StorageTek 8 Gb FC PCI-Express HBA, Emulex Installation Guide For HBA Models SG-XPCIE1FC-EM8-Z, SG-PCIE1FC-EM8-Z, SG-XPCIE1FC-EM8-N, SG-PCIE1FC-EM8-N and SG-XPCIE2FC-EM8-Z, SG-PCIE2FC-EM8-Z, SG-XPCIE2FC-EM8-N, SG-PCIE2FC-EM8-N, 7105391

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StorageTek 8 Gb FC PCI-Express HBA, Emulex Installation Guide For HBA Models SG-XPCIE1FC-EM8-Z, SG-PCIE1FC-EM8-Z, SG-XPCIE1FC-EM8-N, SG-PCIE1FC-EM8-N and SG-XPCIE2FC-EM8-Z, SG-PCIE2FC-EM8-Z, SG-XPCIE2FC-EM8-N, SG-PCIE2FC-EM8-N, 7105391

Part No: E20759-06

Contents

Using This Documentation

- **Overview** – Describes how to install and remove the StorageTek 8 Gb FC PCI-Express HBA, Emulex
- **Audience** – Technicians, system administrators, and authorized service providers
- **Required knowledge** – Advanced experience troubleshooting and replacing hardware

Product Documentation Library

Documentation and resources for this product and related products are available at `http://docs.oracle.com/cd/E19292-01/index.html`.

Feedback

Provide feedback about this documentation at `http://www.oracle.com/goto/docfeedback`.

♦ ♦ ♦ **C H A P T E R 1**

1

HBA Overview

This chapter provides a basic overview of the single and dual port StorageTek 8 Gb Fibre Channel (FC) PCI-Express host bus adapter (HBA), Emulex (referred to as StorageTek 8 Gb FC PCI-Express HBA in this document), which uses Emulex (now Broadcom) technology. This chapter also describes the various operating systems, host platforms, storage, and infrastructure configurations that support the HBA and lists the HBA environmental requirements.

This chapter contains the following topics:

- "Kit Contents" on page 9
- "HBA Features and Specifications" on page 9
- "Operating System and Technology Requirements" on page 11
- "System Interoperability" on page 11
- "Boot Support" on page 14
- "Environmental Requirements" on page 15

Kit Contents

- StorageTek 8 Gb FC PCI-Express HBA, Emulex
- Extra PCI full-size bracket
- *Accessing Documentation* document

HBA Features and Specifications

The StorageTek 8 Gb FC PCI-Express HBA, Emulex (single port: SG-XPCIE1FC-EM8-Z, SG-PCIE1FC-EM8-Z, SG-XPCIE1FC-EM8-N, SG-PCIE1FC-EM8-N, 7105391 dual port: SG-XPCIE2FC-EM8-Z, SG-PCIE2FC-EM8-Z, SG-XPCIE2FC-EM8-N, SG-PCIE2FC-EM8-N) consists of a single-wide, FC bus expansion board. The board interfaces a four- or

eight-lane PCI-Express bus, with the four or eight lanes supporting one or two Fibre Channel (FC) optical media ports. Each independent FC port operates at 8 Gbit/sec and features 8/4/2 autonegotiation.

See the following table for a list of the HBA features.

TABLE 1   HBA Features and Specifications

Feature	Description
PCIconnector	x8
PCI signaling environment	PCI Express x8 (8 active lanes)
PCI lane usage	x8 lanes
PCItransfer rate (maximum)	PCI Express Generation One x8 (2.5 GT/s) in an electrically x8 slot (default)
	PCI Express Generation Two x4 (5.0 GT/s) in an electrically x4 slot
Number of FC ports	One (single port) or Two (dual port)
Number of devices supported	126 devices per FC loop; 510 devices in Fabric mode
FC bus type (external)	Fiber-optic media, short-wave, multi-mode fiber (400‑M5- SN-S)
FC transfer rate	400 MBps per port maximum, half-duplex
	800 MBps per port maximum, full-duplex
FC topologies	Switched fabric (N-Port), arbitrated loop (NL-Port), and point-to-point (N-Port)
RAM	1.5 MB, parity protected, per port
BIOS ROM (FC)	One 4-MB (dual-port) or 2-MB (single-port) flash ROM
NVRAM	One 2-KB EEPROM per port
External connectors	One Small-Form Factor Pluggable (SFP) multimode optic with LC-style connectors per port
Maximum FC cable length	2 Gb/s: 500 meters using 50/125 mm core OM3 fiber
	300 meters using 50/125 mm core OM2 fiber
	150 meters using 62.5/125 mm core OM1 fiber
	4 Gb/s: 380 meters using 50/125 mm core OM3 fiber
	150 meters using 50/125 mm core OM2 fiber
	70 meters using 62.5/125 mm core OM1 fiber
	8 Gb/s: 150 meters using 50/125 mm core OM3 fiber
	50 meters using 50/125 mm core OM2 fiber
	21 meters using 62.5/125 mm core OM1 fiber
LED indicators	Two LEDs per port (yellow and green) on the front panel as status indicators.
Maximum power consumption	13.3W (dual port), 10.1W (signal port)
Form Factor	Low-profile MD2 form factor

Operating System and Technology Requirements

The HBA requires the OS and technology levels listed in the following table.

Note - If you need to contact Oracle Support, first verify that you have a supported OS installed on the host system, and install the latest HBA driver, utility, and firmware versions. Updating the system and HBA to the latest OS, driver, utility, and firmware versions might address the issue, preventing the need to contact Oracle Support about an issue that has already been fixed.

