)	Off	On	Flashing	Flashing in sequence	Off	On or flashing	Off	Off
Green LED (8Gbps)	Off	On	Flashing	Flashing in sequence	On or flashing	Off	Off	Flashing

B Troubleshooting

This appendix provides procedures for solving issues by running Fibre Channel diagnostics using QConvergeConsole GUI. In addition, a two-part flowchart walks you through troubleshooting problems that may occur with devices and LUNs on the 2600 Series Adapter.

Troubleshooting with Fibre Channel Diagnostics

The following sections describe how to use QConvergeConsole GUI and QConvergeConsole CLI to perform diagnostics on the 2600 Series Adapter when its personality is Fibre Channel Adapter. Note that loop is supported only available at 8Gbps, but not at 16 or 32Gbps.

NOTE

When running an external loopback test, do one of the following:

- Insert a loopback connector to the 2600 Series Adapter. The connector runs at one speed, 16Gbps. During this test, the adapter LEDs are off.
- Connect the 2600 Series Adapter to a switch that will run an echo test.

Do not run an internal loopback test if the target device is the SAN target from which the system boots.

Fibre Channel Diagnostics Using QConvergeConsole GUI

QConvergeConsole GUI supports the internal and external loopback, read/write buffer, and beacon on/off diagnostic tests for Fibre Channel ports.

To run the loopback or read/write buffer test:

1. Click the **Loopback Test** or **Read/Write Buffer Test** button.
The diagnostic tests warning appears.
2. If there are no I/Os active and you want to proceed with the test, click **Yes**. Or, to cancel the diagnostic test, click **No**.
3. If you selected the loopback test, a dialog box allows you to select **Internal Loopback** or **External Loopback**. Select the appropriate test, and then click **OK**.

If you selected **Yes** in [Step 2](#), a dialog box appears with the data pattern generated.

4. When you want to end the test, click **Stop**.

To run the beacon on/off test:

1. On the QConvergeConsole GUI main window, click an adapter port in the tree pane on the left.
2. Click the **Information** tab.
3. On the Information page, click the **Beacon On/Off** button to run the test.

For more information, refer to the topic about performing diagnostics in *QConvergeConsole Help*.

Fibre Channel Diagnostics Using Interactive QConvergeConsole CLI

To run the loopback test, read/write buffer test, or beacon test:

1. On the **Main Menu**, select **4: Adapter Diagnostics**.
2. On the **Fibre Channel Diagnostics** menu, do one of the following:
 - Select **1: Loopback Test** to run the loopback test.
 - Select **2: Read Write Buffer Test** to run the read/write buffer test.
 - Select **3: Beacon Test** to run the beacon test.
 - Select **4: Transceiver Diagnostics Monitoring Interface (DMI)** to view the transceiver diagnostics information.

For more information, refer to the section about Fibre Channel interactive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Fibre Channel Diagnostics Using Noninteractive QConvergeConsole CLI

For more information, refer to the section about the Fibre Channel noninteractive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Fibre Channel Troubleshooting Diagram

Figure B-1 and Figure B-2 provide a two-part troubleshooting flowchart.

