**Sun Storage 10 GbE FCoE PCIe
Converged Network Adapter From
QLogic Installation Guide For Adapter
Models SG-PCIEFCOE2-Q-SR, SG-
XPCIEFCOE2-Q-SR, SG-PCIEFCOE2-Q-
TA, SG-XPCIEFCOE2-Q-TA, 7105381, and
7105382**

ORACLE®

Sun Storage 10 GbE FCoE PCIe Converged Network Adapter From QLogic Installation Guide For Adapter Models SG-PCIEFCOE2-Q-SR, SG-XPCIEFCOE2-Q-SR, SG-PCIEFCOE2-Q-TA, SG-XPCIEFCOE2-Q-TA, 7105381, and 7105382

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Contents

Using This Documentation

- **Overview** – Describes how to troubleshoot and maintain the Converged Network Adapter
- **Audience** – Technicians, system administrators, and authorized service providers
- **Required knowledge** – Advanced experience troubleshooting and replacing hardware

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1

Converged Network Adapter Overview

This chapter provides a basic overview of Oracle's Sun Storage 10 GbE FCoE PCIe Converged Network Adapter, which uses Cavium, formerly QLogic, technology. This chapter also describes the various operating systems, storage, and infrastructure configurations that support the Converged Network Adapter, and lists the adapter's environmental requirements.

This chapter contains the following topics:

- "Kit Contents" on page 9
- "Converged Network Adapter Features and Specifications" on page 9
- "Operating System and Technology Requirements" on page 11
- "System Interoperability" on page 12
- "Environmental Requirements" on page 17

Kit Contents

- Sun Storage 10 GbE FCoE PCIe Converged Network Adapter
- Standard bracket
- *Accessing Documentation* document

Converged Network Adapter Features and Specifications

Oracle's Sun Storage 10 GbE FCoE PCIe Converged Network Adapter is a standard low-profile, dual-port Converged Network Adapter that is available in two models:

- **SG-(X)PCIEFCOE2-Q-SR, 7105381** - This model ships with two small form-factor pluggable plus (SFP+) short-range (SR) optical modules and supports a maximum cabling distance of 300 meters over multi-mode fiber.

■ **SG-(X)PCIEFCOE2-Q-TA, 7105382** - This model is intended for use with SFP+ direct-attach twinaxial (twinax) copper cables, and supports a maximum cabling distance of 10 meters.

⚠️ **Caution -** Do not replace any of the SFP+s connectors. Doing so will void the warranty or serviceability of the Converged Network Adapter.

Table 1, "Converged Network Adapter Features and Specifications ," on page 10 lists the features and specifications for this adapter.

TABLE 1   Converged Network Adapter Features and Specifications

Feature	Description
Form factor	Standard low-profile form factor
Connector types	Support for: ■ SFP+ SR optics ■ SFP+ direct attach twinax copper
PCIe specification compliance	*PCI Express Card Version 2.0 Electromechanical Specification*
PCI Training Configurations	PCI Express Gen 2 x4 logical slot or PCI Express Gen 1 x8 logical slot
PCIe hot-plug and hot swap functionality	Supported
Maximum power consumption	11 watts
Oracle Solaris Dynamic Reconfiguration (DR)	Supports Dynamic Reconfiguration, a software mechanism that allows resources to be attached (logically added) or detached (logically removed) from the Oracle Solaris operating environment control without incurring any system downtime
FCoE full offload in hardware requirement	Meets this requirement
Boot support (Ethernet and FCoE)	For all operating systems. For a list of supported operatin systems, see Table 2, "Supported Operating System/Technology Versions (Minimum) ," on page 11.
Receive side scaling (RSS)	Supported
MSI-X (message signaled interrupts)	Supported
Fibre Channel support	Support for dual-port FCoE compatible with: ■ Fibre Channel Generic Services (FC-GS-3) ■ Fibre Channel Tape and Medium Changers (FC-Tape) ■ Fibre Channel Protocol for SCSI (FCP-3-SCSI) ■ Fibre Channel Switch Fabric (FC-SW-4) ■ Fabric Provided MAC Address (FPMA) support ■ FCoE boot code for all supported operating systems **Note -** Link Aggregation Control Protocol (LACP) cannot be used on the same port as FCoE or iSCSI.
Ethernet and NIC support	Standard Ethernet and Enhanced Ethernet support for:

Feature	Description
	■ IEEE 802.1Q VLAN ■ IEEE 802.1p ■ IEEE 802.3x ■ IEEE 802.1Qbb ■ IEEE 802.1Qaz ■ DCBX Controller hardware support for: ■ Jumbo frames support for frame sizes of at least 9 Kbytes ■ Hardware TCP/UDP checksum generation ■ Hardware IPv4/IPv6 checksum offload ■ Hardware Large Segmentation Offload ■ Hardware Header and Data Split ■ Full duplex operation ■ Up to 128 MAC addresses ■ Unicast and multi-cast address filtering ■ VMware NetQueue ■ Packet filtering based on MAC address or VLAN tag ■ Microsoft receive-side scaling (RSS) ■ NIC teaming ■ PCI hot-plug ■ Preboot Execution Environment (PXE) boot ■ FCode

Operating System and Technology Requirements

The Converged Network Adapter requires the operating system (OS) and technology versions listed in Table 2, "Supported Operating System/Technology Versions (Minimum) ," on page 11.

TABLE 2   Supported Operating System/Technology Versions (Minimum)

Operating System/Technology	Supported Versions (minimum)
Oracle Solaris OS for the x86 (64-bit) platform	■ Oracle Solaris 10 01/13 with patches 149176-02 and 145649-04, at minimum ■ Oracle Solaris 11.1 with SRU 7 To obtain the latest patches and SRUs, go to `http://support.oracle.com`
Oracle Solaris OS for the SPARC (64-bit) platform	■ Oracle Solaris 10 01/13 with patches 149175-02 and 145648-04 ■ Oracle Solaris 11.1 with SRU 7 To obtain the latest patches and SRUs, go to `http://support.oracle.com`

Operating System/Technology	Supported Versions (minimum)
Linux OS	■ Oracle Linux 5.9 (Red Hat Compatible Kernel (RHCK) and Unbreakable Enterprise Kernel (UEK) 2, at minimum) ■ Oracle Linux 6.4 (RHCK and UEK2, at minimum) ■ Red Hat Enterprise Linux 5.9 (64-bit) ■ Red Hat Enterprise Linux 6.4 (64-bit) ■ SUSE Linux Enterprise Server 11 SP2 (32-bit and 64-bit)
Microsoft Windows OS Standard, Enterprise, and Datacenter Editions	■ Window Server 2008 R2 including SP1 ■ Windows Server 2012
VMware Technology	■ VMware ESX/ESXi 5.0 ■ VMware ESX/ESXi 5.1

System Interoperability

This section provides information about platforms, storage systems, switches, and software that are compatible with the heterogeneous Fibre Channel and Ethernet network design of the Converged Network Adapter. This section contains the following topics:

- "Host Platform Support" on page 12
- "Storage Support" on page 14
- "Switch Support" on page 15
- "Software Support" on page 16
- "Boot Support" on page 16

Host Platform Support

The adapter is supported by the platforms listed in Table 3, "Host Platform Support," on page 12. For up-to-date information, see your Oracle server release notes and web pages.

TABLE 3   Host Platform Support

Platform	Supported OS/Technology
Oracle SPARC Servers	
Netra SPARC T3-1	Oracle Solaris
SPARC M5-32	Oracle Solaris
SPARC T3-1	Oracle Solaris
SPARC T3-2	Oracle Solaris
SPARC T4-1	Oracle Solaris

Platform	Supported OS/Technology
SPARC T4-2	Oracle Solaris
SPARC T5-2	Oracle Solaris
SPARC Enterprise M3000	Oracle Solaris
SPARC Enterprise M4000	Oracle Solaris
SPARC Enterprise M5000	Oracle Solaris
SPARC Enterprise M8000	Oracle Solaris
SPARC Enterprise M9000	Oracle Solaris
Oracle x86 Servers	
Sun Blade X4-2B	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X2200 M2	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X2250	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X2270	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4140	Oracle Solaris, Linux, VMware, , and Windows
Sun Fire X4150	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4170	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4170 M2	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4170 M3	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4240	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4250	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4270	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4270 M2	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4270 M3	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4275	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4440	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4450	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4470	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4470 M2	Oracle Solaris, Linux, VMware, and Windows
Sun Fire X4640	Oracle Solaris, Linux, VMware, and Windows
Sun Server X2-4	Oracle Solaris, Linux, VMware, and Windows
Sun Server X3-2	Oracle Solaris, Linux, VMware, and Windows
Sun Server X3-2L	Oracle Solaris, Linux, VMware, and Windows
Sun Server X4-2	Oracle Solaris, Linux, VMware, and Windows
Sun Server X4-2L	Oracle Solaris, Linux, VMware, and Windows
Fujitsu M10 Servers	
Fujitsu M10-1	Oracle Solaris
Fujitsu M10-4	Oracle Solaris

Platform	Supported OS/Technology
Fujitsu M10-4S	Oracle Solaris

Storage Support

This section lists the arrays, disk systems, and tape storage devices supported by the Converged Network Adapter. This section provides the following topics:

- "Array Support" on page 14
- "Disk System Support" on page 14
- "Tape Storage Support" on page 14

Array Support

The Converged Network Adapter supports connecting to, using a supported switch, the following arrays:

- Sun StorageTek 2540
- Sun StorageTek 6140
- Sun StorageTek 6180
- Sun StorageTek 6540
- Sun StorageTek 6580/6780 with 8Gb Fibre Channel host interface cards

Disk System Support

The Converged Network Adapter supports connecting to, using a supported switch, the following disk system storage:

- Sun StorageTek 9980/9985/9985V System
- Sun StorageTek 9990/9990V System

Tape Storage Support

The Converged Network Adapter supports connecting to, using a supported switch, the following tape storage devices:

- Sun StorageTek SL24 tape autoloader
- Sun StorageTek SL48 tape library

- Sun StorageTek SL500 modular library
- Sun StorageTek SL3000 modular library
- Sun StorageTek SL8500 modular library
- Sun StorageTek L1400 tape library
- Sun StorageTek T10000A and T10000B tape drives
- Sun StorageTek 9840C and 9840D tape drives
- Sun StorageTek LTO-5 tape drive
- IBM LTO3 and LTO4 tape drives
- Quantum DLT-S4 tape drive

Switch Support

The Converged Network Adapter supports connecting to the following Fibre Channel over Ethernet (FCoE) switches:

- Brocade Elara 8000 (FCoE top-of-rack [ToR] switch)

Caution - When operating with the Oracle Solaris 10 10/09 OS, logging into a Brocade Elara 8000 switch requires VLAN 1002 configuration for that port. This is not a requirement in later versions of the Oracle Solaris OS.

