Sun Dual 10GbE SFP+ PCIe ExpressModule

User's Guide

Sun

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Contents

Regulatory Compliance Statements

Your Sun product is marked to indicate its compliance class:

- Federal Communications Commission (FCC) — USA
- Industry Canada Equipment Standard for Digital Equipment (ICES-003) — Canada
- Voluntary Control Council for Interference (VCCI) — Japan
- Bureau of Standards Metrology and Inspection (BSMI) — Taiwan

Please read the appropriate section that corresponds to the marking on your Sun product before attempting to install the product.

FCC Class A Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Modifications: Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

ICES-003 Class A Notice - Avis NMB-003, Classe A

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

VCCI 基準について

クラス A VCCI 基準について

クラス A VCCI の表示があるワークステーションおよびオプション製品は、クラス A 情報技術装置です。これらの製品には、下記の項目が該当します。

この装置は、情報処理装置等電波障害自主規制協議会 (VCCI) の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

BSMI Class A Notice

The following statement is applicable to products shipped to Taiwan and marked as Class A on the product compliance label.

警告使用者：

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

CCC Class A Notice

The following statement is applicable to products shipped to China and marked with "Class A" on the product's compliance label.

以下声明适用于运往中国且其认证标志上注有 "Class A" 字样的产品。

声明
此为A级产品，在生活环境中，该产品可能会造成无线电干扰。
在这种情况下，可能需要用户 对其干扰采取切实可行的措施。

GOST-R Certification Mark
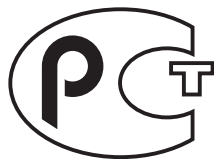
Declaration of Conformity

Compliance Model Number: 5945532
Product Family Name: Sun Dual 10GbE SFP+ PCIe ExpressModule

EMC

USA—FCC Class A

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
1. This equipment may not cause harmful interference.
2. This equipment must accept any interference that may cause undesired operation.

Canada

This Class A digital apparatus complies with Canadian ICES-003.

European Union

This equipment complies with the following requirements of the EMC Directive 2004/108/EC:

As Information Technology Equipment (ITE) Class A per (as applicable):

EN 55022:2006	Class A
EN 61000-3-2:2000 +A2:2005	Pass
EN 61000-3-3:1995 +A1:2001	Pass
EN 55024:1998 +A1:2001 +A2:2003 Required Limits:	
IEC61000-4-2	4 kV (Direct), 8 kV (Air)
IEC61000-4-3	3 V/m
IEC61000-4-4	1 kV AC Power Lines, 0.5 kV Signal and DC Power Lines
IEC61000-4-5	1 kV AC Line-Line and Outdoor Signal Lines, 2 kV AC Line-Gnd, 0.5 kV DC Power Lines
IEC61000-4-6	3 V
IEC61000-4-8	1 A/m
IEC61000-4-11	Pass

Safety

This equipment complies with the following requirements of the Low Voltage Directive2006/95/EC:

EC Type Examination Certificates:		
EN 60950-1:2001, 1st Edition		
IEC 60950-1:2001, 1st Edition	CB Scheme Certificate No. NO47596	
Evaluated to all CB Countries		
UL 60950-1:2003, CSA C22.2 No. 60950-03	File: E139761	Vol. 7

Supplementary Information

This equipment was tested and complies with all the requirements for the CE Mark.
This equipment complies with the Restriction of Hazardous Substances (RoHS) directive 2002/95/EC.

/S/
Dennis P. Symanski   DATE
Worldwide Compliance Office
Sun Microsystems, Inc.
4150 Network Circle, MPK15-102

Safety Agency Compliance Statements

Read this section before beginning any procedure. The following text provides safety precautions to follow when installing a Sun Microsystems product.

Safety Precautions

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all cautions and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

Symbols

The following symbols may appear in this book:

Caution – There is a risk of personal injury and equipment damage. Follow the instructions.

Caution – Hot surface. Avoid contact. Surfaces are hot and may cause personal injury if touched.

Caution – Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.

Depending on the type of power switch your device has, one of the following symbols may be used:

On – Applies AC power to the system.

Off – Removes AC power from the system.

Standby – The On/Standby switch is in the standby position.

Modifications to Equipment

Do not make mechanical or electrical modifications to the equipment. Sun Microsystems is not responsible for regulatory compliance of a modified Sun product.

Placement of a Sun Product

Caution – Do not block or cover the openings of your Sun product. Never place a Sun product near a radiator or heat register. Failure to follow these guidelines can cause overheating and affect the reliability of your Sun product.

System Unit Cover

You must remove the cover of your Sun computer system unit to add cards, memory, or internal storage devices. Be sure to replace the cover before powering on your computer system.

Caution – Do not operate Sun products without the cover in place. Failure to take this precaution may result in personal injury and system damage.

Conformité aux normes de sécurité

Veuillez lire attentivement cette section avant de commencer. Ce texte traite des mesures de sécurité qu'il convient de prendre pour l'installation d'un produit Sun Microsystems.

Mesures de sécurité

Pour votre sécurité, nous vous recommandons de suivre scrupuleusement les mesures de sécurité ci-dessous lorsque vous installez votre matériel:

- Suivez tous les avertissements et toutes les instructions inscrites sur le matériel.

- Assurez-vous que la tension et la fréquence de votre source d'alimentation correspondent à la tension et à la fréquence indiquées sur l'étiquette de la tension électrique nominale du matériel

- N'introduisez jamais d'objets quels qu'ils soient dans les ouvertures de l'équipement. Vous pourriez vous trouver en présence de hautes tensions dangereuses. Tout objet étranger conducteur risque de produire un court-circuit pouvant présenter un risque d'incendie ou de décharge électrique, ou susceptible d'endommager le matériel.

Symboles

Vous trouverez ci-dessous la signification des différents symboles utilisés:

Attention – Vous risquez d'endommager le matériel ou de vous blesser. Veuillez suivre les instructions.

Attention – Surfaces brûlantes. Evitez tout contact. Les surfaces sont brûlantes. Vous risquez de vous blesser si vous les touchez.

Attention – Tensions dangereuses. Pour réduire les risques de décharge électrique et de danger physique, observez les consignes indiquées.

Selon le type d'interrupteur marche/arrêt dont votre appareil est équipé, l'un des symboles suivants sera utilisé:

Marche – Met le système sous tension alternative.

Arret – Met le système hors tension alternative.

Veilleuse – L'interrupteur Marche/Veille est sur la position de veille.

Modification du matériel

N'apportez aucune modification mécanique ou électrique au matériel. Sun Microsystems décline toute responsabilité quant à la non-conformité éventuelle d'un produit Sun modifié.

Positionnement d'un produit Sun

Attention – Evitez d'obstruer ou de recouvrir les orifices de votre produit Sun. N'installez jamais un produit Sun près d'un radiateur ou d'une source de chaleur. Si vous ne respectez pas ces consignes, votre produit Sun risque de surchauffer et son fonctionnement en sera altéré.

Couvercle de l'unité

Pour ajouter des cartes, de la mémoire ou des périphériques de stockage internes, vous devez retirer le couvercle de votre système Sun. Remettez le couvercle supérieur en place avant de mettre votre système sous tension.

Attention – Ne mettez jamais des produits Sun sous tension si leur couvercle supérieur n'est pas mis en place. Si vous ne prenez pas ces précautions, vous risquez de vous blesser ou d'endommager le système.

Einhaltung sicherheitsbehördlicher Vorschriften

Lesen Sie vor dem Ausführen von Arbeiten diesen Abschnitt. Im folgenden Text werden Sicherheitsvorkehrungen beschrieben, die Sie bei der Installation eines Sun Microsystems-Produkts beachten müssen.

Sicherheitsvorkehrungen

Treffen Sie zu Ihrem eigenen Schutz bei der Installation des Geräts die folgenden Sicherheitsvorkehrungen:

- Beachten Sie alle auf den Geräten angebrachten Warnhinweise und Anweisungen.
- Stellen Sie sicher, dass Spannung und Frequenz der Stromversorgung den Nennleistungen auf dem am Gerät angebrachten Etikett entsprechen.
- Führen Sie niemals Fremdobjekte in die Öffnungen am Gerät ein. Es können gefährliche Spannungen anliegen. Leitfähige Fremdobjekte können einen Kurzschluss verursachen, der einen Brand, Stromschlag oder Geräteschaden herbeiführen kann.

Symbole

Die Symbole in diesem Handbuch haben folgende Bedeutung:

Achtung – Gefahr von Verletzung und Geräteschaden. Befolgen Sie die Anweisungen.

Achtung – Heiße Oberfläche. Nicht berühren, da Verletzungsgefahr durch heiße Oberfläche besteht.