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 149174-04, 144189-02, and 150401-16 ■ Oracle Solaris 11.1 with SRU 16 ■ Oracle Solaris 11.2 To obtain the latest patches and SRUs, go to https://support.oracle.com
Oracle Solaris OS for the SPARC (64-bit) platform	■ Oracle Solaris 10 01/13 with patches 149173-04, 144188-02, and 150400-16 ■ Oracle Solaris 11.1 with SRU 16 ■ Oracle Solaris 11.2 To obtain the latest patches and SRUs, go to https://support.oracle.com
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 selected platforms and storage that are compatible with the heterogeneous FC network design of the HBA. This section contains the following topics:

- "Host Platform Support" on page 12
- "Storage Support" on page 13
- "Switch Support " on page 14

Host Platform Support

The HBA is supported by the platforms listed in the following table. For up-to-date information, see your system Product Notes and web pages.

TABLE 3 Platform Support

Platform	Supported OS/Technology
Oracle SPARC Servers	
SPARC Enterprise T2000	Oracle Solaris
SPARC Enterprise T5120	Oracle Solaris
SPARC Enterprise T5140	Oracle Solaris
SPARC Enterprise T5220	Oracle Solaris
SPARC Enterprise T5240	Oracle Solaris
SPARC Enterprise T5440	Oracle Solaris
SPARC Enterprise M4000	Oracle Solaris
SPARC Enterprise M5000	Oracle Solaris
SPARC Enterprise M8000	Oracle Solaris
SPARC Enterprise M9000-32	Oracle Solaris
SPARC Enterprise M9000-64	Oracle Solaris
SPARC M5-32	
SPARC T4-1	Oracle Solaris
SPARC T4-2	Oracle Solaris
SPARC T5-2	Oracle Solaris
SPARC T5-4	Oracle Solaris
SPARC T5-8	Oracle Solaris
Sun Fire V445	Oracle Solaris
Sun Fire V245	Oracle Solaris
Sun Ultra U45	Oracle Solaris
Oracle x86 Servers	
Sun Blade X4-2B	
Sun Fire X4100 M2	Oracle Solaris, Windows, Linux, VMware
Sun Fire X4200 M2	Oracle Solaris, Windows, Linux, VMware
Sun Fire X4600	Oracle Solaris, Windows, Linux, VMware
Sun Fire X4600 M2	Oracle Solaris, Windows, Linux, VMware
Sun Fire X4440	Oracle Solaris, Windows, Linux, VMware
Sun Fire X4450	
Sun Fire X4240	Oracle Solaris, Windows, Linux, VMware

Platform	Supported OS/Technology
Sun Fire X4140	Oracle Solaris, Windows, Linux, VMware
Sun Fire X4150	
Sun Fire X2100 M2	Oracle Solaris, Windows, Linux, VMware
Sun Fire X2200 M2	Oracle Solaris, Windows, Linux, VMware
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

The host system must have at least one PCI-Express 8-lane slot to support the HBA.

Storage Support

This section lists the arrays and tape storage supported by the HBA. This section contains the following topics:

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-
-

Array Support

The HBA supports connecting to, using a supported switch, the following arrays:

- StorageTek 2540
- StorageTek 6140
- StorageTek 6540

Storage System Support

The HBA supports connecting to, using a supported switch, the following storage systems:

- StorageTek 9990
- StorageTek 9980/9985
- StorageTek 9970

Tape Storage Support

The HBA supports connecting to, using a supported switch, the following tape storage:

- StorageTek SL48 tape library
- StorageTek SL24 tape autoloader
- StorageTek SL500 modular library
- StorageTek SL1400 tape library
- StorageTek SL3000 tape library
- StorageTek L8500 modular library
- StorageTek Virtual Tape Library (VTL): VTL Value and VTL Plus
- StorageTek T10000A and T10000B
- StorageTek T9840C, and T9840D tape drives
- StorageTek T9940B tape drive
- IBM and HP LT03 tape drives
- IBM and HP LT04 tape drives
- Quantum S4 tape drive

Switch Support

Note - For technical support issues with any switches, refer to the product documentation or contact the switch manufacturer.

The HBA supports connecting to any 8 Gb/s Fibre Channel (FC) switch from any vendor that follows standard FC specifications, with the following considerations:

- Direct Access Storage for FC is supported with COMSTAR.

Note - This documentation lists switches that are specifically *not* supported by the HBA, when applicable.

The HBA is supported by all 1-Gb Ethernet switches.

Boot Support

The HBA 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 HBA environmental requirements are listed in the following table.

TABLE 4   HBA Environmental Requirements

Specification	Operating	Non-Operating
Temperature	0˚ to 55˚C, non-condensing	-40˚C to 70˚C, non-condensing
Airflow	150 lfm	n/a
Humidity	10% to 90% RH, non-condensing, 27˚C max wet bulb	93% RH, nonconducting, 38˚C max wet bulb
Altitude	3200m	12,200m
Vibration	0.20G in all axes swept for 5-500 Hz sine	1.0G in all axes 5-500-5 Hz sine
Shock	5G, 11 ms half-sine	30G, 11 ms half-sine

2

♦♦♦ **C H A P T E R 2**

Hardware Installation and Removal

This chapter describes the tasks required to install and remove the HBA. 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 HBA can occur as the result of careless handling or electrostatic discharge (ESD). Always handle the HBA 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 HBA 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 HBA, and observe proper ESD grounding techniques.
- Hold the HBA by the edge of the PCB, not by the connectors.
- Place the HBA on a properly grounded antistatic work surface pad when it is out of its protective antistatic bag.