- Cisco Nexus 5548 Series (FCoE ToR switch)
- Cisco Nexus 5010 (FCoE ToR switch)
- Cisco Nexus 5020 (FCoE ToR switch)

Note - The Converged Network Adapter has been verified to function with Cisco 5*xxx* FCoE switches; however, Oracle Services does not support customers with questions or issues about these switches. Direct all inquiries about the use of Cisco 5*xxx* switches to Cisco Systems.

Note - When used strictly as a NIC, the Converged Network Adapter supports the use of any 10 GbE SFP+ Ethernet switch. However, to implement FCoE functionality with the Converged Network Adapter, you must use only the FCoE switches specified in this section.

Note - Link Aggregation Control Protocol (LACP) cannot be used on the same port as FCoE or iSCSI.

Software Support

The Converged Network Adapter supports the software utilities and applications listed in Table 4, "Supported Converged Network Adapter Utilities," on page 16 and Table 5, "Other Supported Software Applications ," on page 16.

TABLE 4 Supported Converged Network Adapter Utilities

Software	Supported OS
Converged Network Adapter firmware update utility	Oracle Solaris, Linux, VMware, and Windows
Converged Network Adapter configuration and management utility	Oracle Solaris, Linux, VMware, and Windows
Converged Network Adapter installation wizard	Windows
Oracle Solaris `fcinfo` utility compatibility	Oracle Solaris

TABLE 5 Other Supported Software Applications

Software	Supported OS
VERITAS Storage Foundation (VxSF) 5.0	Oracle Solaris
VERITAS NetBackup 6.5	Oracle Solaris
Sun StorageTek Enterprise Backup Software (EBS) 7.2/7.3/7.4	Oracle Solaris, Linux, and Windows
Support for native multi-pathing	Oracle Solaris, Linux, and Windows

Boot Support

The Converged Network Adapter supports the following minimum boot types:

- Oracle Solaris 10 01/13 for the x86 and SPARC environments
- Oracle Solaris 11.1 for the x86 and SPARC environments
- Preboot Execution Environment (PXE) boot capable (for x86 systems)
- RHEL 5.9 and 6.4
- SLES 11 SP2
- VMware ESX/ESXi 5.0 and 5.1
- Windows Server 2008, R2 including SP1
- Windows Server 2012

Environmental Requirements

The Converged Network Adapter environmental requirements are listed in Table 6, "Converged Network Adapter Environmental Requirements ," on page 17.

TABLE 6   Converged Network Adapter Environmental Requirements

Specification	Operating	Non-Operating
Temperature	0 C˚ to 55˚ C, noncondensing	–40˚ C to 70˚ C, noncondensing
Humidity	10 % RH to 90 % RH, noncondensing, 27˚C max wet bulb	93 % RH, noncondensing, 38˚ C max wet bulb
Altitude	3000 m	12,000 m
Vibration	0.20 G in all axes, 5-500 Hz sine	1.0 G in all axes, 5–500 Hz sine
Shock	Operating: 5 G, 11 ms half-sine	30 G 11 ms half-sine

♦♦♦ **C H A P T E R   2**

2

Hardware Installation and Removal

This chapter describes how to install and remove the Converged Network Adapter. Refer to your system installation or service manual for detailed instructions.

This chapter contains the following topics:

Observing ESD and Handling Precautions

⚠️ **Caution -** Damage to the Converged Network Adapter can occur as the result of careless handling or electrostatic discharge (ESD). Always handle the adapter with care to avoid damage to electrostatic sensitive components.

To minimize the possibility of ESD-related damage, use both a workstation antistatic mat and an ESD wrist strap. You can get an ESD wrist strap from any reputable electronics store or from Oracle as part number 250-1007. Observe the following precautions to avoid ESD-related problems:

- Leave the adapter in its antistatic bag until you are ready to install it in the system.
- Always use a properly fitted and grounded wrist strap or other suitable ESD protection when handling the adapter and observe proper ESD grounding techniques.
- Hold the adapter by the edge of the PCB, not the connectors.
- Place the adapter on a properly grounded antistatic work surface pad when it is out of its protective antistatic bag.

Installing the Hardware

Follow the procedures in this section to install the hardware:

- "To Install the Converged Network Adapter" on page 20
- "To Connect an Optical Cable" on page 23
- "To Connect a Copper Cable" on page 24
- "To Apply Power" on page 25

▼ To Install the Converged Network Adapter

1. **If the system in which you are installing the adapter is running the Oracle Solaris OS, install the two driver patches for your platform, as listed in "Operating System and Technology Requirements" on page 11.**

2. **Attach an ESD wrist strap (see "Observing ESD and Handling Precautions" on page 19).**

3. **Refer to your system installation or service manual to determine an appropriate PCI Express slot in which to install the Converged Network Adapter.**

4. **Refer to your system documentation to shut down, power off, and unplug the system, if necessary.**

5. **If you do not want to replace the PCI bracket, skip to step 6. Otherwise, if you want to replace the PCI bracket, perform these steps:**

   Note - The Converged Network Adapter comes with a low-profile PCI bracket installed. This bracket is approximately 3.11 in. (7.9 cm) long. A standard mounting bracket, which is approximately 4.75 in. (12.6 cm), is provided with each order.

   a. **Remove the SFP(s), if installed.**

   Caution - Do not replace any of the SFP+s. Doing so will void the warranty or serviceability of the Converged Network Adapter.

b. Remove the mounting bracket screws from the adapter (See the following figure.).
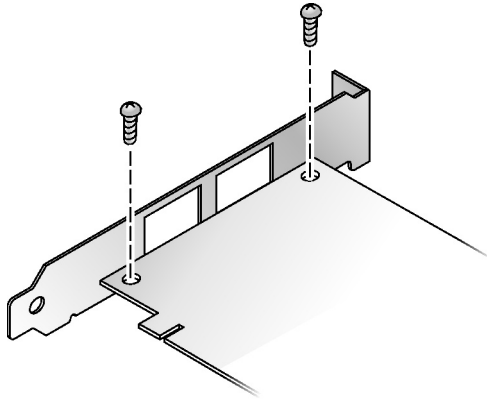
c. Remove the bracket and store it for future use.

d. Align the new mounting bracket tabs with the holes in the adapter.

Note - Be careful not to push the bracket past the grounding tabs of the transceiver housing. Ensure that the LEDs are properly aligned with the holes in the bracket.

e. Replace the screws that attach the adapter to the bracket.

f. Reinstall the SFP(s), if removed in step a.

6.   Insert the adapter into the empty PCI Express x8 or larger slot.
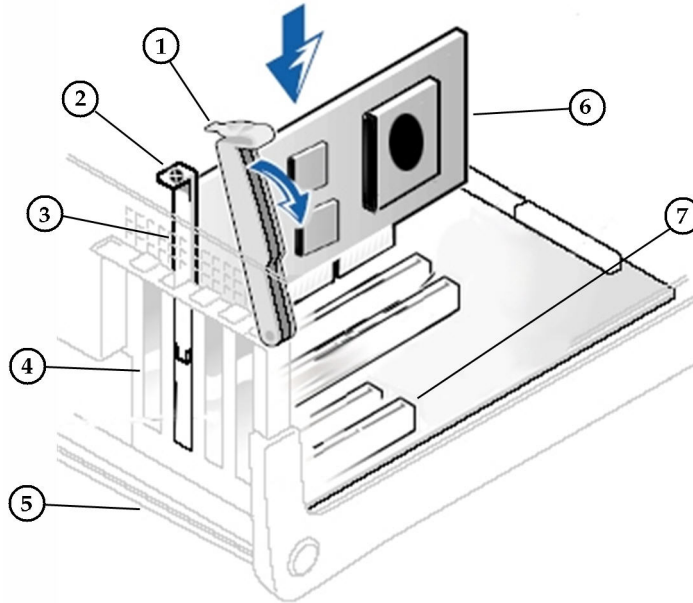
Callout	Description
1	Lever
2	Screw
3	Adapter retaining bracket
4	Slot covers
5	System chassis
6	Converged Network Adapter
7	PCI Express slot

7.   Press firmly until the adapter is seated.

8.   Secure the mounting bracket of the adapter to the case with the panel screw or clip.

9.   Replace the system case and tighten the case screws.

The adapter is now installed and you can connect the optical or copper cables.

▼ To Connect an Optical Cable

Note - The Converged Network Adapter does not allow normal data transmission on an optical link unless it is connected to another similar or compatible Fibre Channel over Ethernet (FCoE) product (that is, another Converged Network Adapter or FCoE switch using compatible short range optics).

Use multi-mode fiber-optic cable, intended for short-wave lasers, that adheres to the specifications listed in Table 1, "Converged Network Adapter Features and Specifications ," on page 10 in Table 1, "Converged Network Adapter Features and Specifications ," on page 10.