Achtung – Gefährliche Spannungen. Befolgen Sie die Anweisungen, um Stromschläge und Verletzungen zu vermeiden.

Je nach Netzschaltertyp an Ihrem Gerät kann eines der folgenden Symbole verwendet werden:

Ein – Versorgt das System mit Wechselstrom.

Aus– Unterbricht die Wechselstromzufuhr zum Gerät.

Wartezustand – Der Ein-/Standby-Netzschalter befindet sich in der Standby-Position.

Modifikationen des Geräts

Nehmen Sie keine elektrischen oder mechanischen Gerätemodifikationen vor. Sun Microsystems ist für die Einhaltung der Sicherheitsvorschriften von modifizierten Sun-Produkten nicht haftbar.

Gehäuseabdeckung

Sie müssen die Abdeckung Ihres Sun-Computersystems entfernen, um Karten, Speicher oder interne Speichergeräte hinzuzufügen. Bringen Sie vor dem Einschalten des Systems die Gehäuseabdeckung wieder an.

Achtung – Nehmen Sie Sun-Geräte nicht ohne Abdeckung in Betrieb. Die Nichtbeachtung dieses Warnhinweises kann Verletzungen oder Geräteschaden zur Folge haben.

Normativas de seguridad

Lea esta sección antes de realizar cualquier operación. En ella se explican las medidas de seguridad que debe tomar al instalar un producto de Sun Microsystems.

Medidas de seguridad

Para su protección, tome las medidas de seguridad siguientes durante la instalación del equipo:

- Siga todos los avisos e instrucciones indicados en el equipo.
- Asegúrese de que el voltaje y frecuencia de la fuente de alimentación coincidan con el voltaje y frecuencia indicados en la etiqueta de clasificación eléctrica del equipo.
- No introduzca objetos de ningún tipo por las rejillas del equipo, ya que puede quedar expuesto a voltajes peligrosos. Los objetos conductores extraños pueden producir cortocircuitos y, en consecuencia, incendios, descargas eléctricas o daños en el equipo.

Símbolos

En este documento aparecen los siguientes símbolos:

Precaución – Existe el riesgo de que se produzcan lesiones personales y daños en el equipo. Siga las instrucciones.

Precaución – Superficie caliente. Evite todo contacto. Las superficies están calientes y pueden causar lesiones personales si se tocan.

Precaución – Voltaje peligroso. Para reducir el riesgo de descargas eléctricas y lesiones personales, siga las instrucciones.

En función del tipo de interruptor de alimentación del que disponga el dispositivo, se utilizará uno de los símbolos siguientes:

Encendido – Suministra alimentación de CA al sistema.

Apagado – Corta la alimentación de CA del sistema.

Espera – El interruptor de encendido/espera está en la posición de espera.

Modificaciones en el equipo

No realice modificaciones de tipo mecánico ni eléctrico en el equipo. Sun Microsystems no se hace responsable del cumplimiento de normativas en caso de que un producto Sun se haya modificado.

Colocación de un producto Sun

Precaución – No obstruya ni tape las rejillas del producto Sun. Nunca coloque un producto Sun cerca de radiadores ni fuentes de calor. Si no sigue estas indicaciones, el producto Sun podría sobrecalentarse y la fiabilidad de su funcionamiento se vería afectada.

Using This Documentation

This user's guide provides hardware and software installation instructions for Oracle's Sun Dual 10GbE SFP+ PCIe Express Module.

This document also describes how to configure the driver software for the `ixgbe` driver for Solaris, Linux, and Microsoft Windows Server 2003 operating systems.

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

Note – In this document the term x86 refers to 64-bit and 32-bit systems manufactured using processors compatible with the SPARC, AMD64, Intel Xeon, or Intel Pentium product families.

Related Documentation

Online documents specific to this product are available at:

http://docs.sun.com/app/docs/prod/dual.sfp.pcie

Application	Title	Part Number	Format	Location
Release Notes	*Sun 10GbE XFP SR PCI Express Card, Sun Dual 10GbE XFP 2 SR PCI Express Card, and Sun Dual 10GbE SFP+ PCIe ExpressModule Release Notes*	820-4505	PDF HTML	Online

Documentation, Support, and Training

These web sites provide additional resources:

■ Documentation http://docs.sun.com/

■ Support http://www.sun.com/support/

■ Training http://www.sun.com/training/

Documentation Feedback

Submit comments about this document by clicking the Feedback[+] link at http://docs.sun.com. Include the title and part number of your document with your feedback:

Sun Dual 10GbE SFP+ PCIe ExpressModule User's Guide, part number *820-4979-12*.

Sun Dual 10GbE SFP+ PCIe ExpressModule Overview

This chapter describes the Sun 10GbE XFP SR PCI Express Card hardware and software, and includes the following sections:

- "Shipping Kit Contents" on page 1
- "ExpressModule Hardware Overview" on page 1
- "Hardware and Software Requirements" on page 5
- "Patches and Updates" on page 6

Shipping Kit Contents

The carton in which your Sun 10GbE XFP SR PCI Express Card was shipped should contain the following items:

- Sun 10GbE XFP SR PCI Express Card
- *Sun Dual 10GbE SFP+ PCIe ExpressModule Getting Started Guide*
- *Safety and Compliance Manual*

ExpressModule Hardware Overview

The Sun 10GbE XFP SR PCI Express Card is a 10 Gigabit Ethernet (10GbE) fiber network interface card (NIC) for PCI Express systems. The ExpressModule is based on the dual-port Intel 82598EB 10GbE controller.

The ExpressModule is optimized for Intel I/O Acceleration Technology (I/OAT), which is designed to optimize network I/O. The ExpressModule is a high-performance, highly integrated 10 Gigabit Ethernet LAN card with PCIe host interface and fiber LAN connectors on the optical modules.

The product conforms to the IEEE 802.3 standard and supports standards for system manageability and power management.

FIGURE 1-1 Sun Dual 10GbE SFP+ PCIe ExpressModule, shown unpopulated. See also FIGURE 3-1 and FIGURE 3-2, which show a populated transceiver.
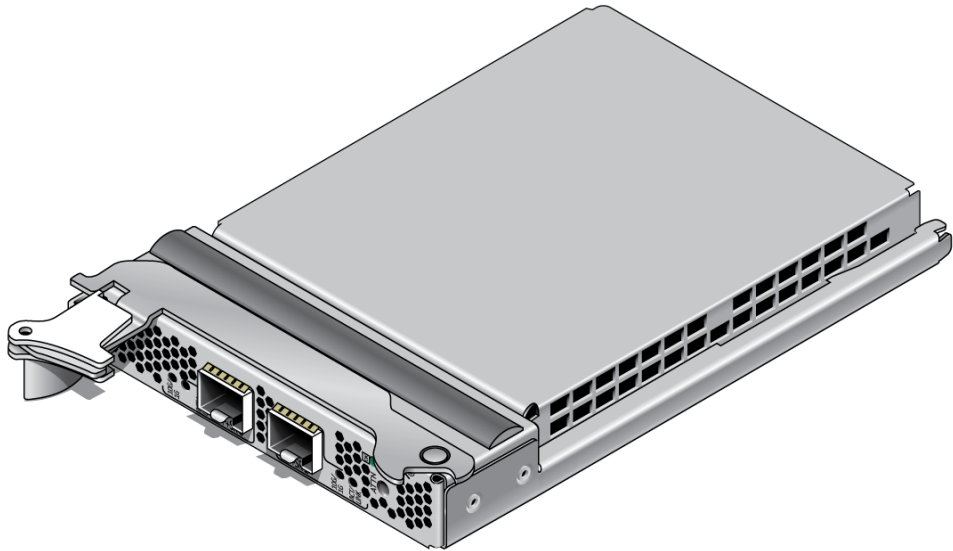
ExpressModule Features

The Sun 10GbE XFP SR PCI Express Card provides the following features and benefits:

- Intel 82598EB 10 Gigabit Ethernet controller
- Load balancing on multiple CPUs
- Intel I/O Acceleration Technology (I/OAT)
- iSCSI remote boot support
- MSI-X support
- Virtual Machine Device queues (VMDq)
- Low latency
- Optimized queues – 32 transmit (Tx) and 64 receive (Rx) per port

- Support for most network operating systems (NOS)
- Remote management support
- Support for SFP+ form factor transceivers
- RoHS compliant, lead-free technology
- Intel PROSet Utility for Windows Device Manager

Indicator Lights on the ExpressModule

On the front panel of the ExpressModule (shown in FIGURE 1-2) next to each port, there are viewing holes for two lights dedicated to that port. TABLE 1-1 explains the meaning of the lights for each port.