Best Practices for Installing the HBA

Before installing the HBA into the system, review the best practices in this section to avoid potential issues:

- "General Best Practices" on page 18
- "Best Practices For Switches and Zoning" on page 19
- "Best Practices For Booting From SAN (BFS) Configurations" on page 19
- "Best Practices For Testing the Environment" on page 20

General Best Practices

Follow these general best practices for installing and configuring the HBA:

- Spread the I/O load amongst multiple HBAs and multiple ports to avoid bottlenecks and promote higher availability.
- Use fixed link speeds instead of auto-negotiation wherever possible. While the HBA supports auto-negotiation, auto-negotiation slows things down in the event of a fabric rebuild.
- Do not configure both tape devices and disks on the same HBA port, even if using a switch and zoning.
- If more than one of a given HBA model is present in the configuration, enable only the OpROM for the first HBA seen in the boot sequence. There is a limited amount of space for OpROMs, so do *not* unnecessarily enable all OpROMs, as space usage issues might occur.
- When installing the HBA, be sure to also install the latest version (version 11.1.218.x or newer) of the command-line utility available from the manufacturer's website (See "Installing Utilities for Updating the BIOS and Firmware" on page 35). Keep the HBA utilities, firmware, and drivers up-to-date, and update them in that order.
- After installing the OneCommand Manager CLI utility, ensure that the `elxhbamgrd` daemon process is running (The OneCommand Manager utility starts this daemon process, by default, upon installation.). In the event of a failure, the `elxhbamgrd` daemon produces a usable firmware dump for troubleshooting. The location of dump files varies, based on your operating system:
  - Windows: *OneCommandManager-installation-directory*`\Util\Dump`
  - Oracle Solaris: `/opt/ELXocm/Dump`
  - Linux: `/var/log/emulex/ocmanager/Dump`

  Keep in mind that manual firmware dumps do not collect fatal firmware errors. If the OneCommand Manager utility is installed and running, the HBA firmware detects a fatal error, and then notifies the HBA driver of the error. The driver then notifies the

OneCommand Manager utility (via the `elxhbamgrd` daemon process) to start the firmware dump. This firmware dump starts automatically, and the dump file is stored in the default dump location, based on your operating system.

Best Practices For Switches and Zoning

Follow these best practices for switches and zoning in your environment:

- FC-SW configurations: check with the switch manufacturer for optimal configuration recommendations, including zoning.
- Note that FC-AL is not supported at 16Gb/s or faster. Use FC-P2P instead.
- Use single initiator hard zoning to do the following:
  - Avoid Registered State Change Notification (RSCN) storms.
  - Shield devices from indiscriminate SCSI inquiries.
  - Provide security by avoiding inappropriate access.
- Use meaningful names for zones, and document the entire configuration.
- Use only FCP-2 (also called FC-TAPE or FCP Error Recovery) with tape and/or sequential devices. While FCP-2 might not cause problems for hard disk drives (HDDs), FCP-2 is a sequence-level error recovery mechanism that is irrelevant to HDDs.
- If using FC tape backups, place tape ports and backup servers on the same FC switch to avoid tying up inter-switch links (ISLs).
- SAN switches can be a major source of disruption if you do not take extreme care with respect to configuration. Do not perform updates to switch OSes and/or firmware, or enable new features on SAN switches, until you have first tried the updated switches in a test configuration. The HBA might not support newer switch features, and switch OS and/or firmware updates might require changes to, and/or restoration of, switch configuration settings.

Best Practices For Booting From SAN (BFS) Configurations

If you plan to install a Boot From SAN (BFS) HBA, follow these best practices:

- Some devices and operating systems do not yet support UEFI-based BIOS and can boot only from the Legacy BIOS boot mode. However, many servers with UEFI firmware allow you to enable a legacy BIOS compatibility mode.
- Legacy BIOS issues - many tweaks and patches have been added over the years to resolve various issues, and not all were done with the larger ecosystem (many different types of servers, HBAs, OSes, and so on) in mind.

- Secure Boot (a UEFI-specific feature) can help you control the boot process, preventing unauthorized code from running.
- Larger devices (>2TB) require the use of a GUID Partition Table (GPT) instead of a Master Boot Record (MBR). GPT is the standard for EFI; it can be implemented in legacy BIOSes, but it is more difficult to set up. So, while you might be able to boot from a >2TB device in the legacy BIOS, it might not be seamless. If you are dual-booting with an OS that is already installed in one mode or the other, however, it is good practice to boot in the same boot mode as the one that is already in use.
- Disable OpROM and BIOS for all HBA cards except the one connected to the boot device.
- When installing a Boot From SAN (BFS) HBA, configure a single connection to a single SAN target/LUN, install the boot OS, and get that working before installing other HBAs and storage. If the configuration is complex, finding the root cause for any BFS issues becomes far more complicated.
- Once BFS is installed and working, make sure the HBA driver and firmware are at the latest revision levels. If required, configure a multipath connection, and perhaps one or more alternate boot LUNs.

Best Practices For Testing the Environment

Test the storage environment by doing the following:

- Boot the OS on the host server, and then disable the primary path to the SAN boot device to validate the multipath connection.
- Physically pull the cable from the system.
- Intentionally disrupt zoning at the FC switch that you plan to attach to the HBA.
- If you have installed any alternate boot LUNs, try to boot from those (after disrupting the primary connection(s)).
- Make sure the boot LUN is set as the first boot device in the system BIOS/UEFI settings.