1. **Connect the fiber-optic cable to an LC connector on the adapter.**

   The following figure shows how to connect the dual-port adapter with a fiber-optic cable.
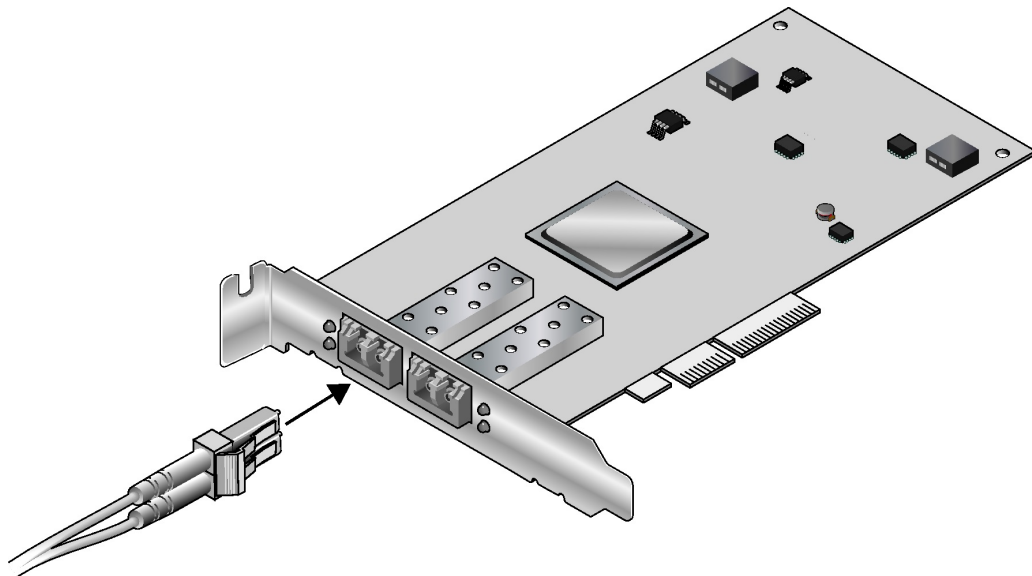
2. **Connect the other end of the cable to the FCoE switch.**

   After the optical cable is connected to the adapter, you can power on the system.

Note - Link Aggregation Control Protocol (LACP) cannot be used on the same port as FCoE or iSCSI.

▼ To Connect a Copper Cable

Before You Begin Use only SFP+ direct attach twinax cables approved by Oracle. The following table lists the part numbers for the approved twinax copper cables.

Brocade Part Number	Oracle Part Number	Cable Description
SN-TWX-0101	SG-XSWBROSFP-1MIPK	Brocade Twinax, 1 Meter, 1 Pack, SN
SN-TWX-0108	SG-XSWBROSFP-1M8PK	Brocade Twinax, 1 Meter, 8 Pack, SN
SN-TWX-0301	SG-XSWBROSFP-3M1PK	Brocade Twinax, 3 Meter, 1 Pack, SN
SN-TWX-0308	SG-XSWBROSFP-3M8PK	Brocade Twinax, 3 Meter, 8 Pack, SN
SN-TWX-0501	SG-XSWBROSFP-5M1PK	Brocade Twinax, 5 Meter, 1 Pack, SN
SN-TWX-0508	SG-XSWBROSFP-5M8PK	Brocade Twinax, 5 Meter, 1 Pack, SN

Note - If you are connecting this Converged Network Adapter to a Cisco FCoE switch, do not use the cables listed in this section. Instead, use OM-3 twin-ax cables that are supported by Cisco. Check with Cisco for the recommended twin-ax cables to use with the specific Cisco switch that you are using.If any issues occur due to the use of Cisco cables, contact Cisco support for resolution.

1. **Insert one end of the copper cable into an empty SFP+ cage on the adapter.**

   Confirm the cable is fully inserted and engaged.

The following figure shows how to connect the dual-port adapter with a copper cable.
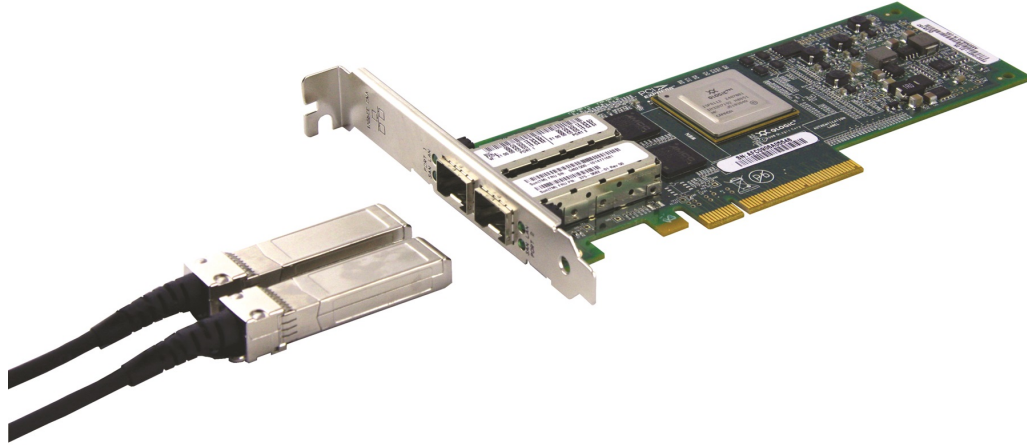
2. **Insert the other end of the copper cable into an empty SFP+ cage on the FCoE switch.**

    After the copper cable is connected to the adapter, you can power on the system.

    Note - Link Aggregation Control Protocol (LACP) cannot be used on the same port as FCoE or iSCSI.

▼ To Apply Power

1. **Verify that the Converged Network Adapter is securely installed in the system.**

2. **Verify that the correct data cable is attached.**

3. **Refer to your system installation or service manual to determine how to power on the system.**

4. **Observe the light-emitting diode (LED) status for the power-on self test (POST) results as shown in this section.**

The green LEDs can be seen through openings in the mounting bracket of the adapter, as shown in the following figure.
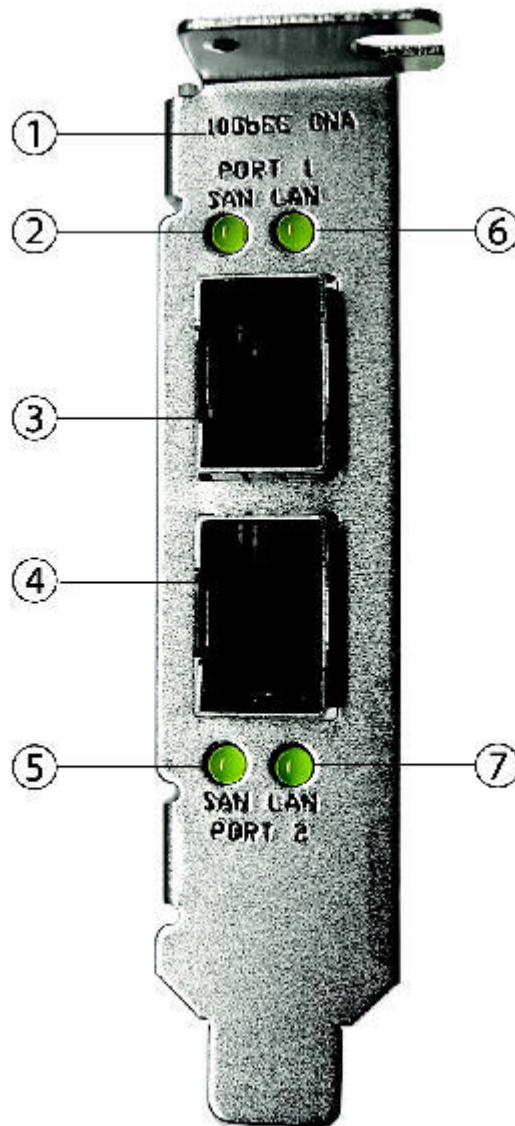
Callout	Description
1	Low profile mounting bracket (standard)
2	Port 1 SAN LED
3	Port 1 LC Connector
4	Port 2 LC Connector
5	Port 2 SAN LED
6	Port 1 LAN LED
7	Port 2 LAN LED

The following table summarizes the LED status conditions.

Green LED (LAN Traffic)	Green LED (SAN Traffic)	Activity
Off	Off	Power off
Slow flashing (unison)	Slow flashing (unison)	Power on (no link)
On	On	Link established; no activity
Flashing	On	Link established; transmit and receive LAN only activity
On	Flashing	Link established; transmit and receive SAN only activity
Flashing	Flashing	Link established; transmit and receive LAN and SAN activity
Off	On or flashing	Fatal error detected on LAN function; SAN functioning normally
On or flashing	Off	Inconsistent state detected on Fibre Channel firmware state machine; unable to recover
Off	Off	MPI firmware initialization failed (incorrect checksum, invalid config image, or EDC PHY firmware load failure), or the MPI firmware asserts during runtime and hangs permanently
Slow flashing (alternating)	Slow flashing (alternating)	Beaconing

Testing the Installation

This section contains the following topics:

- "To Verify Proper Installation (Oracle SPARC Systems)" on page 28
- "To Verify Attached Storage (Oracle SPARC Systems)" on page 30

▼ To Verify Proper Installation (Oracle SPARC Systems)

1. **Use the `show-devs` command at the `ok` prompt to list the installed devices.**

    The Converged Network Adapter can be identified in the output by looking for the `SUNW,qlc@`*n* and `SUNW,qlc@`*n*`,1` node names, where *n* is usually a single-digit number from 0 to 9.