FIGURE 1-2 Front Panel Lights and Attention Switch on a transceiver, shown unpopulated. See also FIGURE 3-1 and FIGURE 3-2, which show a populated transceiver.
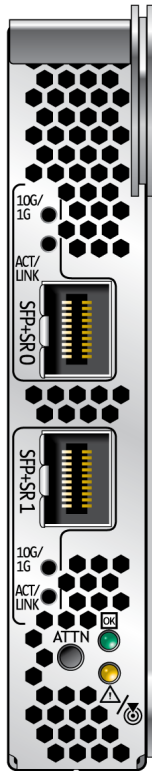
TABLE 1-1 Indicator Lights for Each Port on the ExpressModule

Label	Color	Meaning
ACT/LINK	Green	Activity
10G/1G	Green	10GbE link
10G/1G	Amber	1GbE link

Two LEDs are on the ExpressModule next to the Attention switch. One LED emits green light, the LED other emits amber light. Each light can be on, off, or blinking. TABLE 1-2 explains the meaning of these lights.

TABLE 1-2 LED Indicator Lights on the ExpressModule

LED Color	LED State	Meaning	Action
Green	Off	Power off	Insertion or removal of add-in cards is permitted. All supply voltages (except Vaux) have been removed from the slot if required for add-in card removal.
Green	On	Power on	The slot is powered on. Insertion or removal of add-in cards is not permitted.
Green	Blinking	Power transition	The slot is in the process of powering up or down. Insertion of removal of add-in cards is not permitted.
Amber	Off	Normal	Operation is normal.
Amber	On	Attention	There is an operation problem at this slot.
Amber	Blinking	Locate	This slot is being identified at user request.

Note – The Attention switch currently is not supported.

Hardware and Software Requirements

Before using the Sun 10GbE XFP SR PCI Express Card, ensure that your system meets the hardware and software requirements in TABLE 1-3.

TABLE 1-3   Hardware and OS Requirements

Supported Hardware and Operating Systems	Supported Products
Hardware, SPARC-based	Sun SPARC Enterprise X6300 Server Sun SPARC Enterprise X6340 Server Sun SPARC Enterprise X6450 Server
Hardware, other	Sun Blade X6240 Server Module Sun Blade X6250 Server Module Sun Blade X6440 Server Module Sun Blade X6450 Server Module*
Operating system	Solaris OS – See the ExpressModule Release Notes for the latest information about Solaris OS support. Red Hat Enterprise Linux 5.1 (32-bit and 64-bit) Red Hat Enterprise Linux 4.6 (32-bit and 64-bit) SUSE 10-Sp1 (64-bit) Microsoft Windows 2008 (32-bit and 64-bit) Microsoft Windows 2003 (32-bit and 64-bit)

* The Sun Blade X6450 Server Module supports only Solaris and Linux operating systems.

Note that hardware and software support changes over time. For the latest information concerning I/O options supported by your server, check:

http://www.sun.com

Patches and Updates

Check the Sun Update Connection to ensure that you have the latest recommended patch clusters and security patches. You can download the latest recommended patch clusters and security patches at:

http://sunsolve.sun.com/pub-cgi/show.pl?target=patchpage

Search for keyword **ixgbe**.

In addition:

- Check the product site at:

    http://www.sun.com/products/networking/ethernet.jsp
- To download the most recent drivers for the Solaris OS, go to:

    http://www.sun.com/download
- To download the most recent drivers for Windows or a Linux OS, go to:

http://www.intel.com/support/network/adapter

Installing and Setting Up the Device Driver Software

The `ixgbe` device driver software comes bundled with Solaris software. This chapter explains how to verify the `ixgbe` device driver software is present on an x86 or SPARC system that uses the Solaris OS, and how to download and install the `ixgbe` driver on Solaris, Linux and Microsoft Windows systems. This chapter contains the following sections:

Verifying, Installing, and Removing the Driver on a Solaris Platform

Note – Please see the latest Release Notes for information about which versions of the Solaris OS support the driver for this product.

The driver for this product comes bundled with the versions of the Solaris OS that support it. Therefore, downloading of the driver is not required.

Check the version of the driver to ensure the Sun PCI Express card is properly loaded and is recognized by the Solaris OS.

▼ To Check the Driver Version on a Solaris Platform

- **Check that the version of the `ixgbe` driver is no older than 1.0.4:**

```
modinfo | grep ixgbe
226 fffffffff3f0f000  151b8  67   1  ixgbe (Intel 10Gb Ethernet 1.0.4)
```

Note – If the version number is older than 1.0.4, you must install the latest driver patch. See "Patches and Updates" on page 6.

▼ To Install the Driver for a Solaris Platform

The driver comes bundled with the Solaris OS. However, check for and install the latest patches.

- **Apply the necessary patch to get the latest driver.**

  ```
  # patchadd /absolute_path/patchID
  ```

  See `patchadd`(1M).

▼ To Remove the Driver for a Solaris Platform

- **Remove the driver.**

  ```
  # pkgrm SUNWixgbe
  ```

  See `pkgrm`(1M).

Downloading, Installing and Removing the Driver on a Linux Platform

If your system uses the RedHat or SuSe Linux operating system, you must download the `ixgbe` device driver to install it.

▼ To Download the Driver for a Linux Platform

1. **Log in to your system.**

2. **With a browser, go to this location:**

http://support.intel.com/support/network/adapter/10gbe/srdualserverxpr/

3. **Select the following product:**

   Intel 10 Gigabit XF SR Dual Port ExpressModule

4. **Select this option:**

   Download drivers and software

5. **Select Linux as the operating system.**

6. **Locate the following driver and select Download:**

   Network Adapter Driver for 10 GbE PCI-E Based Network Connections for Linux

7. **Review and accept the software license agreement.**

8. **Select this option:**

   Download Network Adapter Driver for 10 GbE PCI-E Based Network Connections for Linux

   The download begins. The file named `ixgbe-x.x.x.x.tar.gz` is saved in the `~/Desktop` directory of your system.

Note – The primary driver link is buildable source archive that works with Linux 2.6.x kernels only and requires that the currently running kernel match the SRC RPM kernel files and headers in order to build the driver. See the bundled README file in the unpacked archive from Intel for more information.

▼ To Install the Driver for a Linux Platform

For this procedure, assume the file is file is named `ixgbe-1.3.16.1.tar.gz`. The actual file might have different version or subversion numbers.

1. **Copy the file containing the driver from** `~/Desktop` **to** `/temp`**.**

2. **Uncompress and untar the file.**

```
# tar -zxvf ixgbe-1.3.16.1.tar.gz
```

3. **Go to the newly created** `src` **directory:**

```
# cd /temp/ixgbe-1.3.16.1/src
```

4. **Compile the driver source file with these commands:**

```
# make
# make install
```

5. **Load the** `ixgbe` **driver with the** `modprobe` **command:**

```
# modprobe ixgbe
```

6. **Verify that the** `ixgbe` **driver has been successfully installed with this** `lsmod` **command:**

```
# lsmod | grep ixgbe
```

The output should be similar to the following:

```
ixgbe               118052  0
```

7. **Check the** `ixgbe` **driver version with this** `modinfo` **command:**

```
# modinfo ixgbe | grep ver
```

For example, the output might be the following:

```
filename:        /lib/modules/2.6.18-53.el5/kernel/drivers/net/ixgbe/ixgbe.ko
version:         1.3.16.1-lro
description:     Intel(R) 10 Gigabit PCI Express Network Driver
srcversion:      5CFF6AEBA251050F8A4B746
vermagic:        2.6.18-53.el5 SMP mod_unload gcc-4.1
```

▼ To Remove the Driver From a Linux Platform

● **Use the** `rmmod` **command:**

```
# rmmod ixgbe
```

Downloading, Installing and Removing the Driver on a Microsoft Windows Platform

If your system uses the Microsoft Windows Server 2003 operating system, perform the following procedures to download and install the device driver.

▼ To Download and Install the Driver on a Microsoft Windows Platform

1. **Log in to your system.**

2. **With a browser, go to this location:**

   `http://support.intel.com/support/network/adapter/10gbe/srdualserverxpr/`

3. **Select the following product:**

   Intel 10 Gigabit XF SR Dual Port ExpressModule

4. **Select this option:**

   Download drivers and software

5. **Select one of the following as the operating system:**

   - **For a 64-bit driver:** Windows Server 2003 Standard x64 Edition
   - **For a 32-bit driver:** Windows Server 2003 Standard Edition

6. **Locate one of the following and select Download next to it:**

   - **For a 64-bit driver:** Network Adapter Driver for Windows XP Professional x64 Edition or Windows Server 2003 x64 Edition
   - **For a 32-bit driver:** Network Adapter Drivers for Windows 2000, Windows XP, and Windows Server 2003

7. **Review and accept the software license agreement.**

8. **Select one of the following to start the download:**

   - Download Network Adapter Driver for Windows XP Professional x64 Edition or Windows Server 2003 x64 Edition

- Download Network Adapter Drivers for Windows 2000, Windows XP, and Windows Server 2003

The download begins.