Installing the Hardware

The hardware installation process involves the following general steps, as described in these sections:

▼ To Install the HBA

The HBA comes with a low-profile PCIe bracket installed. A standard bracket is included in the box with the HBA. The low-profile mounting bracket is shorter than the standard bracket; approximately 3.11 in. (7.9 cm) compared to 4.75 in. (12.06 cm). If you need to change the bracket for HBA installation, you must first remove the optical transceiver (two transceivers on the two-port adapter) from its housing. This procedure covers how to install the HBA and, if necessary, how to remove the transceiver and change the bracket safely.

The HBA uses different types of transceivers. This procedure shows an example of one type.

1. **Attach an antistatic strap.**

2. **Refer to your system installation or service manual to determine an appropriate PCI-Express slot in which to install the HBA.**

3. **Shut down, power off, and unplug the system, if required.**

4. **Remove the system case.**

5. **Remove the blank panel from an empty PCI-Express slot.**

6. **(Optional) Perform the following steps to replace the PCI bracket.**

    a. **Remove the transceiver from its cage assembly by pulling the bail (handle) out and down to release the latch and gently pull the transceiver out of its housing.**

    Do not force it. After the latch is released, the transceiver slides out easily.

    The following is an image of the optical transceiver.

⚠️ **Caution -** This is a delicate operation–take care not to damage the transceiver.
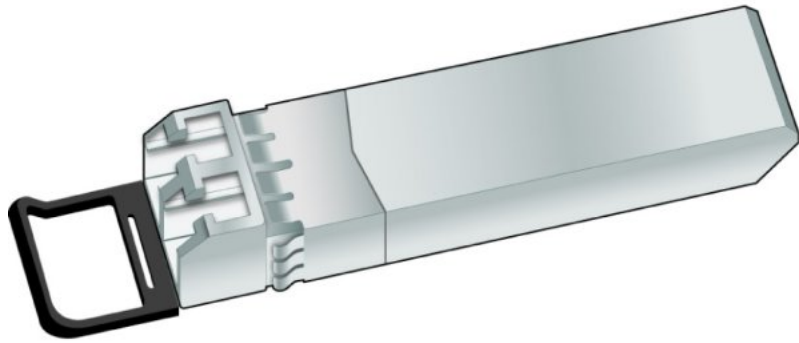
The following image is a partly extracted optical transceiver and an optical transceiver that is latched in place.
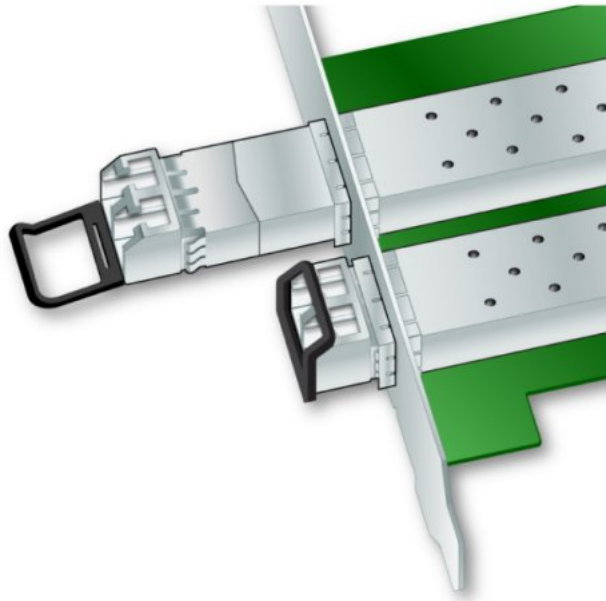
b. Observing ESD precautions, store the transceiver in an ESD-safe place.

     c. **Remove the mounting bracket screws from the top of the HBA.**
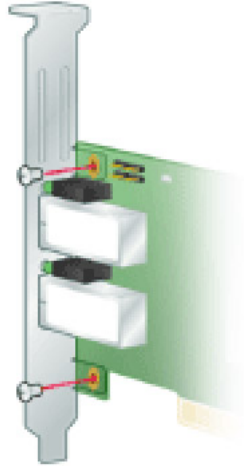
     d. **Remove the bracket and store it for future use.**

     e. **Align the new mounting bracket tabs with the holes in the HBA.**

> ⚠ **Caution -** Be careful not to push the bracket past the transceiver housing's grounding tabs. Make sure the LEDs are properly aligned with the holes in the bracket.

     f. **Re-install the screws that attach the HBA to the bracket.**

     g. **Re-install the transceiver by sliding it into the housing.**

     When the latch engages, it clicks.

     h. **Push the bail back into place.**

7. **Insert the HBA into the empty PCI-Express 8-lane slot and press firmly until the adapter is seated.**

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

9. **Replace the computer case and tighten the case screws.**

   The HBA is now installed in the computer and is ready for media attachment.

▼ To Connect the Optical Cable

Note - The HBA does not allow normal data transmission on an optical link unless it is connected to another similar or compatible Fibre Channel product (that is, multimode to multimode).

Use multimode fiber-optic cable, intended for short-wave lasers, that adheres to the specifications in the following table.

