

**StorageTek Dual 8Gb FC Dual GbE HBA,  
ExpressModule, Emulex Installation  
Guide For HBA Models SG-XPCIEFCGBE-  
E8-Z, SG-PCIEFCGBE-E8-Z, SG-  
XPCIEFCGBE-E8-N, SG-PCIEFCGBE-E8-  
N and 7105393**



StorageTek Dual 8Gb FC Dual GbE HBA, ExpressModule, Emulex Installation Guide For HBA Models SG-XPICIEFCGBE-E8-Z, SG-PCIEFCGBE-E8-Z, SG-XPICIEFCGBE-E8-N, SG-PCIEFCGBE-E8-N and 7105393

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## Using This Documentation

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

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# ◆ ◆ ◆ CHAPTER 1

## HBA Overview

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This chapter provides a basic overview of Oracle's StorageTek Dual 8Gb FC Dual GbE ExpressModule HBA, which uses Emulex (now Broadcom) technology. This chapter also describes the various operating systems, host platforms, storage, and infrastructure configurations that support the HBA.

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 12](#)“System Interoperability” on page 12
- [“Boot Support” on page 15](#)
- [“Environmental Requirements” on page 15](#)

## Kit Contents

- StorageTek Dual 8 Gb FC Dual GbE ExpressModule HBA, Emulex
- *Accessing Documentation* document

## HBA Features and Specifications

The StorageTek Dual 8 Gb FC Dual GbE HBA (SG-XPCIEFCGBE-E8-Z, SG-PCIEFCGBE-E8-Z, SG-XPCIEFCGBE-E8-N, SG-PCIEFCGBE-E8-N, and 7105393) consists of a single-wide, ExpressModule bus expansion board. The board interfaces an eight-lane PCI-Express bus, with four lanes supporting two Fibre Channel (FC) optical media ports and four lanes supporting two UTP (copper) Gigabit Ethernet (GbE) ports. The two independent FC ports operate at 8 Gbit/second and feature 8/4/2 Gbit/second autonegotiation.

The HBA is also backward compatible with FC ports that operate at 4 and 2 Gbit/second. The Gigabit Ethernet ports can be configured to operate in 10-, 100-, or 1000-Mbit/second Ethernet networks.

See [Table 1, “HBA Features and Specifications,” on page 10](#) for a list of the HBA features.

**TABLE 1** HBA Features and Specifications

Feature	Description
PCI connector	x8
PCI signaling environment	PCI-Express x8 (8 active lanes)
PCI lane usage	FC x4 lanes GbE x4 lanes
PCI transfer rate (maximum)	PCI-Express Generation Two (5 Gbit/second) x8
Number of FC ports	Two
Number of devices supported	126 devices per FC loop; 510 devices in Fabric mode
FC bus type (external)	Fiber-optic media, short-wave laser, multimode fiber (400 - M5- SN-S)
FC data rates	2.125, 4.25, 8.5 Gbit/second (auto-detected)
FC topologies	Switched fabric (N_Port), arbitrated loop (NL_Port) and point-to-point (N_Port)
Number of GbE ports	Two
GbE interface type (external)	IEEE 802.3 compliant, copper, UTP RJ-45
GbE transfer rate	10/100/1000-Mbit/second per port, autosensing, full-duplex
RAM	1.5 MB, parity protected, per port
BIOS ROM (FC)	One 4-MB flash ROM, field-programmable
BIOS ROM (GbE)	One 1-MB flash ROM
NVRAM (FC)	One 2-KB EEPROM
NVRAM (GbE)	One 128-KB EEPROM
External connectors	Two Small Form-factor Pluggable (SFP) optics with LC-style connectors and two RJ-45 GbE connectors
Maximum FC cable length	2 Gbit/second: 500 meters using 50/125 mm core OM3 fiber 300 meters using 50/125 mm core OM2 fiber 150 meters using 50/125 mm core OM1 fiber 150 meters using 62.5/125 mm core fiber 4 Gbit/second: 380 meters using 50/125 mm core OM3 fiber 150 meters using 50/125 mm core OM2 fiber 70 meters using 50/125 mm core OM1 fiber