    ```
    show-devs
    /os-io
    /ramdisk-root
    /pci@3,700000
    /pci@2,600000
    /pci@1,700000
    /pci@0,600000
    /pci@8,4000
    /cmp@408,0
    /cmp@400,0
    /pseudo-mc@200,200
    /nvram
    /pseudo-console
    /virtual-memory
    /memory@m3c000000000
    /aliases
    /options
    /openprom
    /chosen
    /packages
    /pci@2,600000/SUNW,qlc@0,3
    /pci@2,600000/SUNW,qlc@0,2
    /pci@2,600000/ethernet@0,1
    /pci@2,600000/ethernet@0
    /pci@2,600000/SUNW,qlc@0,3/fp@0,0
    /pci@2,600000/SUNW,qlc@0,3/fp@0,0/disk
    /pci@2,600000/SUNW,qlc@0,2/fp@0,0
    /pci@2,600000/SUNW,qlc@0,2/fp@0,0/disk
    /pci@0,600000/pci@0
    /pci@0,600000/pci@0/pci@9
    /pci@0,600000/pci@0/pci@8
    /pci@0,600000/pci@0/pci@8/pci@0,1
    /pci@0,600000/pci@0/pci@8/pci@0
    /pci@0,600000/pci@0/pci@8/pci@0/network@2,1
    /pci@0,600000/pci@0/pci@8/pci@0/network@2
    /pci@0,600000/pci@0/pci@8/pci@0/scsi@1
    /pci@0,600000/pci@0/pci@8/pci@0/scsi@1/disk
    /pci@0,600000/pci@0/pci@8/pci@0/scsi@1/tape
    ```

```
/pci@8,4000/ebus@1
/pci@8,4000/ebus@1/panel@14,280030
/pci@8,4000/ebus@1/scfc@14,200000
/pci@8,4000/ebus@1/serial@14,400000
/pci@8,4000/ebus@1/flashprom@10,0
/cmp@408,0/core@1
/cmp@408,0/core@0
/cmp@408,0/core@1/cpu@1
/cmp@408,0/core@1/cpu@0
/cmp@408,0/core@0/cpu@1
/cmp@408,0/core@0/cpu@0
/cmp@400,0/core@1
/cmp@400,0/core@0
/cmp@400,0/core@1/cpu@1
/cmp@400,0/core@1/cpu@0
/cmp@400,0/core@0/cpu@1
/cmp@400,0/core@0/cpu@0
/openprom/client-services
/packages/hsfs-file-system
/packages/ufs-file-system
/packages/obp-tftp
/packages/terminal-emulator
/packages/disk-label
/packages/deblocker
/packages/SUNW,builtin-drivers
/packages/SUNW,probe-error-handler
```

2. **To identify the port as a Sun Storage 10 GbE FCoE PCIe Converged Network Adapter port, use the `cd` command to change to the `SUNW,qlc@`n directories, and use the `.properties` command, as shown in the following example:**

    `cd /pci@0/pci@0/pci@8/pci@0/pci@2/SUNW,qlc@0`

    In the next example, the `.properties` command output displays the properties of one port in a dual-port Converged Network Adapter.

    ```
    {3} ok .properties
    status                okay
    assigned-addresses    81020310 00000000 00000600 00000000 00000100
                          82020314 00000000 0010c000 00000000 00004000
                          8202031c 00000000 00500000 00000000 00100000
                          82020330 00000000 00600000 00000000 00040000
    adapter               Dual Port PCIe 10Gb FCoE
    manufacturer          QLGC
    oem                   SUNW
    release-date          2010-01-11 19:29
    ```

```
revision-level          3.12
port#                   00000001
version                 QLE8142  Host Adapter FCode(SPARC): 3.15 2010-01-11 19:29
model                   QLE8142
node-wwn                20 00 00 c0 dd 0a b4 73
port-wwn                21 00 00 c0 dd 0a b4 73
reg                     00020300 00000000 00000000 00000000 00000000
                        01020310 00000000 00000000 00000000 00000100
                        03020314 00000000 00000000 00000000 00001000
compatible              pciex1077,8001.1077.183.2
                        pciex1077,8001.1077.183
                        pciex1077,183
                        pciex1077,8001.2
                        pciex1077,8001
                        pciclass,c0400
short-version           3.12 2010-01-11 19:29
devsel-speed            00000000
max-latency             00000000
min-grant               00000000
#size-cells             00000000
#address-cells          00000002
device_type             scsi-fcp
name                    SUNW,qlc
fcode-rom-offset        0000b800
interrupts              00000004
cache-line-size         00000010
class-code              000c0400
subsystem-id            00000183
subsystem-vendor-id     00001077
revision-id             00000002
device-id               00008001
vendor-id               00001077
```

▼ To Verify Attached Storage (Oracle SPARC Systems)

- **If online storage is connected to the Converged Network Adapter, use the** `show-children` **command to list the attached storage.**

Note - You might need to run the `reset-all` command before using the `show-children` command.

In the following example, a storage "just a bunch of disks" (JBOD) has one target and two LUNs attached to one port of a dual-port Converged Network Adapter.

```
{0} ok show-disks
a) /pci@7c0/pci@0/pci@8/SUNW,qlc@0,3/fp@0,0/disk
b) /pci@7c0/pci@0/pci@8/SUNW,qlc@0,2/fp@0,0/disk
c) /pci@7c0/pci@0/pci@1/pci@0,2/LSILogic,sas@2/disk
d) /pci@7c0/pci@0/pci@1/pci@0/ide@8/cdrom
e) /pci@7c0/pci@0/pci@1/pci@0/ide@8/disk
q) NO SELECTION
Enter Selection, q to quit: b

{0} ok select /pci@7c0/pci@0/pci@8/SUNW,qlc@0,2
QLogic QLE8142  Host Adapter FCode(SPARC): 3.15 2013-01-11 19:29
ISP Firmware version 5.03.02
MPI FW version 1.39.00

{0} ok show-children
Adapter portID - 11401
************** Fabric Attached Devices **************
 Dev# 0(0)   PortID 10500    Port WWN 200600a0b819e3b8
 LUN    0(0)    DISK  SUN    CSM100_R_FC    0619
 LUN    1(1)    DISK  SUN    CSM100_R_FC    0619
 LUN    2(2)    DISK  SUN    CSM100_R_FC    0619
 LUN    3(3)    DISK  SUN    CSM100_R_FC    0619
 LUN    4(4)    DISK  SUN    CSM100_R_FC    0619
 LUN    5(5)    DISK  SUN    CSM100_R_FC    0619
 LUN    6(6)    DISK  SUN    CSM100_R_FC    0619
 LUN    7(7)    DISK  SUN    CSM100_R_FC    0619
 LUN    8(8)    DISK  SUN    CSM100_R_FC    0619
 LUN    9(9)    DISK  SUN    CSM100_R_FC    0619
```

▼ To Verify Proper Installation (Oracle x86 Systems)

1. During system power-on initiation, the following system booting BIOS initialization screen is displayed.

```
QLogic Corporation
QLE8152 PCI3.0 Fibre Channel ROM BIOS version 2.14
Copyright (c) QLogic Corporation 1992-2009. All rights reserved.
www.qlogic.com

Press <CTRL-Q> or <ALT-Q> for Fast!UTIL
```

```
BIOS for Adapter 0 is disabled
BIOS for Adapter 1 is disabled
ROM BIOS NOT INSTALLED
```

2. **Immediately press `Ctrl-Q`.**
    The following QLogic *Fast!*UTIL menu is displayed.

```
QLogic Corporation
QLE8152 PCI3.0 Fibre Channel ROM BIOS version 2.14
Copyright (c) QLogic Corporation 1993-2009. All rights reserved.
www.qlogic.com

Press <CTRL-Q> or <ALT-Q> for Fast!UTIL

BIOS for Adapter 0 is disabled

BIOS for Adapter 1 is disabled
ROM BIOS NOT INSTALLED

<CTRL-Q> Detected, Initialization in progress, Please wait...
```

Then the following QLogic *Fast!*UTIL menu is displayed.

```
                QLogic Fast!UTIL
                Select Host Adapter
-----------------------------------------------------------
Adapter Type     Address    Slot    Bus    Device    Function

QLE8152          E800       01      05     00        2
QLE8152          EC00       01      05     00        30
```

3. **Use the Arrow key to highlight the Converged Network Adapter port that has connected devices and press Enter.**
    The QLogic *Fast!*UTIL menu is displayed as shown in the following example.

```
                QLogic Fast!UTIL
                Selected Adapter
-----------------------------------------------------------
Adapter Type     Address    Slot    Bus    Device    Function
QLE8152          E800       01      05     00        2


-----------------------------------------------------------
   Fast!UTIL Options
```

```
                    Configuration Settings
                    Scan Fibre Devices
                    Fibre Disk Utility
                    Loopback Data Test
                    Select Host Adapter
                    Exit Fast!UTIL
```

4. Use the Arrow key to highlight Scan Fibre Devices and press Enter.

The following example shows a storage JBOD with seven targets attached to one port of a dual-port Converged Network Adapter.

```
                    QLogic Fast!UTIL


Scan Fibre Channel Loop

ID  Vendor  Product          Rev    Port Name        Port ID

0   SEAGATE ST336752FSUN36G   0205   21000004CF64C8E0 0000CC
1   SEAGATE ST336752FSUN36G   0205   21000004CF6493D0 0000CB
2   SEAGATE ST336752FSUN36G   0205   21000004CF6428C4 0000CA
3   SEAGATE ST336752FSUN36G   0205   21000004CF64C5B2 0000C9
4   SEAGATE ST336752FSUN36G   0205   21000004CF6096F0 0000C7
5   SEAGATE ST336752FSUN36G   0205   21000004CF648010 0000C6
6   SUN     StorEdge 3510F    D1046  215000C0FF00225B 0000CD
7   No device present
8   No device present
9   No device present
10  No device present
11  No device present
12  No device present
13  No device present
14  No device present
15  No device present
```

5. To exit the QLogic *Fast!*UTIL, press the Escape key.

The following QLogic *Fast!*UTIL menu is displayed.

```
              QLogic Fast!UTIL
              Selected Adapter


------------------------------------------------------------
Adapter Type    Address   Slot   Bus   Device   Function
QLE8152         E800      01     05    00       2


------------------------------------------------------------
```

```
Fast!UTIL Options

                        Configuration Settings
                        Scan Fibre Devices
                        Fibre Disk Utility
                        Loopback Data Test
                        Select Host Adapter
                        Exit Fast!UTIL
```

6.   Highlight Exit Fast!UTIL and press Enter.

The following QLogic *Fast!*UTIL menu is displayed.

```
                  QLogic Fast!UTIL

Exit Fast!UTIL
---------------------------------

                        Reboot System
                        Return to Fast!UTIL
```

Updating the PXE

If you are installing the adapter in an x86 system, and you plan to use Preboot Execution Environment (PXE) functionality, you might need to update the Converged Network Adapter PXE under the BIOS and UEFI environments. This section provides the following PXE information:

- "PXE Operating Systems" on page 34
- "Package Files" on page 35
- "System Configuration" on page 35
- "Updating the FCode" on page 37

PXE Operating Systems

Supported operating systems for the BIOS PXE installation include:

- Windows Server 2008 R2 including SP1 64-bit
- SLES 11 SP2 64-bit

- RH 5.9 and 6.4 64-bit
- Oracle's Sun JumpStart PXE server

Note - When installing an operating system from the PXE Server, ensure that the selected OS supports the Converged Network Adapter relative to the BIOS or the UEFI environment. Also ensure that the adapter supporting NIC and Fibre Channel drivers is loaded on the PXE Server.