Fiber-Optic Cable	Maximum Length	Minimum Length	Connector
OM3 - Multimode 50/125 micron fiber (2000 MHz*km bandwidth cable)	2.125 Gb/s: 0.5m - 500m 4.25 Gb/s: 0.5m - 380m 8.5 Gb/s 0.5m – 150m	.5 meters	LC
OM2 - Multimode 50/125 micron fiber (500 MHz*km bandwidth cable)	2.125 Gb/s: 0.5m – 300m 4.25 Gb/s: 0.5m – 150m 8.5 Gb/s 0.5m – 50m	.5 meters	LC
OM1 - Multimode 62.5/125 micron fiber (200 MHz*km bandwidth cable)	2.125 Gb/s: 0.5m – 150m 4.25 Gb/s: 0.5m – 70m 8.5 Gb/s 0.5m – 21m	.5 meters	LC

1. **Connect the fiber-optic cable to an LC connector on the HBA.**
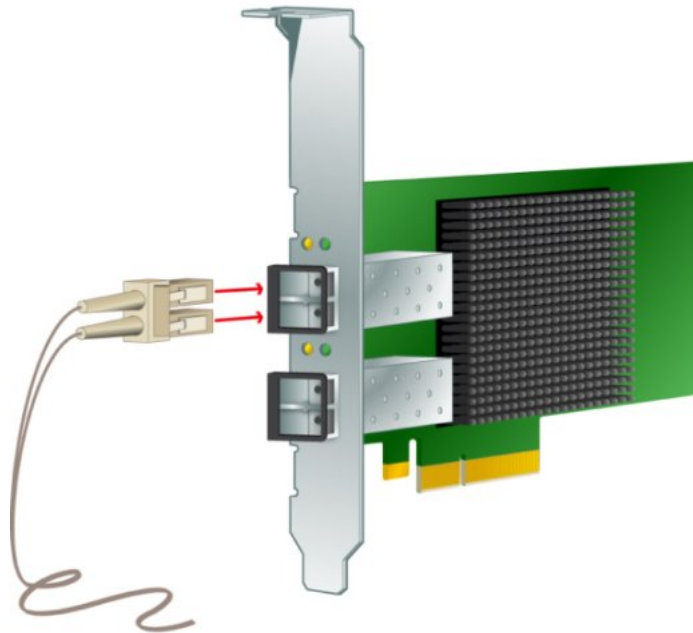
2. **Connect the other end of the cable to the FC device.**

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

▼ To Apply Power

1. **Verify that the HBA is securely installed in the system.**

2. **Verify that the correct fiber-optic cable is attached.**

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

(LED) Status

Yellow and green LEDs can be seen through openings in the mounting bracket of the HBA. Each port has a corresponding set of yellow and green LEDs.
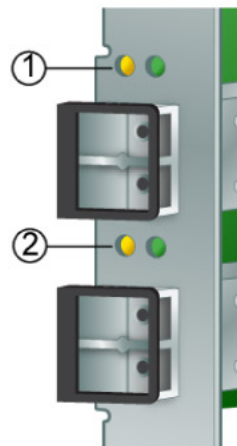
Observe the light-emitting diode (LED) status for the power-on self test (POST) results as shown in the following table.

Green LED	Yellow LED	State
Off	Off	Wake-Up Failure (Dead Board)
Off	On	POST failure (Dead Board)
Off	Slow Blink	Wake-Up Failure Monitor
Off	Fast Blink	Failure in POST
Off	Flashing	POST Processing in Progress
On	Off	Failure While Functioning
On	On	Failure While Functioning
On	2 Fast Blinks	2 Gb Link Rate – Normal, Link up
On	3 Fast Blinks	4 Gb Link Rate – Normal, Link up
On	4 Fast Blinks	8 Gb Link Rate – Normal, Link up
Slow Blink	Off	Normal – Link Down or not started
Slow Blink	On	Not Defined
Slow Blink	Slow Blink	Off-line for Download
Slow Blink	Fast Blink	Restricted Off-line Mode (Waiting for Restart)
Slow Blink	Flashing	Restricted Off-line Mode, Test Active
Fast blink	Off	Debug Monitor in Restricted Mode
Fast blink	On	Not Defined

Testing the Installation

This section contains the following topics:

▼ To Verify Proper Installation (Oracle Solaris)

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

   The HBA can be identified in the output by looking for the `SUNW,emlxs@`*n* and `SUNW,emlxs@`*n*`,1` node names, where *n* is usually a single-digit number from 0 to 9. In this example, there are two dual port and one single port HBAs installed.

   ```
   {0} ok show-devs
   /pci@7c0/pci@0
   /pci@7c0/pci@0/pci@9
   /pci@7c0/pci@0/pci@8
   ```

```
/pci@7c0/pci@0/pci@2
/pci@7c0/pci@0/pci@2
/pci@7c0/pci@0/pci@1
/pci@7c0/pci@0/pci@9/SUNW,emlxs@0,1
/pci@7c0/pci@0/pci@9/SUNW,emlxs@0
/pci@7c0/pci@0/pci@9/SUNW,emlxs@0,1/fp@0,0
```