Feature	Description
	70 meters using 62.5/125 mm core fiber
	8 Gbit/second:
	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 and button	Two LEDs per channel (yellow and green) on the front panel as status indicators
	(Power LED, Attention LED) and a button on the front panel to support hot-swap functionality
Power dissipation	18.2 watts maximum
Form Factor	PCI-Express ExpressModule, single-wide (198 mm x 112 mm x 21 mm)

## Operating System and Technology Requirements

The HBA requires the operating system (OS) and technology levels listed in [Table 2, “Supported Operating System/Technology Versions \(Minimum\) ,”](#) on page 11.

**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	<ul style="list-style-type: none"> <li>■ Oracle Solaris 10 1/13 with patches 149176-02 and 145649-04, at minimum</li> <li>■ Oracle Solaris 11.1 with SRU 7</li> </ul>
Oracle Solaris OS for the SPARC (64-bit) platform	<p>To obtain the latest patches and SRUs, go to <a href="http://support.oracle.com">http://support.oracle.com</a></p> <ul style="list-style-type: none"> <li>■ Oracle Solaris 10 1/13 with patches 149175-02 and 145648-04, at minimum</li> <li>■ Oracle Solaris 11.1 with SRU 7</li> </ul>
Linux OS	<p>To obtain the latest patches and SRUs, go to <a href="http://support.oracle.com">http://support.oracle.com</a></p> <ul style="list-style-type: none"> <li>■ Oracle Enterprise Linux 5.9 (Red Hat Compatible Kernel (RHCK) and Unbreakable Enterprise Kernel (UEK) 2, at minimum)</li> <li>■ Oracle Linux 6.4 (RHCK and UEK2, at minimum)</li> <li>■ Red Hat Enterprise Linux 5.9 (64-bit)</li> <li>■ Red Hat Enterprise Linux 6.4 (64-bit)</li> <li>■ SUSE Linux Enterprise Server 11 SP2 (32-bit and 64-bit)</li> </ul>
Microsoft Windows OS Standard, Enterprise, and Datacenter Editions	<ul style="list-style-type: none"> <li>■ Window Server 2008 R2 including SP1 (64-bit)</li> </ul>

Operating System/Technology	Supported Versions (minimum)
VMware Technology	■ Windows Server 2012
	■ 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](#)
- [“Software Support” on page 14](#)

## Host Platform Support

The HBA is supported by the platforms and operating systems listed in [Table 3, “Platform and Operating System Support,” on page 12](#). For up-to-date information, see your server Product Notes and web pages.

For supported operating system and technology versions, see [Table 2, “Supported Operating System/Technology Versions \(Minimum\) ,” on page 11](#).

**TABLE 3** Platform and Operating System Support

Platform	Supported OS/Technology
Oracle Chassis	
Sun Blade 6000	Oracle Solaris
Sun Blade 6048	Oracle Solaris
Oracle SPARC Servers	
SPARC T4-1B	Oracle Solaris
SPARC T4-4	Oracle Solaris
SPARC T5-1B	Oracle Solaris
Sun Blade T6300	Oracle Solaris
Sun Blade T6320	Oracle Solaris
Sun Blade T6340	Oracle Solaris
Oracle x86 Servers	
Sun Blade X3-2B	Oracle Solaris, Linux, VMware, and Windows

Platform	Supported OS/Technology
Sun Blade X4-2B	Oracle Solaris, Linux, VMware, and Windows
Sun Blade X6220	Oracle Solaris, Linux, VMware, and Windows
Sun Blade X6240	Oracle Solaris, Linux, VMware, and Windows
Sun Blade X6250	Oracle Solaris, Linux, VMware, and Windows
Sun Blade X6270	Oracle Solaris, Linux, VMware, and Windows
Sun Blade X6275	Oracle Solaris, Linux, VMware, and Windows
Sun Blade X6440 <sup>†</sup>	Oracle Solaris, Linux, VMware, and Windows
Sun Server X2-8	Oracle Solaris, Linux, VMware, and Windows

<sup>†</sup>In order for the HBA to support this server, the BIOS version on the server must be later than version 1.17. For information about the BIOS version installed on the server, go to the server web page.