9. **Click on the following** `exe` **files to install the driver:**
   - **For a 64-bit driver:** `PROEM64T.exe`
   - **For a 32-bit driver:** `PRO2KXP.exe`

10. **Follow the instructions in the installation wizard.**

11. **If the Found New Hardware Wizard screen is displayed, click Cancel.**

    The autorun automatically runs after you have extracted the files.

▼ To Remove the Driver From a Microsoft Windows Platform

1. **From the Control Panel, double-click Add/Remove Programs.**

2. **Select Intel PRO Network Connections Drivers.**

3. **Click Add/Remove.**

4. **When the confirmation dialog displays, click OK.**

Installing the ExpressModule

This chapter describes how to install the ExpressModule in your system and verify that it is recognized by the operating system.

This chapter contains the following sections:

- "Installing an Optical Transceiver" on page 13
- "Installing the ExpressModule" on page 16
- "Verifying the Installation" on page 19

Installing an Optical Transceiver

The Sun 10GbE XFP SR PCI Express Card requires a short-range optical transceiver in at least one port to create an Ethernet connection. The short-range optical transceiver (part number X5561A-Z) is available from Sun Microsystems.

Note – Install the optical transceivers into the ExpressModule *before* installing the ExpressModule into the system.

▼ To Install an Optical Transceiver

1. **Pull the locking handle into the full horizontal position.**

   You will feel the handle click into position when it is fully opened.

FIGURE 3-1 Opening the Transceiver Handle
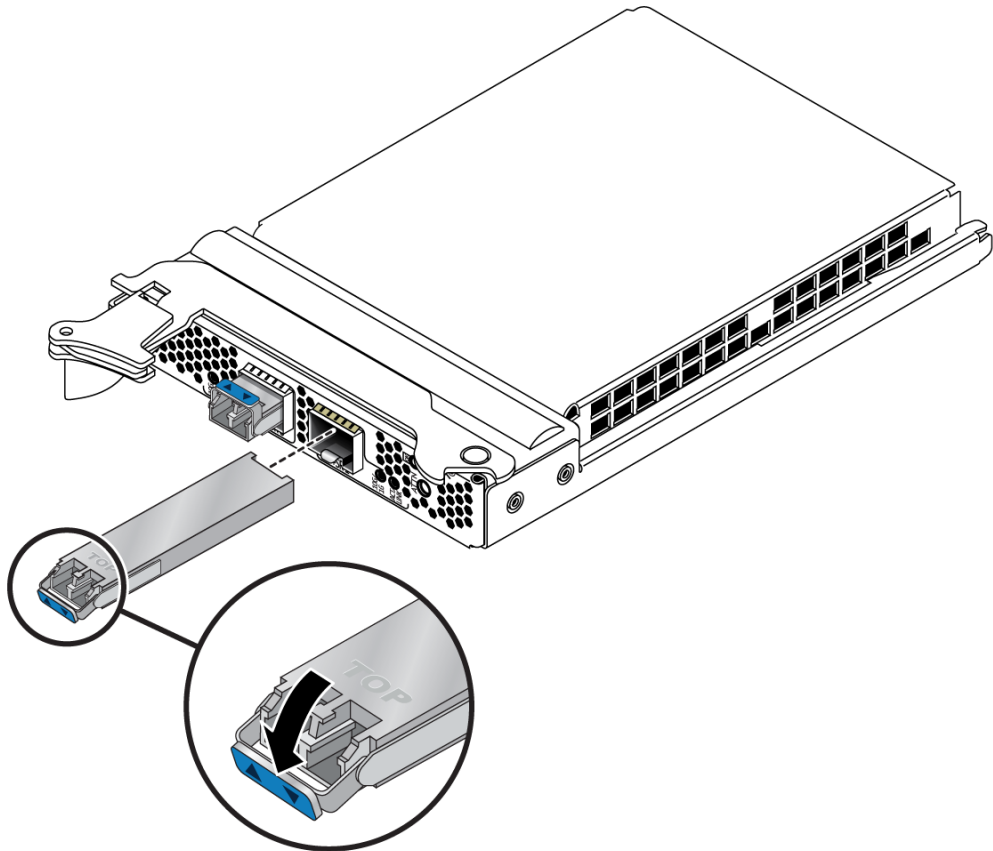
2. **Holding the optical transceiver by the edges, align the transceiver with the slot in the ExpressModule and slide the transceiver into the opening.**

3. **Applying even pressure at both corners of the transceiver, push the transceiver until it is firmly seated in the slot.**

4. **Push the handle closed to lock the optical transceiver in place.**

FIGURE 3-2   Closing the Transceiver Handle
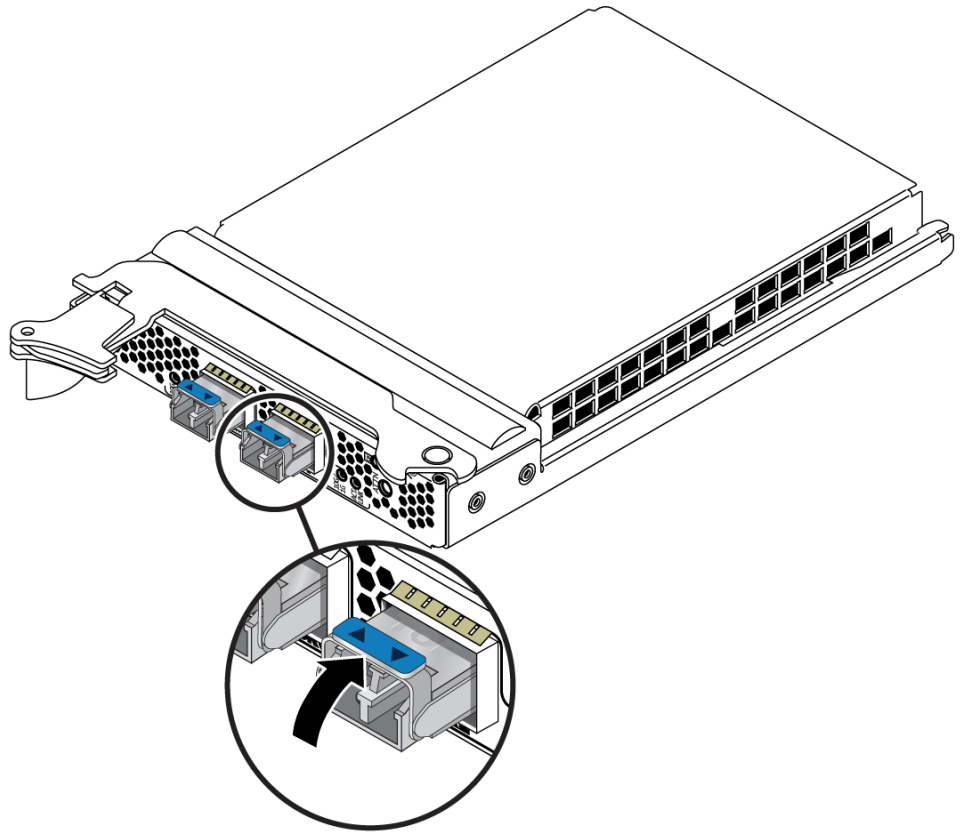
5. Repeat Step 1 **through** Step 4 **to install the second optical transceiver.**

Caution – If you pull the locking handle down when the optical transceiver is installed, remove the optical transceiver entirely and reinstall it. The handle operates an internal lock. Pulling the handle down can disconnect the optical transceiver, even though it might appear to be connected.

Installing the ExpressModule

The following instructions describe the basic tasks required to install the ExpressModule. Refer to your system installation or service manual for detailed ExpressModule installation instructions.

Note – To maintain proper cooling for the ExpressModule in your chassis, all ExpressModule slots must be filled with either operating ExpressModules or filler panels.

