Sun™ Dual 10GbE Fabric Expansion Module User's Guide

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Preface

This guide provides instructions for installing both the hardware and software for Sun Dual 10GbE Fabric Expansion Module (FEM). This guide also describes how to configure the `nxge` driver, which controls the FEM.

These instructions are designed for enterprise system administrators with experience installing network hardware and software.

Note – In this document the term x86 means the following:
- x86 refers to the larger family of 64-bit and 32-bit x86 compatible products.
- x64 points out specific 64-bit information about AMD64 or EM64T systems.
- 32-bit x86 points out specific 32-bit information about x86 based systems.

For supported systems, see the "Hardware and Software Requirements" on page 3.

How This Document Is Organized

Chapter 1 provides an overview of the Sun Dual 10GbE Fabric Expansion Module and lists the hardware and software requirements.

Chapter 2 describes how to download, install, and remove the software for both Solaris and Linux environments, and lists the required driver patches.

Chapter 3 describes how to install the Sun Dual 10GbE Fabric Expansion Module in your system.

Chapter 4 refers to the *Sun Dual 10GbE XFP PCIe ExpressModule User's Guide* (part number 820-1606) for the following information:

- Configuring the Network
- Configuring the `nxge` Device Driver Parameters
- Configuring the Jumbo Frames Feature
- Configuring Link Aggregation
- Configuring VLANs

Appendix A lists the specifications for the Sun Dual 10GbE Fabric Expansion Module.

Appendix B provides an overview of the SunVTS™ diagnostic application and instructions for updating the SunVTS software to recognize the FEM.

Using UNIX Commands

This document might not contain information about basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to the following for this information:

- Software documentation that you received with your system
- Solaris Operating System documentation, which is at:

  `http://docs.sun.com`

Shell Prompts

Shell	Prompt
C shell	*machine-name*%
C shell superuser	*machine-name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Typographic Conventions

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
AaBbCc123	What you type, when contrasted with on-screen computer output	`% su` `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this. To delete a file, type `rm` *filename*.

* The settings on your browser might differ from these settings.

Related Documentation

The documents listed as online are available at:

`http://docs.sun.com/app/docs/prod/dual.fab.exp`

Application	Title	Part Number	Format	Location
Release Notes	*Sun Dual 10GbE Fabric Expansion Module Release Notes*	820-4449	PDF HTML	Online
Getting started	*Sun Dual 10GbE Fabric Expansion Module Getting Started Guide*	820-4486	Printed	In product shipping kit
Safety and compliance	*Important Safety Information for Sun Hardware Systems*	816-7190	PDF HTML	In product shipping kit

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Sun Dual 10GbE Fabric Expansion Module User's Guide, part number 820-4448-13

CHAPTER 1

Sun Dual 10GbE Fabric Expansion Module Overview

This chapter provides an overview of the Sun Dual 10GbE Fabric Expansion Module (FEM), including:

- "Shipping Kit Contents" on page 1
- "Product Description" on page 2
- "Hardware and Software Requirements" on page 3
- "Sun Dual 10GbE Fabric Expansion Module Features" on page 2

Shipping Kit Contents

The carton in which your Sun Dual 10GbE Fabric Expansion Module was shipped should contain the following items:

- Sun Dual 10GbE Fabric Expansion Module
- *Sun Dual 10GbE Fabric Expansion Module Getting Started Guide*

Note – Sun 10GbE SFP+ SR optical tranceivers are available for order with part number, X5561A-Z.

Product Description

The Sun Dual 10GbE Fabric Expansion Module is an x8 lane PCI-Express 10-Gigabit Ethernet card using the Sun ASIC with SFP+ based 10-Gigabit Ethernet optics.