Package Files

The MultiFlash image package contains the following BIOS files:

- *x*8*xyyyyy*.bin—Combined binary file, which includes the binaries for the firmware, PXE, FCode, UEFI, and BIOS.
- readme.txt—Package and configuration information.
- release.txt—Reference the separate PXE (BIOS) and EFI PXE (EFI) release notes.
- update.bat—DOS batch file that calls the executable files to update the adapter PXE in the BIOS environment.
- FlasUtil.exe—Utility to update multi-boot code and firmware.
- VPD.exe—Utility to update the adapter's Vital Product Data.

System Configuration

This section provides information regarding the BIOS PXE feature contained in the 10Gb multi-boot package. PXE boot code is already included in the boot code image, *x*8*xyyyyy*.bin.

Note - For instructions on flashing the BIOS PXE code, refer to the BIOS Readme.txt file.

QLogic Banner During POST

When the server powers on, two QLogic PXE banners per adapter appear, similar to the following example:

```
QLogic PCI 3.O PXE V1.xx
```

```
        Copyright (c) 2009-2010 QLogic Corporation
        Port1 MAC=00 18 8B FF EE F9
        PXE boot is disabled. Press <Ctrl-T> to enable within 5 sec......
```

When PXE boot is enabled on an adapter port, the next system reboot shows the following PXE banner on the modified port:

```
QLogic PCI 3.O PXE V1.xx
        Copyright (c) 2009-2010 QLogic Corporation
        Port2 MAC=00 18 8B FF EE FB
        PXE boot is enabled. Press <Ctrl-T> to disable within 5 sec......
```

Note - PCI 3.0 compliant servers show `QLogic PCI 3.0 PXE v1.xx.`; PCI 2.1 compliant servers show only `QLogic PXE v1.xx`. By default, PXE boot is disabled on the adapter ports. If the server does not detect the QLogic PXE banner, disable the unused on-board NICs.

Enable QLogic PXE

The following shows the response when the PXE is enabled after pressing the `Ctrl-T` key sequence.

```
QLogic PCI 3.O PXE V1.xx
        Copyright (c) 2009-2010 QLogic Corporation
        Port1 MAC=00 18 8B FF EE F9
        PXE boot is disabled. Press <Ctrl-T> to enable within 5 sec......
        <Ctrl-T> was pressed and PXE boot is enabled.
```

The following shows the response when the PXE is disabled after pressing the `Ctrl-T` key sequence.

```
QLogic PCI 3.O PXE V1.xx
        Copyright (c) 2009-2010 QLogic Corporation
        Port2 MAC=00 18 8B FF EE FB
        PXE boot is enabled. Press <Ctrl-T> to disable within 5 sec......
        <Ctrl-T> was pressed and PXE boot is disabled.
```

After the operating system is selected, QLogic PXE bootprom automatically detects the boot server and starts the OS installation. For example:

```
  Linux Boot Server:
  boot: (enter to continue)
```

Note - To install the operating system to the server's internal disk, the QLogic FCoE NIC driver is required. To install the OS to Server's SAN disk, both the QLogic FCoE NIC driver and the Fibre Channel driver are required.

NT Boot Server

The following shows the NT boot server response:

```
... Downloaded WDSNNBD.. Architecture: x64
  Contacting Server: xx.xx.xx.xx
  TFTP Download: Boot\x64\preboot.com
  Press F12 for Network Service Boot.
```

Note - QLogic NIC and Fibre Channel drivers must be installed in the NT PXE boot server.

PXE Errors

The following error might occur if the QLogic PXE detects that the link is down:

```
PXE NICStartUp:  Link is down
```

The following error might occur if the QLogic PXE does not detect a boot server:

```
QLogic UNI vx.xx PXE-x.x (Build xxxx)
  Copyright (c) 2009-2010 QLogic Corporation
  Client MAC Addr: xx xx xx xx xx xx GUID ....
  PXE-E51: No DHCP or Proxy DHCP offers were received.
  PXE-M0F: Exit QLogic PXE ROM.
  ...
```

Updating the FCode

Oracle recommends updating to the latest version of the FCode when using this Converged Network Adapter. FCode for the Converged Network Adapter supports Ethernet boot by means of the Ethernet function. This section provides the following information about the FCode update:

- "Hardware and Software Configuration for FCode" on page 38

- "FCode Update Utilities" on page 38

Hardware and Software Configuration for FCode

Hardware configuration includes the following:

- Oracle's SPARC Solaris boot client
- Oracle Solaris boot server
- Converged Network Adapter installed in Oracle's SPARC Solaris boot client

Software configuration requires that you verify (via the `.properties` command) the FCode version and release date by viewing the values of the following properties:

- revision-level - **3.15** or later
- release-date - **2013-04-30** or later

The following example session shows how to perform an Ethernet boot at the Open Firmware ok prompt on the Oracle's SPARC boot client console:

```
{0} ok show-nets
a) /pci@7c0/pci@0/pci@9/ethernet@0,1
b) /pci@7c0/pci@0/pci@9/ethernet@0
c) /pci@7c0/pci@0/pci@2/network@0,1
d) /pci@7c0/pci@0/pci@2/network@0
e) /pci@780/pci@0/pci@1/network@0,1
f) /pci@780/pci@0/pci@1/network@0
q) NO SELECTION
Enter Selection, q to quit: b
/pci@7c0/pci@0/pci@9/ethernet@0 has been selected.
Type ^Y ( Control-Y ) to insert it in the command line.
e.g. ok nvalias mydev ^Y
         for creating devalias mydev for
/pci@7c0/pci@0/pci@9/ethernet@0
{0} ok boot /pci@7c0/pci@0/pci@9/ethernet@0 -v
```

FCode Update Utilities

You can update the FCode using the SANsurfer FC HBA Manager or SANsurfer FC HBA CLI utilities. These utilities are located on the Oracle support area of the QLogic web site:

http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Oracle_Search.aspx

Before flashing the FCode, install the latest QLogic/Oracle Solaris Converged Network Adapter driver. Then copy the multi-boot binary file `Q8Qxxyyy.BIN` on the Oracle SPARC system under the `root(/)` directory.

For procedures on updating FCode using the SANsurfer utilities, refer to the QLogic SANsurfer FC HBA Manager help system and the *SANsurfer FC HBA CLI User's Guide*.

Removing the Hardware

If you need to remove the adapter, for any reason, follow the instructions in this section. For more detailed removal instructions, see your system installation or service manual.

The following steps summarize the hardware removal process:

1. Halt the operating system and remove power from the system, as required by your system.
2. Remove the adapter hardware.

▼ To Remove the Converged Network Adapter

1. **Use an ESD strap (refer to "Observing ESD and Handling Precautions" on page 19).**

2. **Refer to your system documentation to shut down, power off, and unplug the system, if necessary.**

3. **Disconnect all cables.**

4. **Unscrew the case screws and remove the system case.**

5. **Remove the mounting bracket of the adapter from the system by unscrewing the panel screw or removing the clip, whichever is being used.**

   You can now remove the adapter.

♦♦♦ **C H A P T E R 3**

Software Installation

After you have completed the hardware installation and powered on the computer, follow the instructions in this chapter for your operating system to install the Converged Network Adapter driver and any other utilities required by the adapter.

This chapter contains the following topics:

- "Installing Software for the Oracle Solaris OS" on page 41
- "Installing Software for the Oracle Linux, Red Hat, or SUSE Linux OS" on page 43
- "Installing Software for the VMware Technology" on page 51
- "Installing Software for the Windows OS" on page 51
- "Installing the CLI for Updating the BIOS and FCode" on page 60

Installing Software for the Oracle Solaris OS

This section contains the following topics:

- "Installing the Oracle Solaris Drivers" on page 41
- "Diagnostic Support for the Oracle Solaris OS" on page 42

Installing the Oracle Solaris Drivers

The `qlc` and `qlge` drivers are included with the Oracle Solaris 10 01/13 and the Oracle Solaris 11.1 OSes (or later), and provide support for FCoE functionality with the Converged Network Adapter. You must load the latest `qlc` and `qlge` drivers by installing the appropriate platform patches and SRUs:

- **Oracle Solaris 10 01/13 (for the SPARC environment)**: patches 149175-02 and 145648-04
- **Oracle Solaris 10 1/13 (for the x86 environment)**: patches 149176-02 and 45649-04

- **Oracle Solaris 11.1**: SRU 7

You can download these patches from this web site:

http://support.oracle.com

▼ To Install or Update the `qlc` and `qlge` Converged Network Adapter Drivers From a Patch

Installing or updating the `qlc` and `qlge` Converged Network Adapter drivers from the patches listed in the previous section adds or updates both the FCoE driver and the networking driver. No additional steps are required to install or update those drivers on Oracle Solaris.