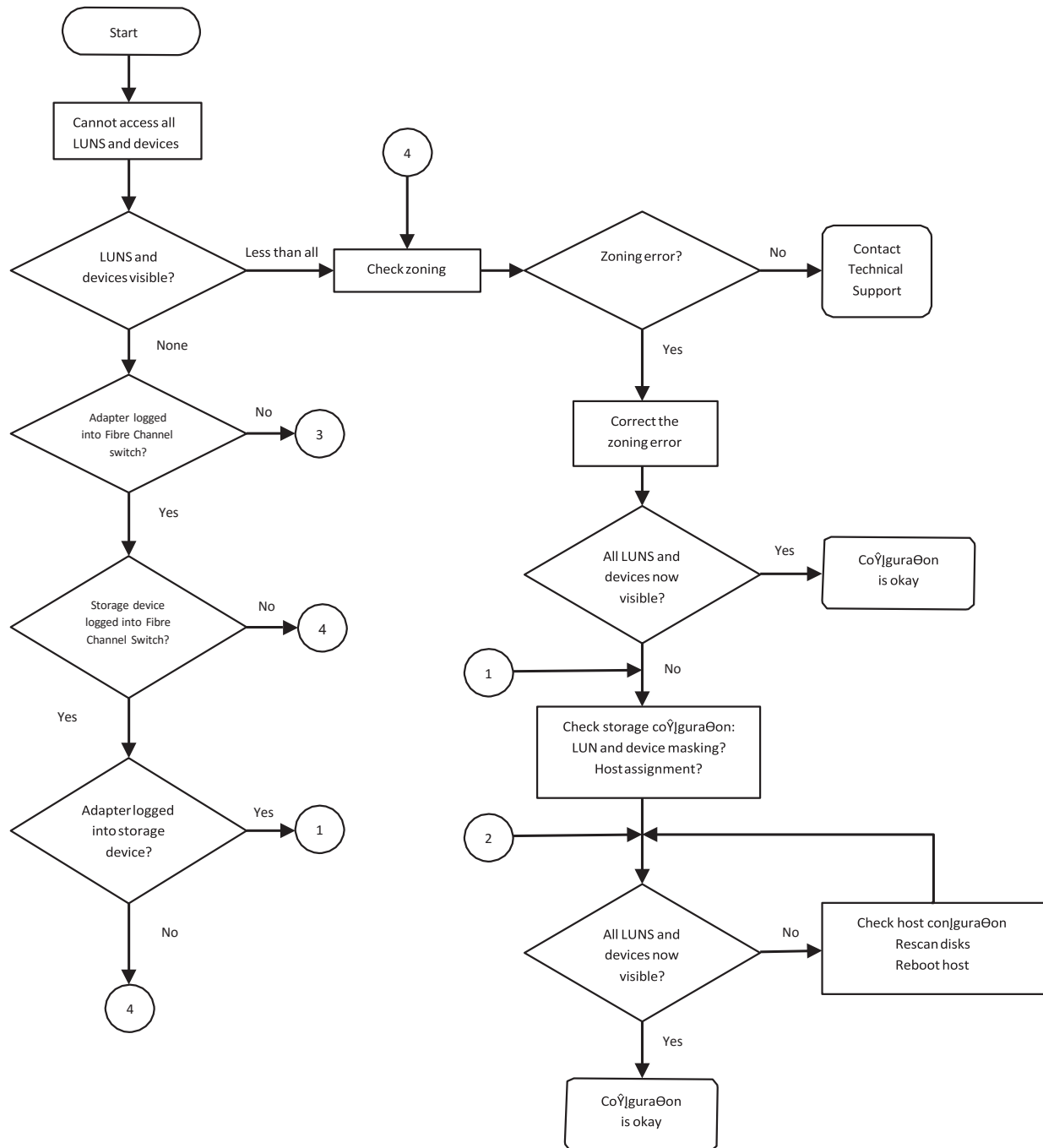


Figure B-1. Fibre Channel Troubleshooting Diagram (Part 1 of 2)