(*continued*)
```
/pci@7c0/pci@0/pci@9/SUNW,emlxs@0,1/fp@0,0/disk
/pci@7c0/pci@0/pci@9/SUNW,emlxs@0/fp@0,0
/pci@7c0/pci@0/pci@9/SUNW,emlxs@0/fp@0,0/disk
/pci@7c0/pci@0/pci@8/SUNW,emlxs@0
/pci@7c0/pci@0/pci@8/SUNW,emlxs@0/fp@0,0
/pci@7c0/pci@0/pci@8/SUNW,emlxs@0/fp@0,0/tape/pci@7c0/pci@0/pci@8/SUNW,emlxs@0/fp@0,0/
disk
/pci@7c0/pci@0/pci@2/network@0,1
/pci@7c0/pci@0/pci@2/network@0
/pci@7c0/pci@0/pci@1/pci@0,2
/pci@7c0/pci@0/pci@1/pci@0
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@2,1
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@2
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@1,1
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@1
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@2,1/fp@0,0
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@2,1/fp@0,0/disk
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@2/fp@0,0
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@2/fp@0,0/disk
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@1,1/fp@0,0
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@1,1/fp@0,0/tape
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@1,1/fp@0,0/disk
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@1/fp@0,0
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@1/fp@0,0/tape
/pci@7c0/pci@0/pci@1/pci@0,2/SUNW,emlxs@1/fp@0,0/disk
/pci@7c0/pci@0/pci@1/pci@0/ide@8
/pci@7c0/pci@0/pci@1/pci@0/usb@6
/pci@7c0/pci@0/pci@1/pci@0/usb@5
/pci@7c0/pci@0/pci@1/pci@0/isa@2
/pci@7c0/pci@0/pci@1/pci@0/ide@8/cdrom
/pci@7c0/pci@0/pci@1/pci@0/ide@8/disk
/pci@7c0/pci@0/pci@1/pci@0/usb@6/hub@1
/pci@7c0/pci@0/pci@1/pci@0/isa@2/serial@0,3f8
/pci@780/pci@0
/pci@780/pci@0/pci@9
/pci@780/pci@0/pci@8
/pci@780/pci@0/pci@2
/pci@780/pci@0/pci@1
/pci@780/pci@0/pci@9/scsi@0
```

```
(continued)
/pci@780/pci@0/pci@9/scsi@0/disk
/pci@780/pci@0/pci@9/scsi@0/tape
/pci@780/pci@0/pci@8/SUNW,emlxs@0,1
/pci@780/pci@0/pci@8/SUNW,emlxs@0
/pci@780/pci@0/pci@8/SUNW,emlxs@0,1/fp@0,0
/pci@780/pci@0/pci@8/SUNW,emlxs@0,1/fp@0,0/tape
/pci@780/pci@0/pci@8/SUNW,emlxs@0,1/fp@0,0/disk
/pci@780/pci@0/pci@8/SUNW,emlxs@0/fp@0,0
/pci@780/pci@0/pci@8/SUNW,emlxs@0/fp@0,0/tape
/pci@780/pci@0/pci@8/SUNW,emlxs@0/fp@0,0/disk
/pci@780/pci@0/pci@1/network@0,1
/pci@780/pci@0/pci@1/network@0
/packages/SUNW,builtin-drivers
{c} ok
```

2. **To positively identify the port as a StorageTek 8 Gb FC port, use the `cd` command to change to the `SUNW,emlxs@`n directories, and use the `.properties` command.**

   In this example, the `.properties` command output displays the properties of the two ports in a dual port HBA.

```
ok cd /pci@780/pci@0/pci@8/SUNW,emlxs@0
{c} ok .properties
assigned-addresses      82060010 00000000 00300000 00000000 00002000
                        82060018 00000000 00304000 00000000 00004000
                        81060020 00000000 00000000 00000000 00000100
                        82060030 00000000 00340000 00000000 00040000
port_wwn                10 00 00 00 c9 71 be fc
node_wwn                20 00 00 00 c9 71 be fc
alternate-reg           01060020 00000000 00000000 00000000 00000100
reg                     00060000 00000000 00000000 00000000 00000000
                        03060010 00000000 00000000 00000000 00001000
                        03060018 00000000 00000000 00000000 00000100
                        02060030 00000000 00000000 00000000 00020000
compatible              pciex10df,fc40.10df.fc42.3
                        pciex10df,fc40.10df.fc42
                        pciex10df,fc42
                        pciex10df,fc40.3
                        pciex10df,fc40
                        pciexclass,0c0400
                        pciexclass,0c04
clock-frequency         02625a00
#size-cells             00000000
#address-cells          00000002
```

```
copyright              Copyright (c) 2000-2007 Emulex
model                  LPe12002-S
name                   SUNW,emlxs
device_type            scsi-fcp
manufacturer           Emulex
fcode-version          3.01a1
fcode-rom-offset       0000c400
interrupts             00000001
class-code             000c0400
subsystem-id           0000fc42
subsystem-vendor-id    000010df
revision-id            00000003
device-id              0000fc40
vendor-id              000010df
{c} ok



assigned-addresses     82080110 00000000 03504000 00000000 00002000
                       82080118 00000000 03506000 00000000 00002000
                       81080120 00000000 00003100 00000000 00000100
                       82080130 00000000 03580000 00000000 00040000
port_wwn               10 00 00 00 c9 4b 3b 39
node_wwn               20 00 00 00 c9 4b 3b 39
alternate-reg          01080120 00000000 00000000 00000000 00000100
reg                    00080100 00000000 00000000 00000000 00000000
                       03080110 00000000 00000000 00000000 00001000
                       03080118 00000000 00000000 00000000 00000100
                       02080130 00000000 00000000 00000000 00020000
compatible             pci10df,fc20
clock-frequency        02625a00
#size-cells            00000000
#address-cells         00000002
copyright              Copyright (c) 2008 Emulex
model                  LPe12002-S
name                   SUNW,emlxs
device_type            scsi-fcp
manufacturer           Emulex
fcode-version          1.50a8
fcode-rom-offset       0000c000
devsel-speed           00000000
class-code             000c0400
interrupts             00000002
latency-timer          00000000
cache-line-size        00000010
max-latency            00000000
min-grant              00000000
subsystem-id           0000fc22
```

```
subsystem-vendor-id      000010df
revision-id              00000002
device-id                0000fc20
vendor-id                000010df
{0} ok
```

▼ To Verify Attached Storage (Oracle Solaris)

- **If online storage is connected to the HBA, use the `apply show-children` command to list the attached storage.**