The system must have an available ExpressModule slot in which you can install the HBA.

## Storage Support

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

- [“Array Support” on page 13](#)
- [“Tape Storage Support” on page 13](#)

### Array Support

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

- StorageTek 2540
- StorageTek 6140
- StorageTek 6540
- StorageTek 6780
- StorageTek 9970
- StorageTek 9980/9985
- StorageTek 9990

### Tape Storage Support

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

- StorageTek 9970 system
- StorageTek 9980/9985/9985V system

- StorageTek 9990/9900V system
- StorageTek SL24 tape autoloader
- StorageTek SL48 tape library
- StorageTek L1400 tape library
- StorageTek virtual tape library (VTL): VTL Value and VTL Plus
- StorageTek SL500 modular library
- StorageTek SL8500 modular library
- StorageTek SL3000 modular library
- IBM and HP LTO3 tape drives
- IBM and HP LTO4 tape drives
- StorageTek T10000A and T10000B tape drive
- StorageTek T9840C tape drive
- StorageTek T9840D tape drive

## Switch Support

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

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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.

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

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The NIC portion of this adapter is supported by all 1-Gb Ethernet switches.

## Software Support

The HBA is supported by the software applications listed in [Table 4, “Software Support ,” on page 14](#).

**TABLE 4** Software Support

Software (minimum version)	Supported OS
Sun Cluster 3.x	Oracle Solaris

Software (minimum version)	Supported OS
Sun StorEdge Enterprise Backup Storage 7.2/7.3/7.4	Oracle Solaris
VERITAS NetBackup 5.1/6.x	Oracle Solaris
VERITAS Software Foundation (VxSF) 4.1/5.0	Oracle Solaris
VERITAS Cluster 5.0	Oracle Solaris
VERITAS File System 5.0	Oracle Solaris
VERITAS Volume Manager VxVM 5.0	Oracle Solaris
Validation Test Suite (SunVTS)	Oracle Solaris
FMA	Oracle Solaris
HBAnyware management utility	Oracle Solaris, Linux, VMware, and Windows
OneCommand Manager application	Oracle Solaris, Linux, and Windows
AutoPilot Installer	Windows

## Boot Support

The HBA supports booting through the HBA in the following environments:

- 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
- Oracle Enterprise Linux 5.9 and 6.4
- 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 [Table 5, “HBA Environmental Requirements,”](#) on page 15.

**TABLE 5** HBA Environmental Requirements

Specification	Operating	Non-Operating
Temperature	0°C to 40°C, noncondensing	-40°C to 70°C, noncondensing

## Environmental Requirements

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Specification	Operating	Non-Operating
Humidity	10% to 90% relative humidity (RH), noncondensing	93% RH, noncondensing, 38°C max wet bulb
Altitude	up to 3000 meters	12,000 meters
Vibration	0.20G in all axes, 5-500 Hz sine	1.0G in all axes, 5-500 Hz sine
Shock	5G, 11 ms half-sine	30G 11 ms half-sine



## Hardware Installation and Removal

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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” on page 17](#)
- [“Best Practices for Installing the HBA” on page 18](#)
- [“Installing the Hardware” on page 20](#)
- [“Configuring the HBA for Hot-Plug Operation” on page 29](#) [“Configuring the HBA for Hot-Plug Operation” on page 29](#)
- [“Removing the Hardware” on page 29](#)

### Observing ESD and Handling Precautions



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**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.