1. **Log in as the root user.**

2. **Navigate to the directory that contains the patch.**

3. **Add the latest patch by using the `patchadd` command.**

   # **patchadd** *patch-number*

4. **Repeat steps 1 through 3 for the other patch.**

Diagnostic Support for the Oracle Solaris OS

Diagnostic support for the HBA is included in the Oracle VTS software. The Oracle VTS software is available for download at: http://support.oracle.com/

For information about the Oracle VTS software, see the Oracle VTS documentation at: http://docs.oracle.com/cd/E19719-01/index.html

Oracle VTS includes the `qlctest` utility, which supports the following functions:

- Connectivity verification
- Firmware version and checksum testing
- Self-testing
- Loopback tests, including:
  - External
  - Internal, single-bit

- Mailbox

Installing Software for the Oracle Linux, Red Hat, or SUSE Linux OS

This section describes how to download and install the fibre channel drivers required by the Converged Network Adapter. It also describes how to install diagnostic support software for the Converged Network Adapter. This section contains the following topics:

- "Downloading the Oracle Linux, Red Hat, or SUSE Linux Drivers" on page 43
- "Installing the Red Hat or SUSE Linux Drivers" on page 44
- "Diagnostic Support for the Red Hat or SUSE OS" on page 50

Downloading the Oracle Linux, Red Hat, or SUSE Linux Drivers

This section describes how to download the FCoE driver for the Converged Network Adapter.

▼ To Download the FCoE Driver

1. **Go to the Oracle support area of the QLogic web site at:**

   http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Oracle_Search.aspx

2. **Locate the table containing your model number.**

3. **At the bottom of the table, in the Software for: row, click Linux.**

4. **Navigate to the table for your specific OS, and find the appropriate driver (the file name is in the format ql2*xxx*-src-vu.vv.ww.xx.*yy*.*zz*.tar.gz, where *yy* and *zz* represent the OS version of the driver (for example 11.0 for SLES 11).**

   Note - Oracle Linux, RHEL 5.4 and later, SLES 10 SP3 and later, and SLES 11 SP1 and later have Converged Network Adapter driver support in the distro; driver download is not required.

5. **Click the driver version that you want to download, read through the software license agreement, and click I Agree to continue with the download.**

6. **Save the file to a directory on the hard disk of the system.**

Note - Because the driver distribution file is now larger than 1.44 MB, it cannot fit on a 1.44MB floppy disk; therefore, you must use a USB drive or local hard disk to download the file.

▼ To Download the Networking Driver

1. **Go to the Oracle support area of the QLogic web site at:**

    `http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Oracle_Search.aspx`

2. **Locate the table containing your model number.**

3. **At the bottom of the table, in the Software for: row, click Linux.**

4. **In the Oracle Linux, Red Hat, or SUSE Linux table, and find the appropriate driver (the file name is in the format** `ql2`*xxx*`-src-vu.vv.ww.xx.`*yy*`.`*zz*`.tar.gz,` **where** *yy* **and** *zz* **represent the OS version of the driver (for example 11.0 for SLES 11).**

Note - Oracle Linux, RHEL 5.4 and later, SLES 10 SP3 and later, and SLES 11 SP1 and later have Converged Network Adapter driver support in the distro; driver download is not required.

---

5. **Click the driver version that you want to download, read through the software license agreement, and click I Agree to continue with the download.**

6. **Save the file to a directory on the hard disk of the system.**

Note - Because the driver distribution file is now larger than 1.44 MB, it cannot fit on a 1.44MB floppy disk; therefore, you must use a USB drive or local hard disk to download the file.

Installing the Red Hat or SUSE Linux Drivers

After you download the drivers, as described in "Downloading the Oracle Linux, Red Hat, or SUSE Linux Drivers" on page 43, you can install the drivers by following the procedures in the order listed in this section:

- "To Build the FCoE Driver " on page 45
- "Loading the Newly Built FCoE Driver" on page 46
- "Deploying the Networking Driver" on page 47

Note - You do not need to install any drivers for the Oracle Linux OS.

▼ To Build the FCoE Driver

The driver installation makes extensive use of the `build.sh` script, which is located in driver source (`extras/build.sh`).

From the source code, you can build a `qla2xxx.ko` module for the host. You can then choose either to manually or automatically load the driver, as described in "Loading the Newly Built FCoE Driver" on page 46.

1. In the directory that contains the source driver file, `qla2`*xxx-x.yy.zz*`-dist.tgz`, enter the commands shown in the following example.

```
# tar -xvzf *.tgz
# cd qla2xxx-src-u.vv.ww.xx.yy.zz-k
```

2. Build and install the driver modules from the source code by executing the `build.sh` script.

```
# ./extras/build.sh install
```

This build script does the following:

- **Builds the driver `.ko` files.**

- **Copies the `.ko` files to the appropriate directory:**

  For RHEL: `/lib/modules/2.6.../kernel/drivers/scsi/qla2xxx` For SLES: `/lib/modules/2.6.../update`

3. Choose how you want to load the driver, as described in "Loading the Newly Built FCoE Driver" on page 46.

Loading the Newly Built FCoE Driver

After you build the FCoE driver, as described in "To Build the FCoE Driver " on page 45, you can choose to manually or automatically load the driver. This section contains the following topics:

- "To Manually Load the FCoE Driver" on page 46
- "To Automatically Load the FCoE Driver" on page 46

▼ **To Manually Load the FCoE Driver**

After building the FCoE driver, you can choose to manually load the driver. If you want to automatically load the driver, skip to "To Automatically Load the FCoE Driver" on page 46.

1. **Build the driver binary, as described in "To Build the FCoE Driver " on page 45.**

2. **Manually load the driver by using the `modprobe -v` command.**

Note - On SLES 11, before running the `modprobe -v` command, modify the `/etc/modprobe.d/unsupported-modules` file by changing the line, `allow_unsupported_modules 0`, to `allow_unsupported_modules 1`.

   ```
   # modprobe -v qla2xxx
   ```

3. **If you want to manually unload the driver, use the `modprobe -r` command.**

   ```
   # modprobe -r qla2xxx
   ```

▼ **To Automatically Load the FCoE Driver**

After building the Fibre Channel driver, you can choose to automatically load the driver. If you want to manually load the driver, see "To Manually Load the FCoE Driver" on page 46.

1. **Build the driver binary, as described in "To Build the FCoE Driver " on page 45.**

2. **Install the driver module (`*.ko`) files to the appropriate kernel module directory.**

```
# ./extras/build.sh install
```

3. **For SUSE Linux users, edit the `/etc/sysconfig/kernel` file and modify the `INITRD_MODULES` directive as shown in the following example.**

```
 ...
INITRD_MODULES=".... qla2xxx"
...
```

4. **Change to the `/boot` directory.**

5. **Back up the current RAMDISK image.**

```
# cp -f initrd-2.6.kernel-version.img initrd-2.6.kernel-version.img.bak
```

6. **Build the RAMDISK image with the `mkinitrd` command.**

```
Red Hat:    # mkinitrd -f initrd-2.6.kernel-version.img kernel-version
SUSE:   # /sbin/mkinitrd
```

7. **Reboot the system to load the RAMDISK image with the driver.**

Deploying the Networking Driver

Networking driver deployment includes creating, installing, and removing the driver. This section contains the following topics:

- "To Create the Driver" on page 47
- "To Install the Driver" on page 48
- "To Rebuild the Driver" on page 48
- "To Remove the Driver" on page 49

▼ **To Create the Driver**

1. **Move the base driver `tar` file to a directory; for example:**

```
/home/user-name
```

2. **Untar the archive by issuing the following command:**

```
tar -xvzf qlge-x.x.x.x.tgz
```

3. **Change to the driver `src` directory as follows:**

```
cd qlge/
```

4. **Compile the driver module by issuing the following command:**

```
make install
```

The binary is installed as follows:

```
/lib/modules/[KERNEL_VERSION]/kernel/drivers/net/qlge/qlge.[k]o
```

> **Note -** The install locations shown in the preceding are the default locations. Some Linux distributions might use other locations.

▼ To Install the Driver

● **Load the module by issuing the following command:**

```
modprobe -v qlge <parameter>=<value>
```

When utilizing an out-of-box driver for SLES 10 SP2, follow these steps to ensure that the module loads on reboot:

▼ To Rebuild the Driver

1. **Rebuild the RAMDISK as follows:**

   a. **Open `/etc/sysconfig/kernel`.**

   b. **Edit the `INITRD_MODULES=` line to append `qlge`; for example:**

```
INITRD_MODULES=piix thermal fan reiserfs qlge
```

   c. **Issue the `mkinitrd` command; for example:**

```
mkinitrd -i initrd-2.6.16.60-0.21-smp-qlge -k vmlinuz-2.6.16.60-0.21-smp -M boot/
System.map-2.6.16.60-0.21-smp
```

Note - Type the entire preceding command on a single line.

d. Modify the `menu.lst` file to include the new RAMDISK as an option to boot from.

e. Reboot the system.

2. Modify the variables in the `sysconfig` as follows:

a. Open the following file to edit:

```
/etc/sysconfig/kernel
```

b. Locate the following line:

```
MODULES_LOADED_ON_BOOT=""
```

c. Add `qlge` to the line; for example:

```
MODULES_LOADED_ON_BOOT="qlge"
```

d. Reboot to automatically load the module.

If the module does not auto-load on reboot, follow this step (this should not be necessary with RHEL 5.3):

e. Open the `/etc/modprobe.conf` file and add the following line:

```
alias eth# qlge
```

Where # is the Ethernet port number for the adapter.