▼ To Install the ExpressModule With the Power Off

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 filler panel from the ExpressModule opening.**

5. **Open the latch on the ExpressModule.**

FIGURE 3-3   Opening the ExpressModule Latch
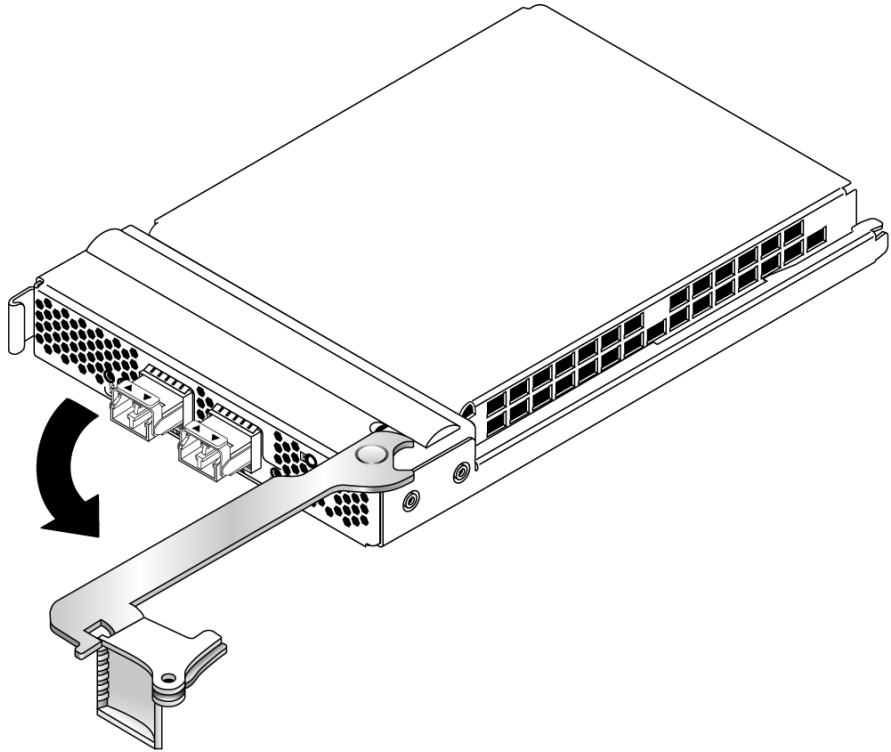
6. **Align the ExpressModule with the vacant ExpressModule slot (1 in the following figure).**

   Ensure that the ExpressModule's indicator lights on the front panel are facing toward you and that the ExpressModule ejector lever on the bottom is fully opened.

FIGURE 3-4   Aligning the ExpressModule and Slot
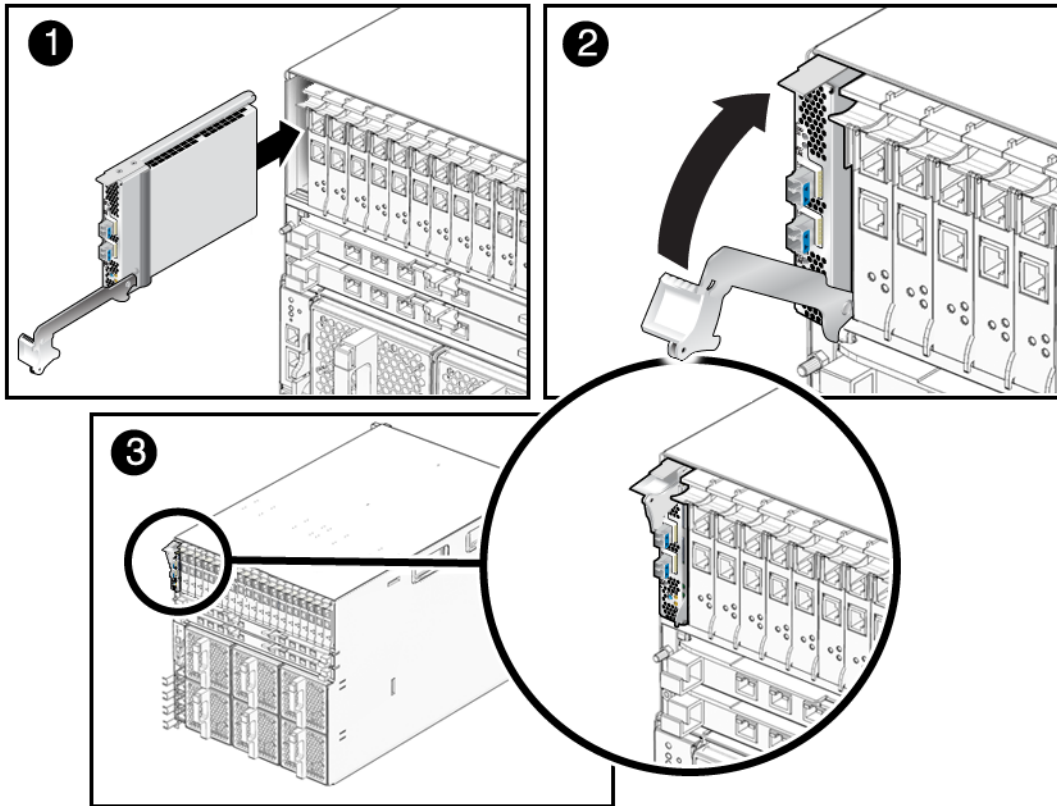
7. **Slide the ExpressModule into the vacant ExpressModule chassis slot until the ejector lever engages and starts to close (2 in the preceding figure).**

   Failure to align the ExpressModule correctly can result in damage with the ExpressModule's internal connection to the chassis midplane.

8. **Complete the installation by closing the ejector lever until the latch snaps into place (3 in the preceding figure).**

Caution – Do not use excessive force when installing the ExpressModule into the slot. You might damage the ExpressModule's connector. If the ExpressModule does not seat properly when you apply even pressure, remove and carefully reinstall the ExpressModule.

9. **Detach the wrist strap.**

10. **Connect the Ethernet cables.**

FIGURE 3-5   Connecting the Ethernet Cables
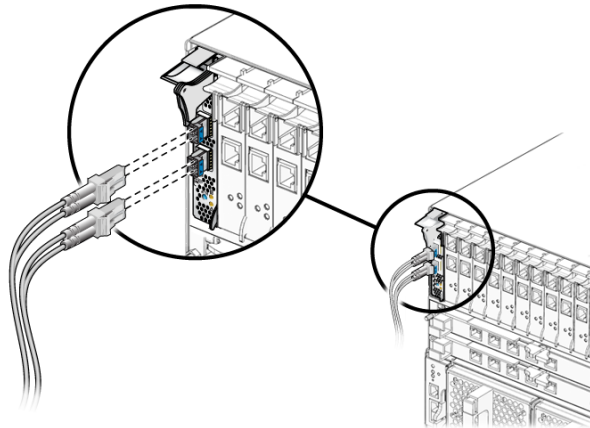
Verifying the Installation

After you have installed the Sun 10GbE XFP SR PCI Express Card, perform the following tasks to verify the installation.

▼ To Verify the Installation on a Solaris System

1. **Power on the system.**

2. **Check the driver version on your system.**

```
# modinfo|grep ixgbe
226 fffffffff3f0f000  151b8  67   1  ixgbe (Intel 10Gb Ethernet 1.0.4)
```

3. **Check to see if the card is properly installed and recognized by the OS:**

```
# grep ixgbe /etc/path_to_inst
```

If the card is properly installed, you will see output similar to the following:

```
"/pci@0,0/pci10de,376@a/pci108e,f35f@0" 0 "ixgbe"
"/pci@79,0/pci10de,376@a/pci108e,f25f@0" 1 "ixgbe"
"/pci@79,0/pci10de,376@a/pci108e,f25f@0,1" 2 "ixgbe"
```

▼ To Verify the Installation in a Linux System

● **Verify the new network interface instances corresponding to the Sun 10GbE XFP SR PCI Express Card:**

```
# ifconfig -a | grep eth

eth3    Link encap:Ethernet   HWaddr 00:1B:21:17:67:B0
eth4    Link encap:Ethernet   HWaddr 00:1B:21:17:67:9B
```

▼ To Verify the Installation in a Microsoft Windows System

1. **Click on Control Panel.**

2. **Click on Network Connection.**

   The Ethernet adapter interfaces labeled as "Intel(R) 82598EB 10 Gigabit AF Dual Port Network Connection" will be displayed at the Network Connection window screen, if the driver is installed successfully.

3. **To check the driver version, use the Administration Tool.**

   The minimum Windows Server 2003 driver version is `1.2.22.0`.

4. **In the Administration Tool click Computer Management, Device Manager, and Network Adapter.**

Network Configuration

This chapter describes how to edit the network host files after the card has been installed on your system. This chapter contains the following section:

Note – To do a PXE boot (or netboot) on a dual-port card, you *must* use the topmost port. That port is the logical Port 0, and it has the lowest MAC address.