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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 Sun 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 metal canister, 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 33](#)). 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 `elxhbmgrd` 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, described in this section:

- [“To Install the HBA” on page 21](#)

- [“To Connect the Optical Cables” on page 23](#)
- [“To Install the Ethernet Cables” on page 25](#)
- [“To Apply Power” on page 25](#)
- [“To Verify Proper Installation \(Oracle Solaris\)” on page 28](#)
- [“To Verify Attached Storage \(Oracle Solaris\)” on page 28](#)

## ▼ To Install the HBA

1. **Attach an antistatic wrist strap (refer to [“Observing ESD and Handling Precautions” on page 17](#)).**
2. **Refer to your system installation or service manual to determine an appropriate ExpressModule slot in which to install the HBA.**

3. **Press down on the plastic tab to release the ExpressModule latch and pull the lever out until it is nearly perpendicular to the ExpressModule front panel.**



4. **Insert the HBA into its slot, being careful that the extension on the bottom of the lever does not come into contact with the chassis sheet metal during insertion.**
5. **When the HBA is inserted nearly all the way into its slot, push the lever back into its fully closed position, allowing the lever extension to insert the HBA fully into place.**

## ▼ To Connect the Optical Cables

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

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

Fiber-Optic Cable	Maximum Length	Minimum Length	Connector
62.5/125 mm (multimode)	150 meters at 2.125 Gbit/second	0.5 meters	LC
	70 meters at 4.25 Gbit/second		
	21 meters at 8.5 Gbit/second		
50/125 mm (multimode)	500 meters at 2.125 Gbit/second	0.5 meters	LC
	380 meters at 4.25 Gbit/second		
	150 meters at 8.5 Gbit/second		

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



Cable	Description
Orange	Fiber-optic (FC) cable
Blue	Ethernet (GbE) cable

2. **Connect the other end of the cable to the FC device.**

After the optical cable is connected to the HBA, you are ready to connect the Ethernet cable(s).



## ▼ To Install the Ethernet Cables

Use high-quality Ethernet cable, category 5e or category 6, that adheres to the specifications in the following table.

Ethernet Cable	Maximum Length	Connector
Cat5e UTP	100 meters	8P8C
Cat6 UTP	100 meters	8P8C

1. **Connect the Ethernet cable to RJ-45 connectors on the HBA.**
2. **Connect the other end of the cable to the Ethernet device.**

After the Ethernet cable is connected to the HBA, you are ready to apply power to the system. If power is already applied to the system, proceed to [“Configuring the HBA for Hot-Plug Operation” on page 29](#).

## ▼ 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. **Verify that the correct Ethernet cable is attached.**
4. **Refer to your system installation or service manual to determine how to power on the system server module (blade).**
5. **Observe the light-emitting diode (LED) status for the power-on self-test (POST) results as shown in the following table.**

The following table summarizes LED indicator combinations. Each FC port has a corresponding set of LEDs that provide a visual indication of the operating state.

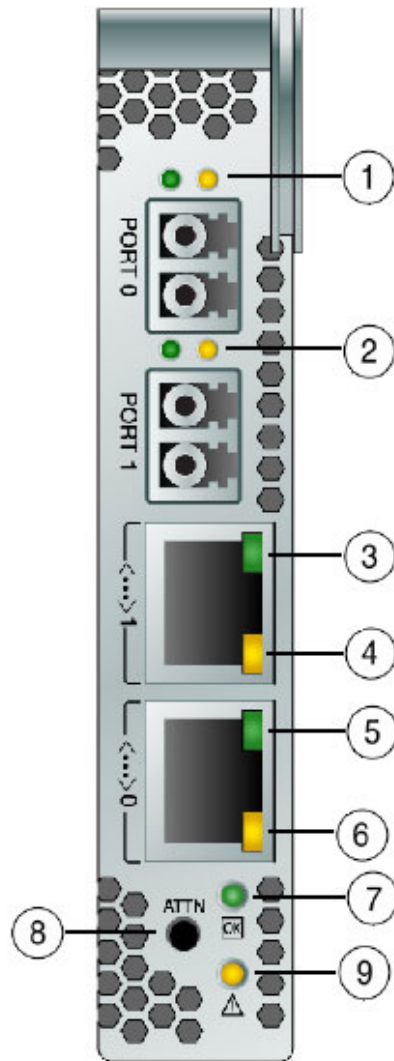
Green LED	Yellow LED	State
On	2 fast blinks	2-Gb link rate - Normal operating state, link up
On	3 fast blinks	4-Gb link rate - Normal operating state, link up
On	4 fast blinks	8-Gb link rate - Normal operating state, link up