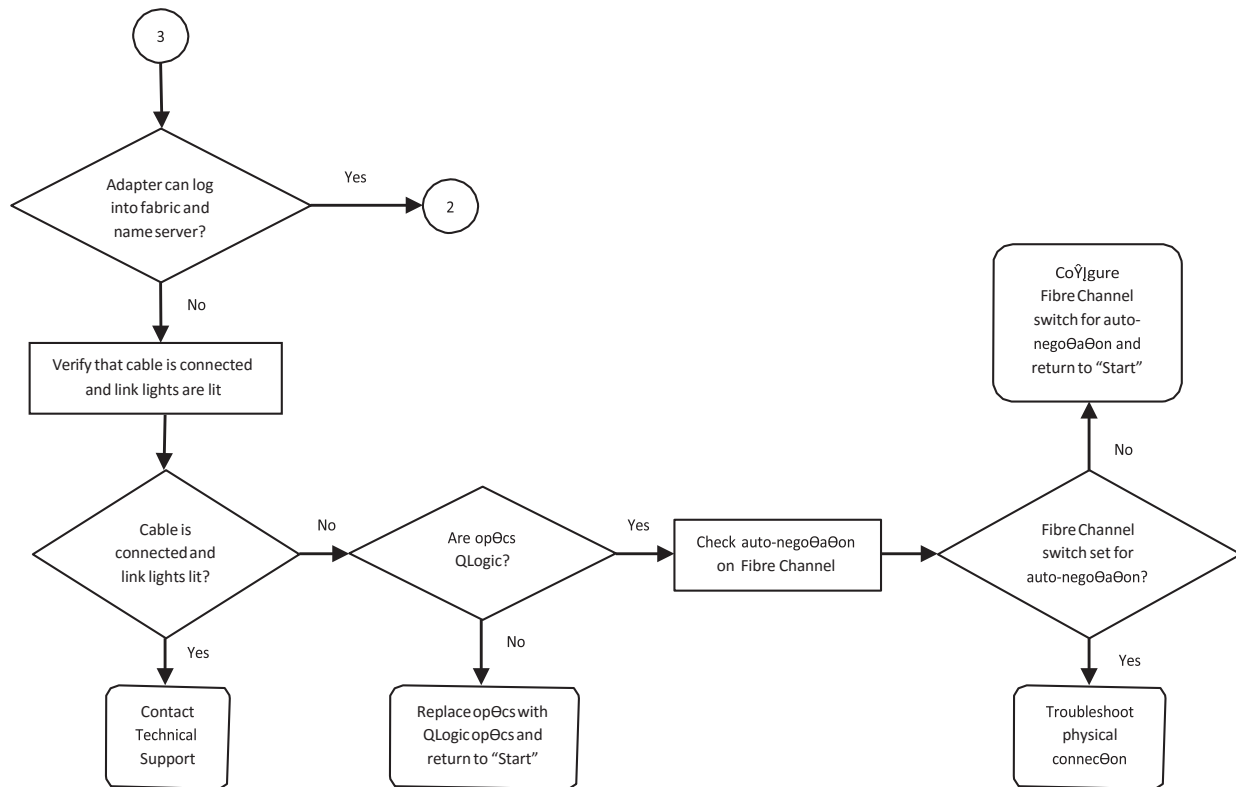


Figure B-2. Fibre Channel Troubleshooting Diagram (Part 2 of 2)

Troubleshooting with a Diagnostic Port (D_Port)

Use the Brocade® ClearLink™ D_Port (diagnostic port) feature on the QLogic 2600 Series Adapter to identify and isolate link failures resulting from faulty modules (link, cable, or SFP) by running diagnostics over a Fibre Channel link.

The D_Port feature is supported on Windows, Linux, ESXi, and Solaris.

D_Port can be run only in *dynamic* mode; it does not support *static* mode.

D_Port requires a 2600 Series Adapter that is linked to a Brocade Fibre Channel 16G switch, the supported Brocade 16G Fibre Channel switch firmware, and a Brocade Fibre Channel switch feature license (Fabric Vision™).

Configure the diagnostic D_Port on the Brocade switch to dynamically allow a port to enter D_Port mode when a D_Port is configured on the switch end, and then return to operational mode when the test is completed. Also configure the switch to start and stop the diagnostic test on the adapter port. For details, see the Brocade switch documentation.

NOTE

All QLogic-branded 16Gbps SFP+ transceivers support the functionality required to run D_Port tests. If you have a supported non-QLogic branded transceiver, ensure that it supports the optical wrap (OWrap) and electrical wrap (EWrap) capability that is required for D_Port.

When a switch port is enabled as a D_Port, the QLogic 2600 Series Adapter automatically runs the basic diagnostic test at both ends of the link. The Brocade switch then runs the following additional tests:

- Electric loopback test
- Optical loopback test

QLogic recommends running D_Port tests on multipath configured boot from a SAN or fabric-assigned boot LUN. Running D_Port tests on a single path boot from SAN or fabric-assigned boot LUN may cause issues with OS stability in true boot from SAN environments.

The following sections describe how to configure and run D_Port mode from the Brocade Fibre Channel 16G switch, and how to verify D_Port mode from the QConvergeConsole utilities:

- [Configuring D_Port on the Brocade Fibre Channel 16G Switch](#)
- [“Checking D_Port Results from the Brocade Fibre Channel 16G Switch” on page 102](#)
- [“Verifying D_Port Mode with QConvergeConsole GUI” on page 103](#)
- [“Verifying D_Port Mode with Interactive QConvergeConsole CLI” on page 103](#)
- [“Verifying D_Port Mode with Noninteractive QConvergeConsole CLI” on page 104](#)
- [“Verifying D_Port Mode with QConvergeConsole Plug-ins for VMware” on page 105](#)

Configuring D_Port on the Brocade Fibre Channel 16G Switch

To enable D_Port diagnostic mode:

From the Brocade Fibre Channel 16G switch, issue the following commands:

```
# portdisable <port#>  
# portcfgdport --enable <port#>  
# portenable <port#>
```

The D_Port test starts automatically.