▼ To Remove the Driver

1. Issue the following command:

```
modprobe -r qlge
```

For Kernel 2.6.x, issue the rmmod command instead:

```
rmmod qlge
```

2. **To uninstall the binary module, issue the following command:**

```
make uninstall
```

3. **To clean the driver build directory, issue the following command:**

```
make clean
```

Diagnostic Support for the Red Hat or SUSE OS

Diagnostic support for the Converged Network Adapter is available through the QLogic graphical user interface (GUI) utility or the command-line interface (CLI) utility. These utilities support the following functions:

- Connectivity verification
- BIOS, multi-boot code, EFI, and firmware version information
- Link status, including topology, data rate, and statistics
- Vital product data (VPD) information
- Attached devices list
- Option ROM, NVRAM update utilities
- Loopback test
- Read/Write Buffer test

▼ To Install Diagnostic Support for the Red Hat or SUSE Linux OS

1. **Go to the Oracle support area of the QLogic web site at:**

    http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Oracle_Search.aspx

2. **Locate the table containing your Converged Network Adapter model.**

3. **At the bottom of the table, in the Software for: row, click Linux.**

4. **Locate the QLogic CLI and GUI utilities for your Linux OS version.**

5. **Click the utility name to download the utility to a local file system.**

6. **For additional information, click the Read Me link for the utility.**

Installing Software for the VMware Technology

The Converged Network Adapter drivers included on the VMware distribution are sufficient for supporting the Converged Network Adapter. No further action is required.

To verify that the drivers loaded successfully, look for the following lines in the `/var/log/vmkernel` file:

```
Initialization for qle8100_707_vmw succeeded with module ID 2.
[timestamp] b12-4600a vmkernel: 0:00:01:18.878 cpu1:1041)qle8100_707_vmw loaded
 successfully.
```

The first line indicates that the fibre channel driver loaded successfully.

Installing Software for the Windows OS

This section describes how to download and install the fibre channel drivers required by the Converged Network Adapter. It also describes how to install diagnostic support software for the Converged Network Adapter. This section contains the following topics:

- "Downloading the Windows Drivers" on page 51
- "Installing the Windows Drivers" on page 53
- "Diagnostic Support for the Windows OS" on page 60

Downloading the Windows Drivers

The Converged Network driver requires download of both the QLogic FCoE driver and networking driver (QLogic 10 GbE NDIS miniport driver). This section provides procedures for downloading both drivers.

▼ To Download the FCoE Driver

1. **Go to the Oracle support area of the QLogic web site at:**

   http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Oracle_Search.aspx

2. **Locate the table containing your Converged Network Adapter model.**

3. **At the bottom of the table, in the Software for: row, click Windows.**

4. **In the table for your Windows operating system, find the appropriate driver.**

5. **Save the file to a directory on the hard disk of the system.**

6. **Unzip (extract) the driver files to a location on the hard disk of the system.**

▼ To Download the Networking Driver and Then Create a Driver Disk

The 10GbE Converged Network Adapter NDIS miniport driver for Windows supports all NDIS 5.1/5.2/6.0/6.1 features. The driver package contains the following files:

- `qlge.inf` - Driver installation file
- `qlge.sys` - 10GbE Converged Network Adapter NDIS miniport driver
- `qlge.cat` - Catalog file
- `Release.txt` - Release notes
- `Readme.txt` - Installation instructions and other useful information

This release of the FCoE Adapter 10GbE NDIS miniport driver works with Windows Server 2003 and Windows Server 2008 as shown in the following table.

Miniport Driver Version	Works With
32-bit NDIS 5.1/5.2	Windows Server 2003 SP1/SP2 R2 (x86)
64-bit NDIS 5.1/5.2	Windows Server 2003 SP1/SP2 R2 (x64)
32-bit NDIS 6.0/6.1	Windows Server 2008 (x86)
	Windows Server 2008 Server Core (x86)
	Windows Server 2008 SP2 (x86)
64-bit NDIS 6.0/6.1	Windows Server 2008 (x64)
	Windows Server 2008 Server Core (x64)

Miniport Driver Version	Works With
	Windows Server 2008 SP2 (x64)
	Windows Server 2008 SP2 Server Core (x64)
	Windows Server 2008 R2 (x64)
	Windows Server 2008 R2 Server Core (x64)

1. **Go to the following web site:**

   http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Oracle_Search.aspx

2. **Click the Converged Network Adapters icon.**

3. **In the selection list, select your adapter model in the second column, select your Windows platform in the third column, and then click the Go button.**

4. **Under Drivers, click the download link for the appropriate driver.**

5. **Read the license agreement, and then click Agree.**

6. **When prompted, select to save the driver to a temporary location on the hard drive or a blank disk.**

   The disk should have the following file structure:

   `qlge.inf` - Driver installation file

   `qlge.sys` - 10GbE Converged Network Adapter NDIS miniport driver

   `qlge.cat` - Catalog file

   `Release.txt` - Release Notes

   `Readme.txt` - Installation instructions and other useful information

Installing the Windows Drivers

The Converged Network driver requires installation of both the FCoE driver and networking driver. This section provides procedures for installing both drivers:

- "To Install the FCoE Driver" on page 54
- "To Install the Driver on Windows 2008" on page 54
- "To Update the Driver on Windows " on page 55

▼ To Install the FCoE Driver

After installing the Converged Network Adapter and restarting the system, the Windows OS detects the newly installed device and displays the Found New Hardware with FCoE Controller message. The Found New Hardware wizard launches.

Note - This procedure requires a system configured with the latest Service Pack and Windows Update.

1. **On the first window of the Found New Hardware wizard, click Search for a suitable driver for my device (recommended), and then click Next.**

2. **Browse to the location on the disk where you downloaded the FCoE driver, then click Next.**

   Windows displays a message, letting you know it found a driver for this device.

3. **On the Completing the Found New Hardware Wizard window, click Finish.**

4. **If the system displays the following message, click Yes to restart the system:**

   ```
   System Settings Change. Windows has finished installing a new device. The software that
    supports your device requires that you restart your computer. You must restart your
    computer before the new settings will take effect. Do you want to restart your computer
    now?
   ```

▼ To Install the Driver on Windows 2008

1. **Power down the system.**

2. **Insert the card into a proper PCIe slot.**

3. **Power on the system.**

   When the system boots up, the PNP subsystem displays a dialog box informing you that new hardware (Fibre Channel Controller) has been found and prompts you to install the driver.

4. **Do one of the following:**

   ■ **If you are installing the driver from removable media, follow these steps:**

      a. **Insert the media.**

      b. Click Locate and install driver software (recommended).

      c. If the Hardware Update Wizard prompts you to search online, click Don't search online.

      d. Click Next.

        The Update wizard locates the driver and automatically completes the installation.

   ■ **If you are not installing the driver from removable media, follow these steps:**

      a. Click I don't have the disc. Show me other options.

      b. Click Browse my computer for driver software (advanced).

      c. Browse to the location of the driver, and then click Next.

        A warning message might be displayed regarding the Digital Signature for Windows Logo certification.

5. To continue with installation, click Yes.

6. To complete the installation, click Finish.

Note - A system reboot is not generally required after installing the driver.

▼ To Update the Driver on Windows

1. Open the Device Manager by doing the following:

   a. Right-click My Computer, and then click Manage.

   b. In the Computer Management dialog box, double-click Device Manager in the left pane.

2. In the right pane, double-click SCSI and RAID Controller.

3. Right-click the FCoE Adapter, and then click Update Driver.

4. Do one of the following:

- **If you are installing the driver from from removable media, follow these steps:**

  a. **Click Search automatically for updated driver software.**

  b. **If the Hardware Update Wizard prompts you to search online, click Don't search online.**

     The Update Wizard locates the driver, and then automatically completes the installation.

- **If you are not installing from removable media, follow these steps:**

  a. **Click Browse my computer for driver software.**

  b. **Click I don't have the disk. Show me other options.**

  c. **Click Browse my computer for driver software (advanced).**

  d. **Browse to the location of the driver, and then click Next.**

     A warning message might be displayed regarding the Digital Signature for Windows Logo Certification.

5. **To continue with the installation, click Yes.**

6. **To complete the installation, click Finish.**

Note - A system reboot is not required after installing the driver.

Installing the Networking Driver

The operating system manages and controls the driver installation process; the driver follows the process dictated by the OS. The driver installation cannot deviate from this process.

This section provides the most common ways of installing and upgrading the driver, as documented for each operating system. For other installation procedures, please consult the OS manuals.

This section contains procedures for the following:

-

- "Updating the Existing NDIS Miniport Driver" on page 58
- "To Remove the Driver" on page 49
-

  Note - The Converged Network Adapter is a multifunction device. When installed in a PNP system, the OS detects two functions for each adapter: Ethernet Controller and Fibre Channel Controller. The Ethernet Controller refers to the Ethernet (NDIS) function.

▼ To Install the Networking Driver on Windows

1. **Power down the system.**

2. **Insert the card into a proper PCIe slot.**

3. **Power on the system.**

   When the system boots up, the PNP subsystem displays a dialog box informing you that new hardware (Ethernet Controller) has been found and prompts you to install the driver.

4. **Do one of the following:**

   - **If you are installing the driver from removable media, follow these steps:**

     a. **Insert the media.**

     b. **Click Locate and install driver software (recommended).**

     c. **If the Hardware Update Wizard prompts you to search online, click Don't search online.**

     d. **Click Next.**

        The Update wizard locates the driver and automatically completes the installation.

   - **If you are not installing the driver from removable media, follow these steps:**

     a. **Click I don't have the disc. Show me other options.**

     b. **Click Browse my computer for driver software (advanced).**

     c. **Browse to the location of the driver, and then click Next.**

A warning message might be displayed regarding the Digital Signature for Windows Logo certification.

5.   To continue with the installation, click Yes.

6.   To complete the installation, click Finish.

Note - A system reboot is not required after installing the driver.