Sun Dual 10GbE Fabric Expansion Module Features

The Sun Dual 10GbE Fabric Expansion Module provides the following features:

- Supports two full-duplex 10-Gigabit Ethernet interfaces from the Sun Blade 6000 10GbE Multi-fabric Network Express Module of the Sun Blade 6000 Modular Systems.
- Small form factor 10-Gigabit Ethernet pluggable (SFP+) optical transceivers with duplex LC fiber connectors in the Sun Blade 6000 10GbE Multi-fabric Network Express Module
- IEEE 802.3ae 2002-compliant
- Uses Sun ASIC and software for innovative throughput networking design
- Networking I/O virtualization supporting Solaris LDoms 1.0 software
- Hardware-based flow classification for extending parallelism and virtualization to networking
- Up to 16 receive DMA channels and up to 24 transmit DMA channels, multiple receive and transmit descriptor rings, and dedicated networking hardware resources (DMA, interrupts, buffer, and more) for each thread or strand
- CPU/thread affinity and CPU load balancing at L1, L2, L3, and L4
- Jumbo Frames support (up to 9KBytes)
- IPv4, IPv6, and IPMP support
- TCP and UDP checksum and CRC32C support
- IEEE 802.1Q VLAN support

Hardware and Software Requirements

Before installing the FEM, ensure that your system meets the hardware and software requirements in TABLE 1-1.

TABLE 1-1 Hardware and Software Requirements for Sun x64 Servers

Requirements	Hardware or Software
Operating system	• Solaris 10 8/07 Operating System • Redhat Enterprise Linux (RHEL) AS4.5 (32- and 64-bit) • RHEL AS4.6 (64-bit) • SuSE Linux Enterprise Server (SLES) 10 SP1 (64-bit) • Windows Server 2008 Enterprise Edition (32-bit and 64-bit miniport driver)
10GbE network express module (NEM)	Sun Blade 6000 10GbE Multi-fabric Network Express Module
Sun Blade Server Module	• Sun Blade X6250 Server Module (375-3501-06 or newer). This part number is printed on the motherboard, and can be read from the ELOM. • Sun Blade X6450 Server Module

The Sun Blade 6000 10GbE Multi-fabric Network Express Module is hot-pluggable and connects to the rear of the Sun Blade 6000 Modular System chassis. The NEM is a pass-through device, which connects the network device of each Sun Blade server module from the chassis mid-plane to an RJ-45 Ethernet port on the NEM. The Sun Blade 6000 10GbE Multi-fabric Network Express Module (marketing part number X4251) NEM retains the pass-through network connections and adds circuitry to provide multiple SAS connections to hard disk drives.

Sun Dual 10GbE Fabric Expansion Module Support on Sun Blade X6250 Server Module

The Sun Dual 10GbE Fabric Expansion Module (FEM) is supported only on the Sun Blade X6250 server motherboard with part number **375-3501-06 or newer**. The Sun Dual 10 GbE FEM also requires CPLD version 231.

To find the part number, either use the ELOM, or look for the number printed on the motherboard itself.

Check Hardware Release Before Installing CPLD Update

Before installing CPLD version 231 on the Sun Blade X6250 server, check the part number on the motherboard. It must be 375-3501-06 or newer. If you have a motherboard with a different part number, *do not* install CPLD version 231.

To find the part number, either use the ELOM, or look for the number printed on the motherboard itself.

CHAPTER 2

Installing and Setting Up the nxge Driver

This chapter explains how to download and install the nxge driver. This chapter contains the following sections:

- "nxge Driver Overview" on page 5
- "nxge Driver for Solaris Platforms" on page 5
- "Downloading and Installing the Driver on a Linux Platform" on page 6
- "Downloading and Installing the Windows OS Drivers" on page 8

nxge Driver Overview

The nxge Gigabit Ethernet driver (nxge[7D]) is a multithreaded, loadable, clonable, GLD-based STREAMS driver. The nxge driver is managed by the dladm(1M) command-line utility, which allows VLANs to be defined on top of nxge instances and for nxge instances to be aggregated. See the dladm(1M) man page for more details on configuring the data-link interfaces and link aggregations.

nxge Driver for Solaris Platforms

If your system uses the Solaris 10 8/07 Operating System, the nxge device driver is bundled with the operating system. However, you must download and install patches for Sun Dual 10GbE Fabric Expansion Module support.

Required Patches

This section lists the latest required patches.