To disable D_Port diagnostic mode:

From the Brocade Fibre Channel 16G switch, issue the following commands:

```
# portdisable <port#>
# portcfgdport --disable <port#>
# portenable <port#>
```

The D_Port test stops.

Checking D_Port Results from the Brocade Fibre Channel 16G Switch

To view the D_Port test results from the Brocade Fibre Channel 16G switch:

1. To obtain the port number, issue the `switchshow` command as follows:

```
# switchshow
```

The following example output identifies port 17:

```
17 17 011100 id N16 Online FC D-Port Loopback->Port 17
```

2. Issue the `portdporttest` command as follows:

```
# portdporttest --show <port#>
```

For example:

```
# portdporttest --show 17
portdporttest --show 17
D-Port Information:
=====
Port:                               17
Remote WWPN:                         21:00:00:0e:1e:11:4a:31
Mode:                                 Automatic
No. of test frames:                  1 Million
Test frame size:                     1024 Bytes
FEC (enabled/option/active):         Yes/No/No
CR (enabled/option/active):          Yes/No/No
Start time:                          Thu Aug 14 01:45:37 2014
End time:                            Thu Aug 14 01:47:40 2014
Status:                              PASSED
=====
Test                               Start time      Result          EST(HH:MM:SS)  Comments
=====
Electrical loopback                01:46:08       PASSED         -----
Optical loopback                   01:46:54       PASSED         -----
```

```
Link traffic test          ----- SKIPPED -----  
=====
```

Roundtrip link latency: 157 nano-seconds
Estimated cable distance: 3 meters
Buffers required: 1 (for 2112 byte frames at 16Gbps speed)

Verifying D_Port Mode with QConvergeConsole GUI

To verify D_Port mode in QConvergeConsole GUI:

1. In the QConvergeConsole GUI left pane, click the **Host** tab.
2. On the Host page, expand a 2600 Series Adapter to view its port nodes.

If a port is in D_Port mode, the port node specifies **Loop Down, Diagnostic Mode**. Figure B-3 shows an example. (The 2600 Series Adapter appears as an 8300 Series Adapter.)

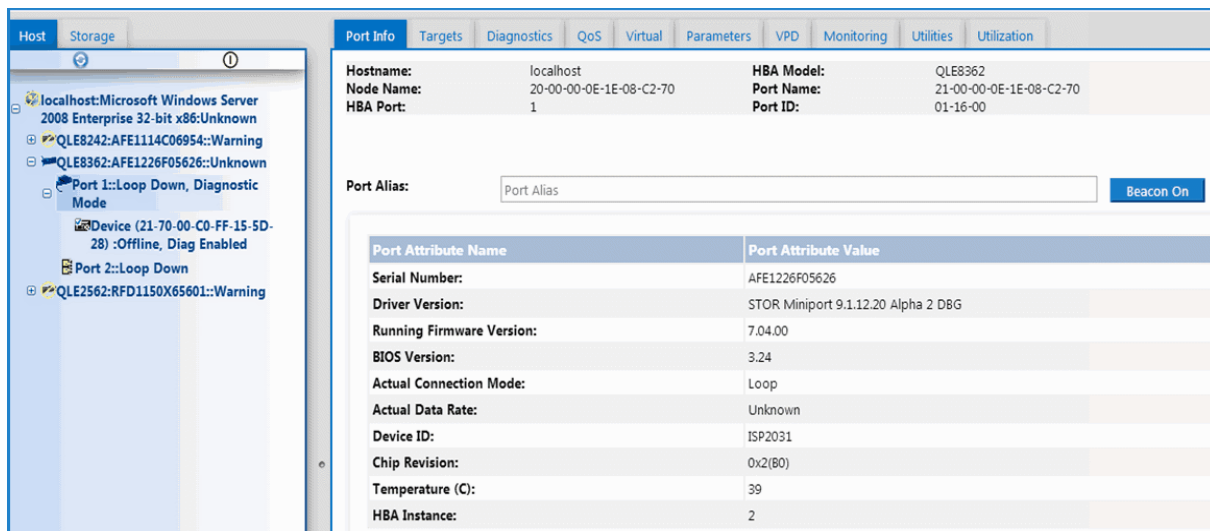


Figure B-3. D_Port Mode in QConvergeConsole GUI

Verifying D_Port Mode with Interactive QConvergeConsole CLI

To verify D_Port mode in interactive QConvergeConsole CLI:

1. On the QConvergeConsole CLI main menu, select the **Adapter Information** option, and then select the adapter type (**Fibre Channel Adapter**).
2. On the **FC Adapter Information** menu, select **2 (FC Port Information)**.