Green LED	Yellow LED	State
Off	Off	Wake-up failure (failed board)
Off	On	POST failure (failed 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
Slow blink	Off	Normal - link down
Slow blink	On	Not defined
Slow blink	Slow blink	Offline for download
Slow blink	Fast blink	Restricted offline mode (waiting for restart)
Slow blink	Flashing	Restricted offline mode, test active

**6. Observe the LEDs status for the Ethernet connection as described in the following table.**

The following table summarizes LED indicator combinations. Each Ethernet port has a corresponding set of LEDs that provide a visual indication of the operating state.

Green LED	Green/Yellow LED	State
Blinks	Off	10-Mb link rate - Normal operating state, link up
Blinks	Green	100-Mb link rate - Normal operating state, link up
Blinks	Yellow	1-Gb link rate - Normal operating state, link up



## Testing the Installation

This section contains the following topics:

- [“To Verify Proper Installation \(Oracle Solaris\)” on page 28](#)
- [“To Verify Attached Storage \(Oracle Solaris\)” on page 28](#)

### ▼ To Verify Proper Installation (Oracle Solaris)

1. Use the `cfgadm` command to verify proper HBA installation.

`cfgadm`

If the HBA is properly installed and connected, you will see output similar to the following:

Ap_Id	Type	Receptacle	Occupant	Condition
c1	fc	connected	configured	ok
c2	fc	connected	configured	ok
pciel	pci-pci/hp	connected	configured	ok

2. If an HBA is shown as **unconfigured** or **disconnected**, use the `cfgadm -c` `configure` command to configure the HBA.

### ▼ To Verify Attached Storage (Oracle Solaris)

1. Use the `cfgadm -al` command to verify attached storage.

`cfgadm -al`

If the HBA is properly installed and storage is connected properly, you will see output similar to the following example. In this example, one port of an HBA is connected through a fabric switch to two ports of a disk array.

Ap_Id	Type	Receptacle	Occupant	Condition
c1	fc-fabric	connected	configured	unknown
c1::200600a0b816005e	disk	connected	configured	unknown
c1::200700a0b816005e	disk	connected	configured	unknown

```

c2          fc          connected  unconfigured unknown
pciel       pci-pci/hp   connected  configured   ok

```

2. **If an HBA is shown as unconfigured, use the `cfgadm -c configure` command to configure it.**
3. **To view more information about the HBA, use the `fcinfo hba-port` command.**

## Configuring the HBA for Hot-Plug Operation

### ▼ To Configure the HBA for Hot-Plug Operation

1. **Locate the green Power OK LED indicator near the bottom of the HBA front panel.**

Power OK LED indicator status is shown in the following table.

Power OK LED State	Meaning	Removal Status
Off	No power to the HBA	Removal is permitted, or the HBA must be configured
Blinking	Hot-plug in process	Removal of the HBA is not permitted
Solid green	HBA is properly configured	Removal is not permitted

2. **If the green Power OK indicator is not illuminated, briefly press the Attention button near the bottom of the HBA front panel.**  
The green Power OK LED will blink for approximately five seconds and then remain on, indicating that the HBA is properly configured.
3. **To cancel the operation, press the Attention button again before the Power OK LED stops blinking.**

## Removing the Hardware

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

The hardware removal process involves the following general steps:

1. Either halting the operating system and removing power from the server blade, or preparing the HBA for hot-plug removal with one of the following:
  - The HBA Attention button
  - The Oracle Solaris OS
  - The Windows Server OS using the Safely Remove Hardware menu
2. Removing the HBA hardware.