Note – Always check for the latest revision of the patch, -01, -02, and so on.

Patch ID	Description
119255-53	Prerequisite patch for Kernel Patch 127128-11
126424-03	Prerequisite patch for Kernel Patch 127128-11
127756-01	Prerequisite patch for Kernel Patch 127128-11
127128-11	Kernel patch for Solaris 10 8/07 OS
138049-02	x86 hot swap support for the Sun Blade 6000 10GbE Multi-fabric Network Express Module

Downloading and Installing the Driver on a Linux Platform

▼ To Download the Driver on a Linux Platform

1. **Log in to your system.**
2. **Download the driver RPM for your operating system:**

   `https://cds.sun.com/is-bin/INTERSHOP.enfinity/WFS/CDS-CDS_SMI-Site/en_US/-/USD/ViewProductDetail-Start?ProductRef=Sunx8Exp-EAD-1.0-G-F@CDS-CDS_SMI`

   For example, the file will look similar to the following:

```
sun_10_Gigabit_Ethernet_driver_update_xx.zip
```

   After unzipping this file, go to the `Linux` directory.

3. **Discover the network interfaces before adding the package by using the `ifconfig -a` command:**

```
# ifconfig -a | grep eth
eth0      Link encap:Ethernet  HWaddr 00:14:4F:20:F1:DC
eth1      Link encap:Ethernet  HWaddr 00:14:4F:20:F1:DD
eth2      Link encap:Ethernet  HWaddr 00:14:4F:20:F1:DE
eth3      Link encap:Ethernet  HWaddr 00:14:4F:20:F1:DF
```

4. **Use the `rpm` tool to install the driver on SuSe and RedHat Linux.**

```
# rpm -ivh nxge-2.6.9-55.ELsmp-2.1-1.x86_64.rpm
Preparing...                ########################################### 
[100%]
 1:nxge-2.6.9-55.ELsmp    ###########################################
[100%]
```

5. **Ensure that the driver is loaded after the RPM installation, enter the following:**

```
# lsmod | grep nxge
```

6. **Verify the new network interface instances corresponding to the Sun Dual 10GbE Fabric Expansion Module:**

```
# ifconfig -a | grep eth
eth0      Link encap:Ethernet  HWaddr 00:14:4F:20:F1:DC
eth1      Link encap:Ethernet  HWaddr 00:14:4F:20:F1:DD
eth2      Link encap:Ethernet  HWaddr 00:14:4F:20:F1:DE
eth3      Link encap:Ethernet  HWaddr 00:14:4F:20:F1:DF
eth4      Link encap:Ethernet  HWaddr 00:14:4F:6C:78:E8
eth5      Link encap:Ethernet  HWaddr 00:14:4F:6C:78:E9
```

The Sun Dual 10GbE Fabric Expansion Module instances, `eth2` and `eth3`, appear in the third and fourth lines of the output.

7. **Use the `ethtool` command to check the parameter configurations that apply to the `nxge` driver:**

```
(For 10G)
# ethtool -i eth2
driver: nxge
version: 2.1.1
firmware-version: RFEM PXE1.49 FCode 3.16
bus-info: 0000:0d:00.0
```

▼ To Remove the Driver From a Linux Platform

- **To remove the driver packages from a Linux platform use the `rpm -e` command.**

  For example:

```
# rpm -e nxge-2.6.9-55.ELsmp-2.1-1
```

  If driver package removal is attempted when the driver is not loaded, the removal could fail. For example:

```
# rpm -e nxge-2.6.16.46-0.12-smp-2.1-1.x86_64
ERROR: Removing 'nxge': No such file or directory
error: %postun(nxge-2.6.16.46-0.12-smp-2.1-1.x86_64) scriptlet
failed, exit status 255
```

  In the case of such failure, use the `--noscripts` option as follows.

```
# rpm -e --noscripts nxge-2.6.16.46-0.12-smp-2.1-1.x86_64
```

Downloading and Installing the Windows OS Drivers

The Sun Dual 10GbE Fabric Expansion Module supports the Windows Server 2008 Enterprise Edition 32/64-bit miniport driver. For additional Windows driver release information, refer to the *Sun Multithreaded 10GbE and QGC Networking Cards Specification for Windows xxx Drivers* document.