The Adapter Information window shows the affected port with a status of **Loop Down, Diagnostic Mo**. [Figure B-4](#) shows an example.

```
QConvergeConsole
CLI - Version 1.1.3 <Build 23>

FC Adapter Information

1: FC Adapter Information
2: FC Port Information
3: FC UPD Information
4: FC Target/LUN Information

<p or 0: Previous Menu; n or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: 2

QConvergeConsole
CLI - Version 1.1.3 <Build 23>

Adapter Information

HBA Model QLE8362 SN: AFE1226F05626
1: Port 1: WWPN: 21-00-00-0E-1E-08-C2-70 Loop Down, Diagnostic Mo
2: Port 2: WWPN: 21-00-00-0E-1E-08-C2-71 Link Down
HBA Model QLE2562 SN: RFD1150X65601
3: Port 1: WWPN: 21-00-00-24-FF-36-48-40 SFP not installed
4: Port 2: WWPN: 21-00-00-24-FF-36-48-41 SFP not installed

<p or 0: Previous Menu; n or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: _
```

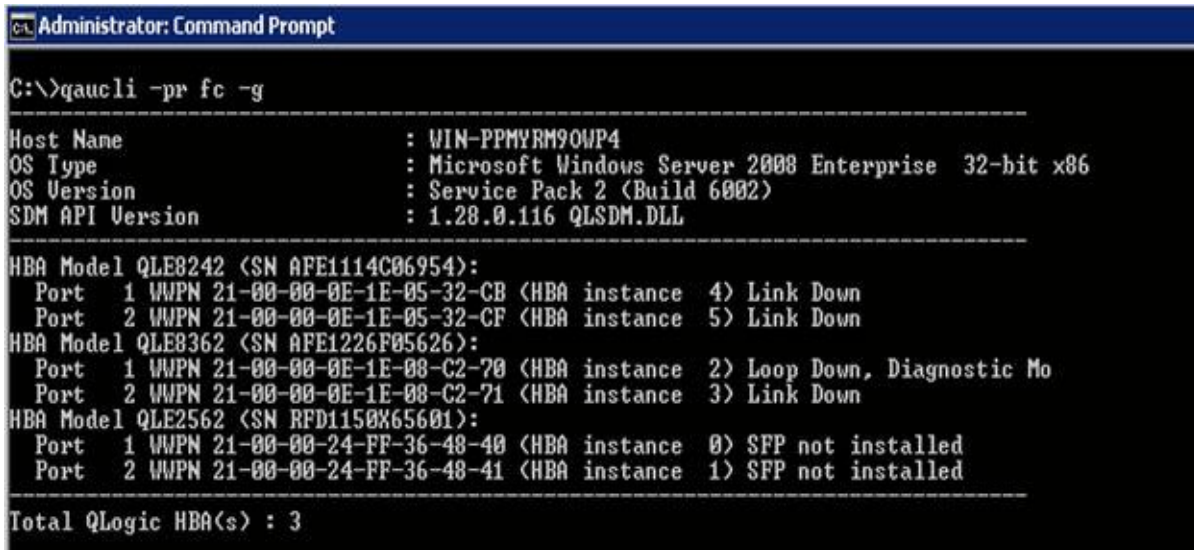
Figure B-4. D_Port Mode in Interactive QConvergeConsole CLI

Verifying D_Port Mode with Noninteractive QConvergeConsole CLI

To verify D_Port mode in noninteractive QConvergeConsole CLI, issue the following command:

```
quacli -pr fc -g
```