Configuring the Network Host Files for a Solaris System

After installing the driver software, you must plumb up the `card` by using either of the following methods:

- For each `card` (using instance number), create a file named `/etc/hostname.ixgbe#`. When the Solaris OS is booted up, each of these `ixgbe cards` is plumbed up automatically. (See .)
- Use the `ifconfig` command to plumb up the `ixgbe` card. (See .)

▼ To Configure the Network Host Files by Creating `/etc/hostname.ixgbe#` Files

> **Note –** Use this procedure to configure the network host files permanently. The new settings will be restored at each reboot.

1. **Create a file named** `/etc/hostname.ixgbe#` **for each ixgbe interface.**

   Where **#** is the interface's instance number.

2. **Edit the** `/etc/hosts` **file to include an IP address and host name for each** `ixgbe` **interface.**

3. **Boot the Solaris OS.**

   The `ixgbe` interfaces will be plumbed up automatically when you boot.

▼ To Configure the Network Host Files Using the `ifconfig` Command

> **Note –** Use this procedure to configure the network host files dynamically on the command line. At reboot, the settings will revert.

1. **Create a file named** `/etc/hostname.ixgbe#` **for each ixgbe interface, where #** **is the ixgbe interface instance number you plan to use.**

   For example, to bring up ixgbe0 at boot, create a file called `/etc/hostname.ixgbe0`, where 0 is the number of the ixgbe interface. If the instance number were 1, the filename would be `/etc/hostname.ixgbe1`. The `/etc/hostname.ixgbe#` file must contain the host name for the appropriate ixgbe interface.

2. **At the command line, use the** `dladm` **command to get the** `ixgbe` **instances:**

```
# dladm show-dev
```

The output might include lines similar to the following:

```
ixgbe0 link: up speed: 10000 Mbps duplex: full
nge0 link: up speed: 1000 Mbps duplex: full
nge1 link: down speed: 0 Mbps duplex: unknown
ixgbe1 link: up speed: 10000 Mbps duplex: full
ixgbe2 link: up speed: 10000 Mbps duplex: full
```

3. **Use the** `ifconfig` **command to set up the adapter's** `ixgbe` **interfaces.**

   Your ifconfig command might look similar to the following:

```
# ifconfig ixgbe0 plumb ip_address netmask [255.255.255.0] broadcast + up
```

   For more information, see `ifconfig`(1M).

▼ To Boot Over the Network using PXE

- **See "x86: Overview of Booting and Installing Over the Network With PXE" in the** *Solaris 10 Installation Guide: Network-Based Installations***:**

  http://docs.sun.com/app/docs/doc/817-5504

Configuring the Network Host Files for Booting Over the Gigabit Ethernet Network for Linux Systems

▼ To Boot Over the Network on Linux Systems

1. **Obtain the MAC address of the first Sun 10GbE XFP SR PCI Express Card port by checking the label of the card.**

   For the dual-port card, the MAC address on the label is for the first port. The second port's MAC address is the MAC address from the label, plus 1.

2. **Set up the PXE boot server with the MAC addresses.**

3. **Plug the Ethernet cable into the card port.**

4. **Power on the system.**

5. **Press the F2 key or the Control-E keys to go to the BIOS.**

6. **Check and ensure that the boot order of the network devices is higher than the hard drive.**

7. **Press the F10 key to save the boot configuration changes and exit.**

   The system should reboot after saving the boot configuration.

8. **Press the F12 key to install the OS from the network.**

   If the cable is connected to the correct port, you should see the MAC address that you assigned to your PXE server displayed by BIOS.

```
image : pxe-mac-addr
PXE-E61: Media test failure, check cable
PXE-MOF: Exiting Intel Boot Agent.

NVIDIA Boot Agent 217.0513
Copyright (C) 2001-2005) NVIDIA Corporation
Copyright (C) 1997-2000) NVIDIA Corporation
PXE-E61: Media test failure, check cable
PXE-MOF: Exiting Intel Boot Agent.

NVIDIA Boot Agent 217.0513
Copyright (C) 2001-2005) NVIDIA Corporation
Copyright (C) 1997-2000) NVIDIA Corporation
PXE-E61: Media test failure, check cable
PXE-MOF: Exiting Intel Boot Agent.

Intel (R) Boot Agent GE v1.2.43 Beta-1
Copyright (C) 1997-2006) Intel Corporation

CLIENT MAC ADDR; 00 15 17 13 90 00 GUID: 00000000 0000 0000 0000
00144F26E0B7
```

9. **Install the** `ixgbe` **driver and configure the Ethernet adapter.**

10. **After the Linux OS install completes, use the BIOS to change the boot device priority to Boot from Hard Disk in order to boot up the newly installed OS.**

    Unless the boot device priority is changed, the OS installation process will repeat.

Configuring the Driver Parameters

The `ixgbe` device driver controls the Sun 10GbE SFP+ PCIe ExpressModule interfaces. You can manually set the `ixgbe` device driver parameters to customize each device in your system.

This chapter lists the available device driver parameters and describes how you can set these parameters.

Driver Overview

Each `ixgbe` channel provides 10000BASE-T networking interfaces.

The `ixgbe` driver is capable of supporting 10000 Mbit/sec, full-duplex.

Driver Parameters for Solaris

TABLE 5-1 describes the functions of the driver parameters.

TABLE 5-1   Driver Parameters

Type	Keyword	Description
Jumbo Frame	default_mtu=u	The size of the default MTU (payload without the Ethernet header) Allowed values: 1500 to 16366 (default =1500)
Flow Control	flow_control	Ethernet flow control Allowed values (default = 3): 0 - Disable 1 - Receive only 2 - Transmit only 3 - Receive and transmit
Transmit/ Receive Queues	tx/rx/queue: tx_queue_number	The number of the transmit queues Allowed values: 1 to 32 (default = 1)
Transmit/ Receive Queues	tx/rx/queue: tx_ring_size	The number of the transmit descriptors per transmit queue Allowed values: 64 to 4096 (default = 512)
Transmit/ Receive Queues	tx/rx/queue: rx_queue_number	The number of the receive queues Allowed values: 1 to 64 (default = 1)
Transmit/ Receive Queues	tx/rx/queue: rx_ring_size	The number of the receive descriptors per receive queue Allowed values: 64 to 4096 (default = 512)

Setting `ixgbe` Driver Parameters in Solaris

▼ To set driver parameters using the `ixgbe.conf` file

1. **Obtain the hardware path names for the ixgbe devices in the device tree.**

   Check the /etc/driver_aliases file to identify the name associated with a particular device. For example:

   ```
   # grep ixgbe /etc/driver_aliases
   ixgbe "pciex8086,10e1"
   ```

2. **Locate the path names and the associated instance numbers in the** /etc/path_to_inst **file.**

   For example:

   ```
   # grep ixgbe /etc/path_to_inst
   "/pci@0,0/pci10de,376@a/pci108e,f35f@0" 0 "ixgbe"
   "/pci@79,0/pci10de,376@a/pci108e,f25f@0" 1 "ixgbe"
   "/pci@79,0/pci10de,376@a/pci108e,f25f@0,1" 2 "ixgbe"
   ```

   In the examples shown above:

   - The first part within the double quotes specifies the hardware node name in the device tree.
   - The number not enclosed in quotes is the instance number (shown in bold for emphasis).
   - The last part in double quotes is the driver name. To identify a PCI-E device unambiguously in the ixgbe.conf file, use the name, parent name, and the unit-address for the device. Refer to the pci(4) man page for more information about the PCI-E device specification.
   - The name is "pciex8086,10e1", the parent is "/pci@0,0/pci10de,376@a", and the unit address is "0".

3. **Set the parameters for the ixgbe devices in the** `/kernel/drv/ixgbe.conf` **file.**

   For example, to set the flow_control parameter to 3 for `ixgbe0`:

```
name = "pciex8086,10e1"
parent = "/pci@0,0/pci10de,376@a"
unit-address = "0"
flow_control = 3;
```

4. **Save the** `ixgbe.conf` **file.**

5. **Reboot the system.**

Improving Performance in Solaris

Based on system configuration, some system and driver variables may need to be tuned to appropriate values for better performance in Solaris. For example:

1. `rx_queue_number` should be less than or equal to a minimum of #CPU - 1, and the MSI-X allocation limit (that is, `dde_msix_alloc_limit`).

2. `ddi_msix_alloc_limit` / `pcplusmp:apic_multi_msi_max` / `pcplusmp:apic_msix_max` should be equal to `rx_queue_number` + 1, as `tx` and other events, such as link status change, require an additional interrupt vector.

3. `ip:ip_soft_rings_cnt` should be tuned based on system type.