Updating the Existing NDIS Miniport Driver

Follow the appropriate procedure for your Windows operating system:

-

▼   **To Update the Networking Driver on Windows**

1.   To open the Device Manager:

a.   **Right-click My Computer, and then click Manage.**

b.   **In the Computer Management dialog box, double-click Device Manager in the left pane.**

2.   In the right pane, double-click Network Adapters.

3.   Right-click the 10 GbE PCI Ethernet Adapter, and then click Update Driver.

4.   Do one of the following:

- **If you are installing the driver from removable media, follow these steps:**

    a.   **Click Search automatically for updated driver software.**

    b.   **If the Hardware Update Wizard prompts you to search online, click Don't search online.**
    The Update Wizard locates the driver, and then automatically completes the installation.

- **If you are not installing the driver from removable media, follow these steps:**

      a. **Click Browse my computer for driver software.**

      b. **Click I don't have the disk. Show me other options.**

      c. **Click Browse my computer for driver software (advanced).**

      d. **Browse to the location of the driver, and then click Next.**

         A warning message might be displayed regarding the Digital Signature for Windows Logo Certification.

5. **To continue with the installation, click Yes.**

6. **To complete the installation, click Finish.**

> **Note -** A system reboot is not required after installing the driver.

▼ To Remove the Driver

To remove the driver in a Windows environment, uninstall it as a Plug and Play device as follows:

1. **Power down your system.**

2. **Remove the device from your system according to the manufacturer's instructions.**

> **Note -** Generally, you do not have to use the Device Manager or the Hardware wizard to uninstall a Plug and Play device. After you remove the device from your system and restart your system, Windows recognizes that it has been removed.

The following additional notes apply:

- When the driver is updated on one port of the adapter, the second adapter port might show the incorrect driver version. Both ports of the adapter will be updated with the new driver when the update is performed.
- To configure the jumbo frame for IPv6, issue the following command at the command prompt after enabling the jumbo frame using adapter properties:

netsh int ipv6 set *<index>* mtu = 9014

Where *<index>* is the interface index number for the adapter.

Diagnostic Support for the Windows OS

Diagnostic support for the Converged Network Adapter is available through QLogic's SANsurfer FC HBA Manager (GUI), SANsurfer FC HBA CLI, and SANsurfer Converged Network Adapter Networking CLI tools. These tools support the following functions:

- Connectivity verification
- BIOS, FCode, multi-boot code, EFI, and firmware version information
- Link status, including topology, data rate, and statistics
- Vital Product Data (VPD) information
- Attached devices list
- Option ROM, NVRAM update utilities
- Loopback test
- Read/Write Buffer test

▼ To Install Diagnostic Support for the Windows OS

1. **Go to the Oracle support area of the QLogic web site at:**

   http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Oracle_Search.aspx

2. **Locate the table containing your Converged Network Adapter model.**

3. **At the bottom of the table, in the Software for: row, click Windows.**

4. **Locate the CLI and GUI utilities for your Windows OS version.**

5. **Click the utility name to download the utility to a local file system.**

6. **For additional information, click the Read Me link for the utility.**

Installing the CLI for Updating the BIOS and FCode

Oracle recommends updating to the latest version of the FCode when using this Converged Network Adapter. If you need to update the fibre channel BIOS and FCode, you can do so by using the QLogic SANsurfer command line interface (CLI).

If you have not done so already, you can download the SANsurfer FC HBA CLI and SANsurfer Converged Network Adapter Networking CLI tools from the Oracle support area of the QLogic web site at:

`http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/Oracle_Search.aspx`

Follow the installation instructions in the `README.TXT` file. Installation instructions are also available in the QLogic user's guides for those tools, which can be found on the QLogic web site, `http://www.qlogic.com/pages/default.aspx`

For instructions on how to update the BIOS and FCode, see the *SANsurfer FC HBA CLI User's Guide* and *SANsurfer Converged Network Adapter Networking CLI User's Guide* on the QLogic web site.

♦ ♦ ♦   **C H A P T E R   4**

Known Issues

This chapter provides supplementary and workaround information for the adapter. Specific bug identification numbers are provided for service personnel.

This chapter contains the following topics:

Link Aggregation Control Protocol (LACP) Cannot Be Used In Certain Conditions

Bug 18707752

Conditions:

- System Platform: All supported systems using the Oracle Solaris driver
- Operating Protocol Mode of Universal HBA: FC, CNA
- Environment: Universal HBA connected directly to supported storage

Issue:

LACP cannot be used on the same port as FCoE or iSCSI.

Workaround:

None.

`vpd r/w failed` Error Messages Are Displayed

CR 20084365, 19154195

Conditions:

- Operating System: Any operating system (OS) based on Red Hat Linux 5.9 or greater, including, but not limited to, Oracle Enterprise Linux 5.9 OS with Unbreakable Enterprise Kernel (UEK) 3, RHEL 6.6 OS, or OVM 3.3.1
- Operating Protocol Mode: CNA and HBA
- Environment: Universal HBA installed in an x86 system, during functional check procedures

Issue:

If you are using any operating system based on the Red Hat Linux operating system, you might receive "vpd r/w failed" messages upon issuing functional check commands, such as `dmesg` and `lspci`.

Workaround:

None. Ignore these messages as they do not adversely affect the functionality of the universal HBA.

Error Message Occurs After Running the `cfgadm -c configure ap-id` Script

Bug 15750655

Issue:

When attempting to script rapid unconfiguration/configuration of the Converged Network Adapter, you might encounter the following error message:

```
nwamd_ncu_handle_link_action_event: ignoring action for link:qlge1: permission denied
```

Workaround:

When running such scripts, keep in mind that it takes time to discover every device connected to the Converged Network Adapter. Greater numbers of connected devices require more time for discovery. If there are many devices connected to the Converged Network Adapter, perform such configurations manually at first, and note how much time is required for all devices to become visible and usable. Add a 10% time cushion to the maximum time encountered (for safety) and build that into the script after each `cfgadm` command. If you continue to encounter the error message, add more time to the maximum time encountered variable in the script.

`FCIO_RESET_LINK` Error Message Occurs After Issuing the `luxadm -e forcelip` Command

Bug 15632822

Issue:

You might encounter this error message after issuing the `luxadm -e forcelip` command from a system with the following configuration:

- Oracle Solaris 10 10/09 OS running
- Adapter installed and connected to a Brocade 8000 FCoE switch
- Brocade 8000 FCoE switch connected to a tape zone on a FC SAN with an SL48-LTO4 FC tape library

If you issue the `luxadm -e forcelip` command upon the removal of a device from the tape zone, this message might be generated:

```
Error: FCIO_RESET_LINK ioctl failed.
Could not reset the loop
```

Workaround:

To avoid encountering the error message, manually unconfigure the unusable device (the device removed from the tape zone) at the attachment point of the device:

▼ To Manually Unconfigure the Unusable Device

1. **Issue the `cfgadm -al` *unusable-device-attachment-point* command to list the unusable device, as described in the following procedure.**

In this example, the attachment point of the unusable device is c1.

```
> cfgadm -al c1
Ap_Id                        Type        Receptacle  Occupant
Condition
c1                           fc-fabric   connected   configured
unknown
c1::12340080e512b600         disk        connected   configured
unknown
c1::123400a0b82804a6         disk        connected   configured
unusable
c1::123410a0008beb2a         tape        connected   configured
unknown
>
```

2. **Issue the `cfgadm -c unconfigure -o unusable_SCSI_LUN` *unusable-device-attachment-point* command to unconfigure the unusable devices on the attachment point.**

    ```
    > cfgadm -c unconfigure -o unusable_SCSI_LUN c1
    ```

    Note - If a device is manually unconfigured, it must then be manually configured in order to return to the tape zone.

System Panic After Installing the Adapter in an x86 System

Bug 15635205

Issue:

If you install the adapter in an x86 system that is running the Oracle Solaris 10 10/09 OS, the system might panic when you perform any of the following actions:

1. Reboot the system.
2. Update the flash software on the adapter (via `scli`).
3. Detach the driver (by issuing the `cfgadm unconfigure` command) and then reattach the driver (by issuing the `cfgadm configure` command).

Workaround:

Reboot the system. If this does not address the issue, ensure that the `kmem_flags` are disabled on the system by doing the following:

1. Shut down the system.
2. Physically remove the adapter from the system and reboot.
3. Access the `/etc/system` file and verify that the `kmem_flags` are disabled: `kmem_flags=0`
4. If the `kmem_flags` does not have a value of `0`, edit the `/etc/system` file so that it does.
5. Shut down the system.
6. Reinstall the adapter and reboot the system.

   If the system panics continue to occur with the `kmem_flags` disabled, or you need to keep the `kmem_flags` enabled, for any reason, contact Oracle Service to obtain and apply the appropriate IDR patch.

The `qlge` Driver Keeps Sending NOTICE: Messages to the Console

Bug 15639510

Issue:

Every time the cable is plugged in or out, the console displays these "NOTICE:" messages.

Workaround:

None. You can ignore these messages as they do not affect performance in any way.

The Adapter Is Not Logging Into the Brocade 8000 Switch

Bug 15622146

Issue:

When configuring an Oracle Solaris 10 system with the adapter, the host-side adapter might not log into the Brocade 8000 switch unless VLAN 1002 is configured on the switch; specifically on the port to which the adapter is connected.

Workaround:

Configure the Brocade 8000 port that is connected to the host-side adapter so that the port is included in VLAN 1002. For more information, see the Brocade documentation that describes how to configure ports.

Windows Server 2008 R2 Stop Error

Bug 15657319

Issue:

With the Windows Server 2008 R2 operating system, a stop error (BSoD or "blue screen of death") occurs when you connect storage devices and the correct drivers are not installed.

Workaround:

Ensure that you have downloaded and installed the NDIS Miniport and Fibre Channel drivers before installing the adapter hardware. For details, see "Installing Software for the Windows OS" on page 51.