All the 2600 Series Adapters are listed. The affected port has a status of **Loop Down, Diagnostic Mo**. [Figure B-5](#) shows an example.



```
Administrator: Command Prompt
C:\>gauccli -pr fc -g
-----
Host Name           : WIN-PPMYRM90WP4
OS Type            : Microsoft Windows Server 2008 Enterprise 32-bit x86
OS Version         : Service Pack 2 (Build 6002)
SDM API Version    : 1.28.0.116 QLSDM.DLL
-----
HBA Model QLE8242 (SN AFE1114C06954):
  Port 1 WWPN 21-00-00-0E-1E-05-32-CB (HBA instance 4) Link Down
  Port 2 WWPN 21-00-00-0E-1E-05-32-CF (HBA instance 5) Link Down
HBA Model QLE8362 (SN AFE1226F05626):
  Port 1 WWPN 21-00-00-0E-1E-08-C2-70 (HBA instance 2) Loop Down, Diagnostic Mo
  Port 2 WWPN 21-00-00-0E-1E-08-C2-71 (HBA instance 3) Link Down
HBA Model QLE2562 (SN RFD1150X65601):
  Port 1 WWPN 21-00-00-24-FF-36-48-40 (HBA instance 0) SFP not installed
  Port 2 WWPN 21-00-00-24-FF-36-48-41 (HBA instance 1) SFP not installed
-----
Total QLogic HBA(s) : 3
```

Figure B-5. D_Port Mode in Noninteractive QConvergeConsole CLI

For more information, refer to the section about the Fibre Channel noninteractive commands in the *User's Guide—QConvergeConsole CLI* (part number SN0054667-00).

Verifying D_Port Mode with QConvergeConsole Plug-ins for VMware

For information about verifying D_Port mode using QConvergeConsole Plug-in for VMware vCenter Server and QConvergeConsole Plug-in for VMware vSphere Web Client, see the “Fibre Channel Adapter Management” section in the *User's Guide—QConvergeConsole Plug-ins for VMware vSphere* (part number SN0054677-00).

Glossary

adapter

The board that interfaces between the host system and the target devices. Adapter is synonymous with *Host Bus Adapter*, *Host Channel Adapter*, *host adapter*, and *adapter board*.

adapter port

A port on the adapter board.

adapter port beacon

An LED on the adapter. Flashing it enables you to locate the adapter.

AL_PA

Arbitrated loop physical address. A unique one-byte value assigned during loop initialization to each node loop port (NL_Port) on a loop.

alias

A user-defined name for an adapter, adapter port, logical disk, or subsystem.

arbitrated loop physical address

See [AL_PA](#).

bandwidth

A measure of the volume of data that can be transmitted at a specific transmission rate. A 1Gbps or 2Gbps Fibre Channel port can transmit or receive at nominal rates of 1 or 2Gbps, depending on the device to which it is connected. This corresponds to actual bandwidth values of 106MB and 212MB, respectively.

basic input output system

See [BIOS](#).

BIOS

Basic input output system. Typically in Flash PROM, the program (or utility) that serves as an interface between the hardware and the operating system and allows booting from the adapter at startup.

boot code

The program that initializes a system or an adapter. Boot code is the first program to run when a system or a device within a system, such as an adapter, is powered on. [FCode](#), [BIOS](#), and extensible firmware interface (EFI) are all forms of boot code for specific hardware/operating system environments.

Boot code for QLogic Fibre Channel Adapters is required if the computer system is booting from a storage device (disk drive) attached to the adapter. The primary function of the boot code is communication with the external boot device before the operating system is up and running. Boot code can also perform secondary functions, including managing the setup for the adapter and initializing and testing the adapter's ISP.

boot device

The device, usually the hard disk, that contains the operating system the BIOS uses to boot from when the computer is started.

boot from SAN

The ability for each server on a network to boot their operating system from a Fibre Channel RAID unit located on the SAN, rather than from a local disk or direct-attached storage (DAS). This enables easier SAN management because you can replace a server and boot it from the Fibre Channel RAID unit.

CRC

Cyclic redundancy check. A scheme to check data that have been transmitted or stored and to detect errors. A CRC cannot correct errors.

cyclic redundancy check

See [CRC](#).

device

A computer subsystem, such as an adapter card, that mediates data in a computer network. The term “device” is used interchangeably with “target” and “target device.”

driver

The software that interfaces between the file system and a physical data storage device or network media.