Changes similar to the following might improve performance on both x86 and SPARC platforms.

▼ To improve performance in the case of large numbers of connections and packets

1. **Add the following lines to the** `/etc/system` **file:**

```
set ddi_msix_alloc_limit=9
set pcplusmp:apic_multi_msi_max=9
set pcplusmp:apic_msix_max=9
set pcplusmp:apic_intr_policy=1
set ip:ip_soft_rings_cnt=4
set ip_squeue_soft_ring=1
```

2. **Set the rx_queue number to 8 in the** `/kernel/drv/ixgbe.conf` **file:**

   `rx_queue_number = 8;`

3. **Reboot the server.**

Driver Parameters for Linux Systems

TABLE 5-2 lists the tunable `ixgbe` driver parameters for Linux operating systems and describes their function.

TABLE 5-2   Tunable `ixgbe` Driver Parameters for Linux Operating Systems

Keyword	Valid Range	Default Value	Description
FlowControl	0 to 3 (0=none, 1=Rx only, 2=Tx only, 3=Rx and Tx)	Read from the EEPROM. If EEPROM is not detected, default is 3.	This parameter controls the automatic generation (Tx) and response (Rx) to Ethernet PAUSE frames.
RxDescriptiors	64 to 512	512	This value is the number of receive descriptors allocated by the driver. Increasing this value allows the driver to buffer more incoming packets. Each descriptor is 16 bytes. A receive buffer is also allocated for each descriptor and can be either 2048, 4056, 8192, or 16384 bytes, depending on the MTU setting. When the MTU size is 1500 or less, the receive buffer size is 2048 bytes. When the MTU is greater than 1500, the receive buffer size will be either 4056, 8192, or 16384 bytes. The maximum MTU size is 16114.

Keyword	Valid Range	Default Value	Description
RxIntDelay	0 to 65535 (0=off)	72	This value delays the generation of receive interrupts in units of 0.8192 microseconds. Receive interrupt reduction can improve CPU efficiency if properly tuned for specific network traffic. Increasing this value adds extra latency to frame reception and can end up decreasing the throughput of TCP traffic. If the system is reporting dropped receives, this value might be set too high, causing the driver to run out of available receive descriptors.
TxDescriptors	80 to 4096	256	This value is the number of transmit descriptors allocated by the driver. Increasing this value allows the driver to queue more transmits. Each descriptor is 16 bytes.
XsumRX	0 to 1	1	A value of 1 indicates that the driver should enable IP checksum offload for received packets (both UDP and TCP) to the Ethernet adapter hardware.

Setting `ixgbe` Driver Parameters in Linux Systems

▼ To Configure Jumbo Frames

Jumbo Frames can support up to 15000 MTU. The default value is 1500 MTU.

● **Use the** `ifconfig` **command to increase MTUs to allow transmission of Jumbo Frames.**

For example, where the IP address for `eth7` is `192.1.1.200`, the following command increases MTUs to the maximum:

```
# ifconfig eth7 192.1.1.200 mtu 15000  up
```

Configuring Link Aggregation

This chapter describes how to configure link aggregation. It contains the following sections:

- "Link Aggregation Overview" on page 31
- "Configuring Link Aggregation in a Solaris Environment" on page 32

Link Aggregation Overview

Link aggregation enables one or more network links to be aggregated together to form a link aggregation group. This link aggregation group appears to MAC clients as a regular link. Link aggregation is defined by IEEE 802.3ad and it provides the following benefits:

- Increased bandwidth
- Linearly incremental bandwidth
- Load sharing
- Automatic configuration
- Rapid configuration and reconfiguration
- Deterministic behavior
- Low risk of duplication or misordering
- Support of existing IEEE 802.3ad MAC clients

Configuring Link Aggregation in a Solaris Environment

This section explains how to configure link aggregation in a Solaris environment.

▼ To Configure Link Aggregations

The example in this procedure aggregates sample interfaces `ixgbe0`, `ixgbe1`, `ixgbe2`, and `ixgbe3`. Arbitrary key numbers (`1` and `2`) are used for each aggregation.

1. Unplumb the interfaces to be aggregated:

```
# ifconfig ixgbe0 unplumb
# ifconfig ixgbe1 unplumb
# ifconfig ixgbe2 unplumb
# ifconfig ixgbe3 unplumb
```

2. Create a link aggregation group with key 1 containing the first two interfaces.

In this example, the `-l active` option turns on LACP mode:

```
# dladm create-aggr -l active -d ixgbe0 -d ixgbe1 1
# ifconfig aggr1 plumb
# ifconfig aggr1 192.2.2.84 up
```

3. Create a link aggregation group with key 2 containing the other two interfaces.

No mode is specified for the link aggregation group in this example:

```
# dladm create-aggr -d ixgbe2 -d ixgbe3 2
# ifconfig aggr2 plumb
# ifconfig aggr2 193.2.2.84 up
```

Note – These commands change the contents of the `/etc/aggregation.conf` file.

▼ To Display Information About Link
Aggregations

The `ifconfig` and `dladm` commands provide different details about link
aggregations, as in the following examples. For additional command options, see the
man pages for `ifconfig` (1M) and `dladm` (1M).

1. Use the `ifconfig` **command to examine the details about a link aggregation:.**

The following examples display the information about the two link aggregations
created in .

```
# ifconfig aggr1
aggr1: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 32
  inet 192.2.2.84 netmask ffffff00 broadcast 192.2.2.255
  ether 0:15:17:75:ff:81
# ifconfig aggr2
aggr2: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 33
  inet 193.2.2.84 netmask ffffff00 broadcast 193.2.2.255
  ether 0:15:17:75:ff:83
```

2. Use the `dladm show-aggr` **command to show link aggregation status.**

3. Use the `dladm show-aggr -s` **command to show link aggregation statistics.**

4. Use the `dladm show-aggr -L` **command to display LACP specific
information.**

▼ To Delete Link Aggregations

1. Use the `ifconfig` **command to unplumb each link aggregation you want to
delete.**

For example:

```
# ifconfig aggr1 unplumb
# ifconfig aggr2 unplumb
```

2. Use the `dladm` **command to delete each unwanted link aggregation.**

For example:

```
# dladm delete-aggr 1
# dladm delete-aggr 2
```

Configuring VLANs

This chapter describes how to configure virtual local area networks (VLANs).

This chapter contains the following sections:

Note – If you change any of the VLAN configuration parameters, you must reboot the system before the changes take effect. If you make changes and do not reboot, you might experience configuration problems.

VLAN Overview

With multiple VLANs on a card, a server with a single card can have a logical presence on multiple IP subnets. By default, 128 VLANs can be defined for each VLAN-aware card on your server. However, this number can be increased by changing the system parameters.

If your network does not require multiple VLANs, you can use the default configuration, in which case no further configuration is necessary.

VLANs enable you to split your physical LAN into logical subparts, providing an essential tool for increasing the efficiency and flexibility of your network.

VLANs are commonly used to separate groups of network users into manageable broadcast domains, to create logical segmentation of workgroups, and to enforce security policies among each logical segment. Each defined VLAN behaves as its own separate network, with its traffic and broadcasts isolated from the others, increasing the bandwidth efficiency within each logical group.

Although VLANs are commonly used to create individual broadcast domains or separate IP subnets, it can be useful for a server to have a presence on more than one VLAN simultaneously. Several Sun products support multiple VLANs on a per-port or per-interface basis, allowing very flexible network configurations.

FIGURE 7-1 shows an example network that uses VLANs.