Note – Installing the Windows OS driver changes the hot-swapping procedure for the Sun Blade 6000 10 GbE Multi-Fabric Network Expansion Module. See "Hot-Swapping a Sun Blade 6000 10GbE Multi-Fabric NEM With Windows OS Driver Installed" on page 9.

The Sun Dual 10GbE Fabric Expansion Module must be installed before you install the Windows Server 2008 Enterprise Edition miniport driver. Without the Sun Dual 10GbE Fabric Expansion Module installed, the Windows OS driver will not install correctly.

To download the Windows OS driver and documentation, go to:
`https://cds.sun.com/is-bin/INTERSHOP.enfinity/WFS/CDS-CDS_SMI-Site/en_US/-/USD/ViewProductDetail-Start?ProductRef=Sunx8Exp-EAD-1.0-G-F@CDS-CDS_SMI`

The zip file looks similar to the following:

```
sun_10_Gigabit_Ethernet_driver_update_xx.zip
```

After unzipping this file, go to `Windows` directory, which contains the documents and driver:

```
Readme.txt                                  User Manual.pdf
Release Notes.txt                  windows_2008_Releasepackage.zip
Sun MulitThreaded 10GbE and QGC Installer.msi
```

Note – Multiple VLANs are not currently supported with the Windows OS driver.

Hot-Swapping a Sun Blade 6000 10GbE Multi-Fabric NEM With Windows OS Driver Installed

This section explains how to remove an existing 10GbE Multi-Fabric NEM and install another in its place.

Caution – Damage to the NEM can occur as the result of careless handling or electrostatic discharge (ESD). Always handle the NEM with care to avoid damage to ESD-sensitive components. To minimize the risk of electrostatic damage, Sun strongly recommends that you use both a workstation antistatic mat and an antistatic wrist strap.

Replacing a 10GbE Multi-Fabric NEM

If an Multi-Fabric NEM fails, you will need to replace it.

Caution – The NEM should be replaced immediately after it fails.

The Multi-Fabric NEM is a Customer Replaceable Unit (CRU). You replace the entire module. There are no subcomponents that you can replace.

You can remove and replace a 10GbE Multi-Fabric NEM from a powered-on chassis using a hot-swap operation, as well as from a powered-off chassis.

Caution – Before you remove the NEM from the chassis, you should pause or shut down any active I/O that passes through the NEM.

Note – The blue Ready to Remove LED on the NEM is not operational. To help identify a NEM that you plan to remove, you can illuminate the white Locate LED using the proxy CLI. For more information, refer to the *Sun Blade 6000 10GbE Multi-Fabric Network Express Module User's Guide*.

▼ To Replace a 10GbE Multi-Fabric NEM

Caution – If you are replacing the NEM while power is applied to the chassis, be sure to have a NEM filler panel ready for use before you remove the NEM. The NEM slot must not be left uncovered for more than a minute while power is active in the chassis.

1. **Double-click the Safely Remove Hardware icon located at the bottom right of the GUI.**
2. **Select the device Sun Muiltithreaded 10GbE & QGE Networking Cards #.**
3. **Click STOP.**
4. **Confirm it is the correct device click OK.**
5. **When the GUI reports that it is safe to remove the hardware, click OK.**
6. **Label all the cables so you can reconnect them in the same location.**
7. **Disconnect all cables from the NEM.**
8. **Press together and hold the ejector buttons on both the right and left ejector levers.**
9. **Open the ejector levers by extending them outward until they stop.**
10. **Hold the opened ejector levers and pull the NEM out.**
11. **Insert the new Multi-Fabric NEM into the chassis.**

12. **Reconnect all the cables in their original locations.**

CHAPTER 3

Installing the Fabric Expansion Module

This chapter describes how to install the Sun Dual 10GbE Fabric Expansion Module in your system and verify that it has been installed correctly.