EFI

Extensible firmware interface. A specification that defines a software interface between an operating system and platform firmware. EFI is a replacement for the older BIOS firmware interface present in all IBM PC-compatible personal computers.

Ethernet

The most widely used LAN technology that transmits information between computer, typically at speeds of 10 and 100 million bits per second (Mbps).

extensible firmware interface

See [EFI](#).

fabric device management interface

See [FDMI](#).

Fast!UTIL

QLogic *Fast!UTIL* Fibre Channel Adapter BIOS utility.

FCode

Forth code. A type of boot code designed for use on Sun® SPARC® or Macintosh® hardware platforms. See also [Flash](#).

FCoE

Fibre Channel over Ethernet. A technology defined by the T11 standards body that allows traditional Fibre Channel storage networking traffic to travel over an Ethernet link by encapsulating Fibre Channel frames inside Layer 2 Ethernet frames. For more information, visit www.fcoe.com.

FDMI

Fabric device management interface. A standard enabling the management of devices such as adapters through the fabric.

FEC

Forward error correction. Automatically detects and recovers from bit errors. FEC enhances transmission reliability and performance.

Fibre Channel

High-speed serial interface technology that supports other higher layer protocols such as SCSI and IP, and is primarily used in SANs. Standardized under ANSI in 1994.

Fibre Channel over Ethernet

See [FCoE](#).

firmware

Low-level software typically loaded into read-only memory and used to boot and operate an intelligent device.

Flash

Non-volatile memory where the boot code is saved. At times, Flash and boot code are used interchangeably.

Forth code

See [FCode](#).

forward error correction

See [FEC](#).

Host Bus Adapter

An adapter that connects a host system (the computer) to other network and storage devices.

Internet small computer system interface

See [iSCSI](#).

iSCSI

Internet small computer system interface. Protocol that encapsulates data into IP packets to send over Ethernet connections.

LED

Light-emitting diode. Status indicator on a switch, router, adapter, or other device.

light-emitting diode

See [LED](#).

logical unit number

See [LUN](#).

loopback

A diagnostic tool that routes transmit data through a loopback connector back to the same adapter.

LUN

Logical unit number. A subdivision of a SCSI target. It is the small integer handle that differentiates an individual disk drive or partition (volume) within a common SCSI target device such as a disk array.

message signaled interrupts

See [MSI](#), [MSI-X](#).

MSI, MSI-X

Message signaled interrupts. One of two PCI-defined extensions to support message signaled interrupts (MSIs), in PCI 2.2 and later and PCI Express. MSIs are an alternative way of generating an interrupt through special messages that allow emulation of a pin assertion or deassertion.

MSI-X (defined in PCI 3.0) allows a device to allocate any number of interrupts between 1 and 2,048 and gives each interrupt separate data and address registers. Optional features in MSI (64-bit addressing and interrupt masking) are mandatory with MSI-X.

multiboot

The act of installing multiple operating systems on a computer, and being able to choose which one to boot when starting the computer. Multibooting may require a custom boot loader.

N_Port

Node port. A port that connects by a point-to-point link to either a single N_Port or a single F_Port. N_Ports handle creation, detection, and flow of message units to and from the connected systems. N_Ports are end ports in virtual point-to-point links through a fabric, for example, N_Port to F_Port to F_Port to N_Port using a single Fibre Channel fabric switch.

node port

See [N_Port](#).

node port ID virtualization

See [NPIV](#).

non-volatile random access memory

See [NVRAM](#).

NPIV

Node port ID virtualization. The ability for a single physical Fibre Channel end point (N_Port) to support multiple, uniquely addressable, logical end points. With NPIV, a host Fibre Channel Adapter is shared in such a way that each virtual adapter is assigned to a virtual server and is separately identifiable within the fabric. Connectivity and access privileges within the fabric are controlled by identification of each virtual adapter and hence, the virtual server using each virtual adapter.

NVRAM

Non-volatile random access memory. A type of memory that retains data (configuration settings) even when power is removed. You can manually configure NVRAM settings or restore them from a file.

OoOFR

Out-of-order frame reassembly. A QLogic (patent pending) feature that reassembles the frames within an exchange in the correct order, even if they were received out of order. Used in a meshed switch topology where frames can traverse through different ISLs to arrive at the target. Otherwise, according to the Fibre Channel specification, the entire exchange of multiple frames would have to be retransmitted.

out-of-order frame reassembly

See [OoOFR](#).

path

A path to a device is a combination of an adapter [port instance](#) and a target port as distinct from internal paths in the fabric network. A fabric network appears to the operating system as an opaque network between the adapter (initiator) and the target.