## ▼ To Prepare the HBA for Removal Using the HBA Attention Button

1. **Attach an antistatic wrist strap (refer to “[Observing ESD and Handling Precautions](#)” on page 17).**
2. **Press and release the Attention button near the bottom of the HBA front panel.**

The green Power OK LED near the button will blink for approximately five seconds, indicating that the HBA is being prepared for removal.

If you want to cancel the operation, press the Attention button again before the LED stops blinking.
3. **After the Power OK LED turns off, remove the HBA.**

## ▼ To Prepare the HBA for Hot-Plug Removal (Oracle Solaris)

If you want to remove the HBA without first halting the operating system and removing power from the associated server blade, prepare the HBA for removal as follows:

1. **Use the `cfgadm` command to identify the HBA to be removed.**

```
cfgadm
Ap_Id      Type      Receptacle Occupant  Condition
pcie1      pci-pci/hp connected configured ok
pcie2      pci-pci/hp connected configured ok
```

2. **Use the `cfgadm -c unconfigure` command to unconfigure the attachment point ID (`Ap_Id`) for the HBA.**

3. **Use the `cfgadm -c disconnect` command to prepare the HBA for removal.**

A flashing Power OK LED indicates that the HBA is being prepared for removal. An off Power OK LED indicates that the HBA is ready to be removed.

## ▼ To Remove the HBA Hardware

1. **Disconnect all cables.**
2. **Press the HBA latch to disengage the HBA.**
3. **Pull forward and down to eject the HBA from the system.**

You can now remove the HBA.





# ◆ ◆ ◆ CHAPTER 3

## HBA Software Installation

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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.

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**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.

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This chapter contains the following topics:

- “Installing Utilities for Updating the BIOS and Firmware” on page 33
- “Installing Diagnostic Software” on page 34
- “Installing Drivers” on page 36

## 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” on page 34
- “Diagnostic Support for All Other Supported Operating Systems” on page 35
- “Using the OneCommand Manager CLI for Troubleshooting a Fatal Error” on page 36

## 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
- `elxhbmgrd` 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 `elxhbmgrd` 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 37](#)
- [“Installing Drivers for All Other Supported Operating Systems” on page 37](#)

## Installing Drivers for the Oracle Solaris OS

The HBA driver is included with the Oracle Solaris OS versions supported by the HBA (see “Operating System and Technology Requirements” on page 11). The following additional patches and SRUs are required:

- **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 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 33.

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.**



## Known Issues

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

This chapter contains the following topic:

- [“Server Compatibility Issues” on page 39](#)

## Server Compatibility Issues

This section contains the following topics:

- [“Cannot Detect the HBA on the Sun Blade T6300 System ” on page 39](#)
- [“Cannot Verify the FCode Version of the HBA on the Sun Blade T6300 and T6320 Systems” on page 40](#)
- [“Cannot Boot-From-SAN on the Sun Blade X6250 System” on page 40](#)
- [“HBA Fails to Properly Disconnect During a Hot-Plug Operation on a Sun Blade T6320 System ” on page 41](#)
- [“HBA Does Not Correctly Map Ethernet Settings on a Sun Blade X6250 System ” on page 41](#)
- [“On the Sun Blade X6275 System, Default HBA Settings Do Not Allow Boot-From-SAN Through FC Ports” on page 42](#)

## Cannot Detect the HBA on the Sun Blade T6300 System

### **Bug 15468086**

**Issue:** After swapping between different types of HBAs on a Sun Blade T6300 system, the system might not be able to detect the StorageTek Dual 8 Gb FC Dual GbE HBA.