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

In the example that follows, four SANS with 14 to 16 drives each and an FC tape drive are attached to the two ports or a dual-port HBA.

```
{14} ok show-children
Device  PortID 10600  WWPN 200600a0b8220346
   LUN  0     Disk    SUN     CSM100_R_FC     0612
   LUN  1     Disk    SUN     CSM100_R_FC     0612
   LUN  2     Disk    SUN     CSM100_R_FC     0612
   LUN  3     Disk    SUN     CSM100_R_FC     0612
   LUN  4     Disk    SUN     CSM100_R_FC     0612
   LUN  5     Disk    SUN     CSM100_R_FC     0612
   LUN  6     Disk    SUN     CSM100_R_FC     0612
   LUN  7     Disk    SUN     CSM100_R_FC     0612
   LUN  8     Disk    SUN     CSM100_R_FC     0612
   LUN  9     Disk    SUN     CSM100_R_FC     0612
   LUN  a     Disk    SUN     CSM100_R_FC     0612
   LUN  b     Disk    SUN     CSM100_R_FC     0612
   LUN  c     Disk    SUN     CSM100_R_FC     0612
   LUN  d     Disk    SUN     CSM100_R_FC     0612
Device  PortID 10700  WWPN 50020f2300006cee
   LUN  0     Disk    SUN     T300            0301
   LUN  1     Disk    SUN     T300            0301
   LUN  2     Disk    SUN     T300            0301
   LUN  3     Disk    SUN     T300            0301
   LUN  4     Disk    SUN     T300            0301
   LUN  5     Disk    SUN     T300            0301
   LUN  6     Disk    SUN     T300            0301
   LUN  7     Disk    SUN     T300            0301
   LUN  8     Disk    SUN     T300            0301
```

```
    LUN   9     Disk     SUN     T300           0301
    LUN   a     Disk     SUN     T300           0301
    LUN   b     Disk     SUN     T300           0301
    LUN   c     Disk     SUN     T300           0301
    LUN   d     Disk     SUN     T300           0301
    LUN   e     Disk     SUN     T300           0301
    LUN   f     Disk     SUN     T300           0301



(continued)
Device  PortID 20600   WWPN 200600a0b8220345
    LUN   0     Disk     SUN     CSM100_R_FC    0612
    LUN   1     Disk     SUN     CSM100_R_FC    0612
    LUN   2     Disk     SUN     CSM100_R_FC    0612
    LUN   3     Disk     SUN     CSM100_R_FC    0612
    LUN   4     Disk     SUN     CSM100_R_FC    0612
    LUN   5     Disk     SUN     CSM100_R_FC    0612
    LUN   6     Disk     SUN     CSM100_R_FC    0612
    LUN   7     Disk     SUN     CSM100_R_FC    0612
    LUN   8     Disk     SUN     CSM100_R_FC    0612
    LUN   9     Disk     SUN     CSM100_R_FC    0612
    LUN   a     Disk     SUN     CSM100_R_FC    0612
    LUN   b     Disk     SUN     CSM100_R_FC    0612
    LUN   c     Disk     SUN     CSM100_R_FC    0612
    LUN   d     Disk     SUN     CSM100_R_FC    0612
Device  PortID 20700   WWPN 50020f2300003206
    LUN   0     Disk     SUN     T300           0301
    LUN   1     Disk     SUN     T300           0301
    LUN   2     Disk     SUN     T300           0301
    LUN   3     Disk     SUN     T300           0301
    LUN   4     Disk     SUN     T300           0301
    LUN   5     Disk     SUN     T300           0301
    LUN   6     Disk     SUN     T300           0301
    LUN   7     Disk     SUN     T300           0301
    LUN   8     Disk     SUN     T300           0301
    LUN   9     Disk     SUN     T300           0301
    LUN   a     Disk     SUN     T300           0301
    LUN   b     Disk     SUN     T300           0301
    LUN   c     Disk     SUN     T300           0301
    LUN   d     Disk     SUN     T300           0301
    LUN   e     Disk     SUN     T300           0301
    LUN   f     Disk     SUN     T300           0301
Device  PortID 20900   WWPN 500104f00047457b
    LUN   0     Removable Tape    STK    T9840B         1.34
{14} ok
```

Replacing the SFP+ Unit on the HBA

The Small Form Factor Pluggable (SFP+) optics unit on this card is considered a part of the card, NOT as a separate field replaceable unit (FRU). Therefore, in the event that the SFP+ unit malfunctions, you must return the entire card in order to receive a replacement SFP+ unit. Always return any malfunctioning card with the SFP+ unit attached. For information about removing the card from a system in order to return it, see "To Remove the Hardware" on page 34.

Removing the Hardware

▼ To Remove the Hardware

The following procedures describe how to remove the HBA. Refer to your system installation or service manual for detailed HBA adapter removal instructions.

The hardware removal process involves these general steps:

1. **Halting the operating system and removing power from the server blade, or computer.**

2. **Removing the HBA hardware.**

▼ To Remove the HBA Hardware

1. **Use an ESD strap.**

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

3. **Disconnect all cables.**

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

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

   You can now remove the HBA.

♦ ♦ ♦ **C H A P T E R 3**

3

HBA Software Installation

After you have completed the HBA hardware installation and powered on the system, follow the instructions in this chapter to install any HBA utilities, firmware, and operating system-specific drivers, in that order, that might be required by the HBA.

Note - Software listed in this chapter as being located at the Oracle designated web site will only be available at the web site if required by the HBA.

This chapter contains the following topics:

Installing Utilities for Updating the BIOS and Firmware

Use the OneCommand Manager command-line interface (CLI) or graphical user interface utilities to update the BIOS and firmware for the HBA. These utilities provide support for the following functions:

- Discover local and remote hosts, HBAs, targets, and LUNs
- Reset HBAs
- Set HBA driver parameters
- Update firmware
- Enable or disable the system BIOS
- Run diagnostic tests on HBAs
- Manage out-of-band HBAs
- Manage local and in-band remote HBAs

For more information about the OneCommand Manager graphical user interface or command-line interface utilities, download their user manuals from the Emulex (Broadcom) support site for Oracle at: https://www.broadcom.com/support/oem/oracle-fc/.