Note – If you are installing the FEM into a machine running the Solaris 10 OS, you *must* install the software *before* you install the hardware.

Installing the FEM

The following instructions describe the basic tasks required to install the FEM inside a blade server. Refer to your system installation or service manual for detailed FEM installation instructions.

▼ To Install the FEM

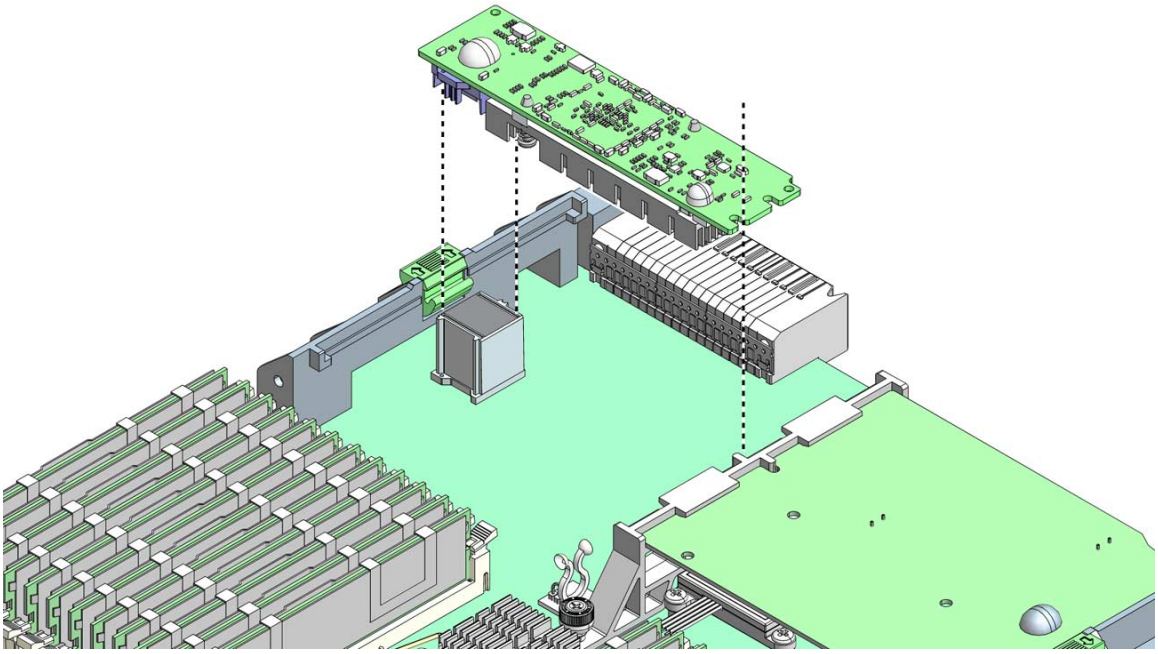
1. **Halt and power off your system.**
2. **Power off all peripherals connected to your system.**
3. **Attach the adhesive copper strip of the antistatic wrist strap to the metal casing of the power supply. Wrap the other end twice around your wrist, with the adhesive side against your skin.**
4. **Remove the main cover of your system.**

5. **Remove the filler cap from the FEM connector.**

   The FEM connector is labeled FEM.

6. **Align the FEM card with the connector and support bracket, then seat it carefully into the slot (**FIGURE 3-1**).**

FIGURE 3-1 Installing the FEM



CHAPTER 4

Configuration Information

If you require more information about the following topics, refer to the *Sun Dual 10GbE XFP PCIe ExpressModule User's Guide*, part number 820-1606.