Because a path is a combination of an adapter and a target port, it is distinct from another path if it is accessed through a different adapter or it is accessing a different target port. Consequently, when switching from one path to another, the driver might be selecting a different adapter (initiator), a different target port, or both.

This is important to the driver when selecting the proper method of failover notification. It can make a difference to the target device, which might have to take different actions when receiving retries of the request from another initiator or on a different port.

PCI Express (PCIe)

A third-generation I/O standard that allows increased network throughput beyond that of the older peripheral component interconnect (PCI) and PCI extended (PCI-x) desktop and server slots.

personality

When used in the context of an adapter, the term *personality* refers to the entire adapter. It includes all the I/O ports and the functions on that adapter. For example, a QLogic adapter can have dual personality, converting from Fibre Channel to Converged Network Adapter or vice versa. Therefore, all the I/O functions and all the I/O physical ports on the adapter changes from Fibre Channel Adapter to Converged Network Adapter.

port

Access points in a device where a link attaches. The most common port types are:

- N_Port—a Fibre Channel port that supports point-to-point topology.
- NL_Port—a Fibre Channel port that supports loop topology.
- F_Port—a port in a fabric where an N_Port can attach.
- FL_Port—a port in a fabric where an NL_Port can attach.

port instance

The number of the port in the system. Each adapter may have one or multiple ports, identified with regard to the adapter as port 0, port 1 and so forth. To avoid confusion when dealing with a system containing numerous ports, each port is assigned a port instance number when the system boots up. So port 0 on an adapter might have a port instance number of 8, for example, if it is the eighth port discovered by the system.

QLflash

The executable file `QLflash.exe` is used by the `UPDATE.BAT` file to update the adapter [multiboot](#) code. The application `QLflash.exe` may be used to read, write, or verify either the multiboot image or the [NVRAM](#) on the adapter.

QoS

Quality of service. Refers to the methods used to prevent bottlenecks and ensure business continuity when transmitting data over virtual ports by setting priorities and allocating bandwidth.

quality of service

See [QoS](#).

RAID

Redundant array of independent disks. Fault-tolerant disks that look like either single or multiple volumes to the server.

redundant array of independent disks

See [RAID](#).

SAN

Storage area network. Multiple storage units (disk drives) and servers connected by networking topology.

SCSI

Small computer systems interface. The original SCSI specification was a hardware bus specification and a packet-oriented protocol specification for communicating on that bus. SCSI over Fibre Channel uses the packet-oriented protocol to communicate with storage devices on the Fibre Channel.

small computer systems interface

See [SCSI](#).

storage area network

See [SAN](#).

target

The storage-device endpoint of a SCSI session. Initiators request data from targets (usually disk drives, tape drives, or other media devices). Typically, a SCSI peripheral device is the target but an adapter may, in some cases, be a target. A target can contain many LUNs.

target binding

The process in which the adapter driver binds a target ID using a target's worldwide port name ([WWPN](#)) or port ID. This binding enables the target ID to always connect to the WWPN or port ID across reboots regardless of [SAN](#) reconfiguration.

UEFI

Unified extensible firmware interface. A specification detailing an interface that helps hand off control of the system for the pre-boot environment (that is, after the system is powered on, but before the operating system starts) to an operating system, such as Windows or Linux. UEFI provides a clean interface between operating systems and platform firmware at boot time, and supports an architecture-independent mechanism for initializing add-in cards.

unified extensible firmware interface

See [UEFI](#).

virtual machine

See [VM](#).

virtual port

See [vPort](#).

VM

Virtual machine. A software implementation of a machine (computer) that executes programs like a real machine.

vPort

Virtual port. A port number or service name associated with one or more virtual servers. A virtual port number should be the same TCP or UDP port number to which client programs expect to connect.

worldwide node name

See [WWNN](#).

worldwide port name

See [WWPN](#).

WWNN

Worldwide node name. A unique 64-bit address assigned to a device.

WWPN

Worldwide port name. A unique 64-bit address assigned to each port on a device. One WWNN may contain multiple WWPN addresses.

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