▼ To Install Utilities for Updating the BIOS or Firmware:

1. **Go to the Emulex (now Broadcom) support site for Oracle at:**

   https://www.broadcom.com/support/oem/oracle-fc/

2. **Click the type of HBA, and then click the model number of the HBA for which you want to install utility software.**

3. **In the Utilities section, click the utility for the OS that you want, and download the utility to a local file system.**

4. **Install the utility as described in the Emulex documentation, located on the Emulex (Broadcom) web site.**

Installing Diagnostic Software

This section contains the following topics:

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: https://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

The `emlxtest` utility, which is included in the Oracle VTS software, supports the following functions:

- Connectivity verification
- Firmware version and checksum test
- Self-test
- Loopback tests

- External
- Internal, single-bit
- Internal, 10-bit
- Mailbox

Diagnostic Support for All Other Supported Operating Systems

Diagnostic support for the HBA with all supported operating systems other than the Oracle Solaris OS is available through version 11.1.218.x, or newer, of the OneCommand Manager graphical user interface (GUI) or the OneCommand Manager command-line interface (CLI) utility. These utilities support the following functions:

- Production of useful firmware dump information, in the unlikely event of a failure (from the OneCommand Manager CLI only)
- Connectivity verification
- BIOS, FCode, 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 Utilities for a Supported OS Other Than the Oracle Solaris OS:

1. **Go to the Emulex (now Broadcom) support site for Oracle at:**

   https://www.broadcom.com/support/oem/oracle-fc/

2. **Click the type of HBA, and then click the model number of the HBA for which you want to install diagnostic software.**

3. **In the Utilities section, click the diagnostic support utility for the OS that you want, and download the diagnostic utility to a local file system.**

4. **Install the diagnostic utility as described in the Emulex documentation, located on the Emulex (Broadcom) web site.**

Using the OneCommand Manager CLI for Troubleshooting a Fatal Error

In the event of a failure, the OneCommand Manager application command-line interface (CLI) produces a usable firmware (FW) dump that you can send to Emulex (now Broadcom) for troubleshooting. The default location of the firmware dump varies by operating system:

- Windows – `/Util/Dump` subdirectory of the OneCommand Manager installation directory
- Oracle Solaris – `/opt/ELXocm/Dump`
- Linux – `/var/log/emulex/ocmanager/Dump`

About Automatic Firmware Dumps

This section lists the requirements for producing automatic firmware dumps, and provides general information about the OneCommand Manager CLI firmware dumps.

Requirements:

- OneCommand Manager application command-line interface, version 11.1.218.x, or newer
- `elxhbamgrd` process must be running in the background (The ECD installer or system boot starts the process, by default.)

General Information

- Manual firmware dumps do not collect fatal firmware errors.
- HBA firmware (FW) detects fatal errors.
- HBA firmware notifies the driver of any errors.
- The driver notifies the OneCommand Manager command-line interface (via the OneCommand Manager `elxhbamgrd` daemon process) to start the firmware dump process.
- The firmware dump is produced and stored in the default dump directory, per your operating system.

Installing Drivers

This section contains the following topics:

- "Installing Drivers for the Oracle Solaris OS" on page 39
- "Installing Drivers for All Other Supported Operating Systems" on page 39

Installing Drivers for the Oracle Solaris OS

The HBA driver is included with the Oracle Solaris OS versions supported by the HBA (see Table 2, "Supported Operating System/Technology Versions (Minimum)," on page 11). The following additional patches and SRUs are required:

- **Oracle Solaris 10 01/13 (for the SPARC environment)**: patches 149173-04, 144188-02, and 150400-16 (or newer)
- **Oracle Solaris 10 1/13 (for the x86 environment)**: patches 149174-04, 144189-02, and 150401-16 (or newer)
- **Oracle Solaris 11.1**: SRU 16

You can download the latest patches and SRUs from this web site: `https://support.oracle.com`.

▼ Installing Drivers for All Other Supported Operating Systems

If drivers for specific operating systems are required by the HBA, the drivers will be available for download at the Emulex (now Broadcom) support site for Oracle. Before installing any drivers, install the utilities and then the firmware, in that order, for the HBA. For more information about installing utilities and firmware, see "Installing Utilities for Updating the BIOS and Firmware" on page 35.

1. **After installing the utilities and the latest firmware for the HBA, go to the Emulex (now Broadcom) support site for Oracle at:**

   `https://www.broadcom.com/support/oem/oracle-fc/`

2. **Click the type of HBA, and then click the model number of the HBA for which you want to install a driver.**

3. **In the Driver section, click the OS driver that you want, and download the driver files to a local file system.**

4. **Install the driver for OS, as described in the Emulex documentation, located on the Emulex web site.**

♦ ♦ ♦ **C H A P T E R 4**

4

Known Issues

This chapter contains any known issues with the HBA. Specific bug identification numbers are provided for Service Personnel. This section contains the following topic:

Reboot Fails on the SPARC Enterprise M8000 System

Bug 15495849

Issue: On the SPARC Enterprise M8000 system, if you use the `stmsboot` command to provide dual paths to the boot device, on occasion the boot device is not found and the reboot does not succeed.

At the console, the following message will be printed:

Can't open boot device

Workaround: When this occurs, retry the boot operation. The system will now reboot as expected.