- Configuring the Network
- Configuring the `nxge` Device Driver Parameters
- Configuring the Jumbo Frames Feature
- Configuring Link Aggregation
- Configuring VLANs

Sun Dual 10GbE XFP PCIe ExpressModule User's Guide URL

`http://docs.sun.com/app/docs/prod/10gbe.xfp.pcie~10gbe-xfp-pem`

APPENDIX **A**

Specifications

This appendix lists the specifications for the Sun Dual 10GbE Fabric Expansion Module. This appendix contains the following sections:

- "Performance Specifications" on page 18
- "Physical Characteristics" on page 18
- "Power Requirements" on page 18

Performance Specifications

TABLE A-1 Performance Specifications

Feature	Specification
Bus type	x8 lane PCI Express 1.1
Bus width	x8 lane PCI Express
Bus speed (x8, encoded rate)	20 Gbit/sec unidirectional; 40 Gbit/sec bidirectional (theoretical)
Maximum Ethernet transfer rate	10 Gbps (full-duplex)
Optics	Optical transceiver is installed in NEM

Physical Characteristics

TABLE A-2 Physical Characteristics of the ExpressMoudle

Dimension	Measurement
Length	139.7 mm (5.5 inches)
Width	21.10 mm (.83 inches)
Height	35 mm (1.38 inches)

Power Requirements

TABLE A-3 Environmental Requirements

Specification	Measurement
Power consumption	10.615W RMS typical 14.151W maximum
Voltage	12V @ 1.18A maximum (0.885A RMS typical) 3.3V @ 0.032A maximum (0.025A RMS typical)

APPENDIX **B**

Diagnostic Software

This appendix provides an overview of the SunVTS diagnostic application and instructions for updating the SunVTS software to recognize the Sun Dual 10GbE Fabric Expansion Module. This appendix contains the following sections:

- "SunVTS Diagnostic Software" on page 19
- "Updating SunVTS to Recognize the FEM" on page 20
- "Using the SunVTS `netlbtest`" on page 20

SunVTS Diagnostic Software

The SunVTS software executes multiple diagnostic hardware tests from a single user interface. SunVTS is used to verify the configuration and functionality of most hardware controllers and devices. The SunVTS software operates primarily from a graphical user interface, enabling test parameters to be set quickly and easily while a diagnostic test operation is being performed.

The SunVTS `nettest` diagnostic can be used to test all of the networking interfaces on the system, including the interfaces on the FEM.

To use the `nettest` diagnostic, you must have the SunVTS software installed on your system. Refer to your Solaris documentation for installation instructions.

Refer to the SunVTS documentation (listed in TABLE B-1) for instructions on how to run and monitor the `nettest` diagnostic. These SunVTS documents are available online at the following URL:

`http://www.sun.com/documentation`

Select the document for the Solaris release on your system.

TABLE B-1 SunVTS Documentation

Title	Description
SunVTS User's Guide	Describes the SunVTS diagnostic environment
SunVTS Test Reference Manual	Describes each SunVTS test (including the `nettest`) and describes the various test options and command-line arguments
SunVTS Quick Reference	Provides an overview of the user interface

Updating SunVTS to Recognize the FEM

Use SunVTS 6.4 PS3 or later. You will need to update the SunVTS configuration to recognize the FEM.

▼ To Update SunVTS to Recognize the FEM

1. **Plug in a loopback cable.**
2. **Ensure that the SunVTS software and the `nxge` driver are installed on your system.**
3. **Add the following lines to the `/opt/SUNWvts/lib/conf/netlbtest.conf` and `/opt/SUNWvts/lib/conf/nettest.conf` files:**

```
nxge nxge 10gbaset
```

Using the SunVTS `netlbtest`

You must have the FEM and the device driver installed, a loopback connector in place, and Intervention mode enabled before running `netlbtest`. `netlbtest` cannot run if the network interface is connected to a live network. `netlbtest` also requires that the Ethernet device be configured offline before running the test. Use the `ifconfig(1M)` command to power down the Ethernet device before running `netlbtest`.

▼ To Use the `netlbtest`

1. **Ensure that the SunVTS software and the `nxge` driver are installed on your system.**
2. **Plug in a loopback cable.**
3. **Unplumb the interface from the system, using the `ifconfig` command:**

```
# ifconfig nxgeinstance down
# ifconfig nxgeinstance unplumb
```

   where *instance* is the instance number of the interface.

   Refer to SunVTS documentation for instructions on how to run `netlbtest`.

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