**Workaround:** Reboot the system.

## Cannot Verify the FCode Version of the HBA on the Sun Blade T6300 and T6320 Systems

### Bug 15471696

**Issue:** The FCode version is not displayed when you issue the `luxadm fcode -p` command from either a Sun Blade T6300 or T6320 system.

**Workaround:** To view the FCode version, issue the `fcinfo hba-port` command.

## Cannot Boot-From-SAN on the Sun Blade X6250 System

### Bug 15591000

**Issue:** The ILOM/BIOS of the Sun Blade X6250 system disables the ExpressModule 0 and 1 BIOS Option ROM. This prevents the Emulex Lightpulse x86 BIOS banner from being displayed upon boot of the Sun Blade X6250 system.

**Workaround:** Modify the BIOS menu by doing the following:

### ▼ To Modify the BIOS Menu

1. **Boot the Sun Blade X6250 system.**
2. **In the BIOS menu, press the F2 key for setup.**
3. **From the BIOS Boot menu, select [Enabled] for all of the EMx FUNx OPTION ROM settings.**
4. **Press the F10 key to save the BIOS settings and reboot the Sun Blade X6250 system.**

The Emulex Lightpulse x86 BIOS banner will be displayed, allowing you to configure Boot-from-SAN.



## HBA Fails to Properly Disconnect During a Hot-Plug Operation on a Sun Blade T6320 System

### Bug 15589575

**Issue:** After installing the HBA in ExpressModule Slot 0 of a Sun Blade T6320 system that uses the Oracle Solaris 10 01/13 OS, the HBA might fail to properly disconnect when you attempt to perform a hot-plug removal operation. Upon pressing the Attention button or issuing the `cfgadm -c disconnect device` command, the following error message might be displayed:

```
cfgadm: Component system is busy, try again: disconnect failed.
```

This does not occur if the HBA is installed ExpressModule Slot 1 of the Sun Blade T6320 system.

**Workaround:** Shut down the system, remove the card from ExpressModule Slot 0, and reinstall the HBA into ExpressModule Slot 1. To avoid this error, always install the HBA in ExpressModule Slot 1 of a Sun Blade T6320 system.

## HBA Does Not Correctly Map Ethernet Settings on a Sun Blade X6250 System

### Bug 15593314

**Issue:** If you install the HBA in a Sun Blade X6250 system (32-bit) that uses the Oracle Solaris 10 01/13 OS, the Ethernet port mapping in the HBA will be incorrect, based on the listed order described in the Sun Blade X6250 system documentation.

**Workaround:** Verify the actual Ethernet port mapping for the HBA.

### ▼ To Verify the Ethernet Port Mapping for the HBA

1. Use the `ifconfig e1000gdevice-instance-number plumb` command to verify which `e1000gdevice-instance-number` modules are plumbed to the Ethernet ports of the HBA.

```
ifconfig e1000gdevice-instance-number plumb
```

2. Use the `ifconfig -a` command to list the MAC addresses of the Ethernet ports.

This will help you identify whether the device is an HBA Ethernet port or any other Ethernet port.

```
ifconfig -a
```

The designator for the HBA Ethernet port has a MAC address of 00:00:C9:xx:xx:xx.

## On the Sun Blade X6275 System, Default HBA Settings Do Not Allow Boot-From-SAN Through FC Ports

### Bug 15601963

**Issue:** When using an external storage boot disk connect, you cannot select Boot-from-SAN through the FC ports of the HBA.

**Workaround:** To enable Boot-from-SAN through the FC ports of the HBA, do the following:

### ▼ To Enable Boot-From-SAN Through the FC Ports of the HBA

1. Boot the Sun Blade X6275 system.
2. In the BIOS menu, press the F2 key for setup.
3. In the BIOS Boot menu, select Boot Settings Configuration.
4. Review the Boot Device Priority and verify that the FC device targeted is in priority position 1.
5. If the FC device is targeted to a different priority position, modify the value so that the priority position is 1 for the targeted FC device.
6. Press F10 to save the BIOS settings and reboot the Sun Blade X6275 system.