FIGURE 7-1 Example of Servers Supporting Multiple VLANs With Tagging Adapters
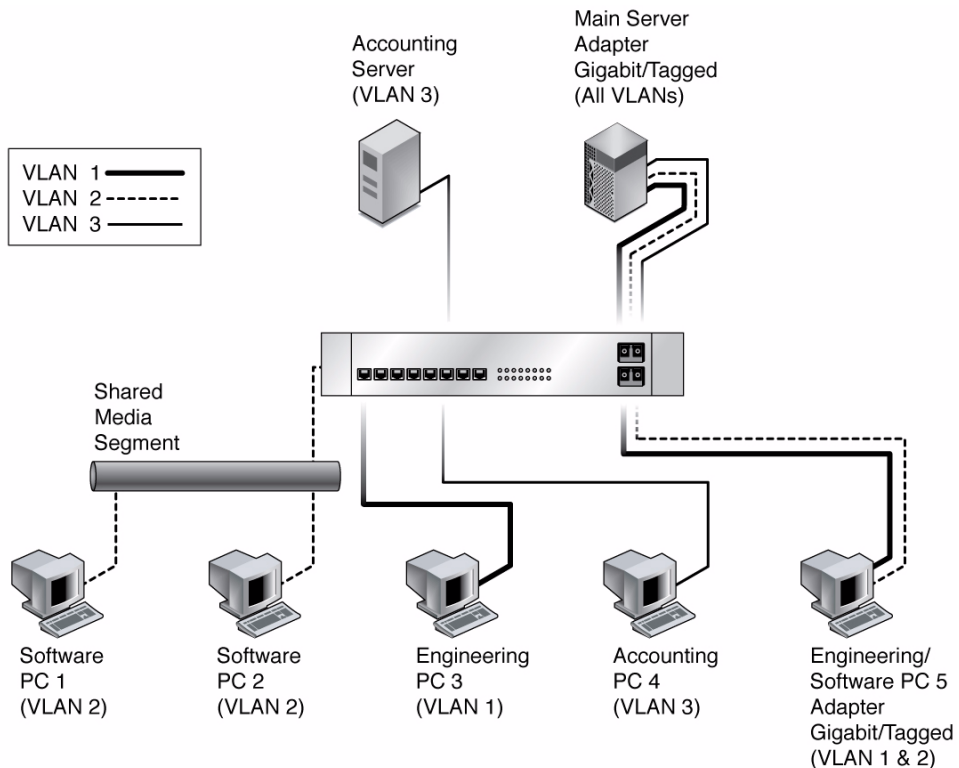
The example network has the following features:

The physical LAN network consists of a switch, two servers, and five clients. The LAN is logically organized into three different VLANs, each representing a different IP subnet.

- VLAN 1 is an IP subnet consisting of the Main Server, Client 3, and Client 5. This represents an engineering group.
- VLAN 2 includes the Main Server, Clients 1 and 2 by means of a shared media segment, and Client 5. This is a software development group.
- VLAN 3 includes the Main Server, the Accounting Server, and Client 4. This is an accounting group.

The Main Server is a high-use server that needs to be accessed from all VLANs and IP subnets. The server has a Sun 10GbE XFP SR PCI Express Card installed. All three IP subnets are accessed by means of the single physical Ethernet adapter interface. The server is attached to one of the switch's Gigabit Ethernet ports, which is configured for VLANs 1, 2, and 3. Both the Ethernet adapter and the connected switch port have tagging turned on. Because of the tagging VLAN capabilities of both devices, the server is able to communicate on all three IP subnets in this network, but continues to maintain broadcast separation between all of those subnets. The following list describes the components of this network:

- The Accounting Server is available to only VLAN 3. The Accounting Server is isolated from all traffic on VLANs 1 and 2. The switch port connected to the server has tagging turned off.
- Clients 1 and 2 are attached to a shared media hub that is then connected to the switch. Clients 1 and 2 belong only to VLAN 2. Those clients are logically in the same IP subnet as the Main Server and Client 5. The switch port connected to this segment has tagging turned off.
- Client 3 is a member of VLAN 1. This client can communicate only with the Main Server and Client 5. Tagging is not enabled on Client 3's switch port.
- Client 4 is a member of VLAN 3. This client can communicate only with the servers. Tagging is not enabled on Client 4's switch port.
- Client 5 is a member of both VLANs 1 and 2. This client has a Sun 10GbE XFP SR PCI Express Card installed. Client 5 is connected to switch port 10. Both the Ethernet adapter and the switch port are configured for VLANs 1 and 2, and both have tagging enabled.

VLAN tagging is only required to be enabled on switch ports that create trunk links to other VLAN-aware Ethernet switches, or on ports connected to tag-capable end-stations, such as servers or workstations with VLAN-aware Ethernet adapters.

Configuring VLANs

VLANs can be created according to various criteria, but each VLAN must be assigned a VLAN tag or VLAN ID (VID). The VID is a 12-bit identifier between 1 and 4094 that identifies a unique VLAN. For each network interface (ixgbe0, ixgbe1, ixgbe2, and so on), 4094 possible VLAN IDs can be selected for each port.

Tagging an Ethernet frame requires the addition of a tag header to the frame. The header is inserted immediately following the destination MAC address and the source MAC address. The tag header consists of two bytes of Ethernet Tag Protocol identifier (TPID, 0x8100) and two bytes of tag control information (TCI). FIGURE 7-2 shows the Ethernet tag header format.

FIGURE 7-2 Ethernet Tag Header Format
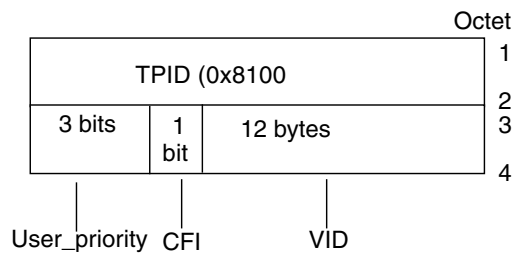
By default, a single VLAN is configured for every port, which groups all ports into the same broadcast domain, just as if there were no VLANs at all. This means that VLAN tagging for the switch port is turned off.

Note – If you configure a VLAN virtual device for an Ethernet adapter, all traffic sent or received by that Ethernet adapter must be in VLAN-tagged format.

▼ To Configure Static VLANs in a Solaris Environment

1. **Create one** /etc/hostname.*ixgbe*# **file for each VLAN that will be configured for each adapter on the server.**

   Use the following naming format, which includes both the VID and the physical point of attachment (PPA):

   VLAN logical PPA = *1000 * VID + Device PPA*
   123000 = 1000*123 + 0
   So the VLAN interface will be ixgbe123000.

   This format limits the maximum number of PPAs (instances) you can configure to 1000 in the /etc/path_to_inst file.

   For example, if the virtual ID is 123 and physical adapter is instance 2:

   > VLAN logical PPA = 1000 * VID + [Device PPA]
   > 123002 = 123000 + 2

   So the VLAN interface is ixgbe123002. This format limits the maximum number of PPAs (instances) that can be configured in the /etc/path_to_inst file to 1000 .

   For example, on a server with the Sun PCI Express card having an instance of 2, belonging to a member of two VLANs, with VID 123 and 224, you would use ixgbe123002 and ixgbe224002, respectively, as the two VLAN PPAs.

2. **Use the** ifconfig **command to configure each VLAN virtual device.**

   Include the IP address in the command you type. For example, if the IP address is 192.2.2.84, type:

   ```
   # ifconfig ixgbe123002 plumb 192.2.2.84 up
   ```

3. **Type the** ifconfig -a **command to see details about the VLAN devices.**

   This example shows the output of ifconfig -a on a system having VLAN devices ixgbe123002 and ixgbe224002:

   ```
   ixgbe123002: flags=201000843<UP,BROADCAST,RUNNING,\
   MULTICAST,IPv4,CoS> mtu 1500 index 4
   inet 192.2.2.82 netmask ffffff00 broadcast 192.2.2.255
   ether 0:13:20:f5:f6:dc
   ixgbe224002: flags=201000843<UP,BROADCAST,RUNNING,\
   MULTICAST,IPv4,CoS> mtu 1500 index 5
   inet 0.0.0.0 netmask ffffff00
   ether 0:13:20:f5:f6:dc
   ```

Note – In the above examples, the second NIC output for ixgbe224002 was plumbed and up'd but had no IP address. By default, the netmask and broadcast are set by the system, which uses IP class C to make that setting 255.255.255.0. When the address is set, the `ifconfig` command by default does not display the broadcast address if the explicit IP addr is not set.

Refer to the documentation that came with your switch for specific instructions for setting VLAN tagging and ports.

▼ To Configure VLANs in a Linux Environment

1. Ensure that the `ixgbe` module is loaded:

```
# modprobe ixgbe
```

2. Plumb the Sun 10GbE XFP SR PCI Express Card interface:

```
# ifconfig eth6 xxx.xxx.xx.xxx up
```

where *xxx.xxx.xx.xxx* = the IP address of the interface.

3. Add the VLAN instance (VID).

For example:

```
# vconfig add eth6 5
```

where `eth6` is the interface and `5` is the VID.

Note – In Linux systems, you can use any single digit as the VID.

4. Configure the `ixgbe` VLAN (`eth2` in this example):

```
# ifconfig eth6.5 xxx.xxx.xx.xxx up
```

where *xxx.xxx.xx.xxx* = the IP address of the interface.

▼ To Configure VLANs in a Microsoft Windows 2003 Environment

1. **Click Control Panel.**

2. **Click Network Connection.**

3. **Click the folder icon from the sub-manual bar.**

4. **Right-click the Sun 10GbE XFP SR PCI Express Card port, then select Properties.**

5. **Click Configure.**

6. **Click VLAN, then click on New.**

7. **Type** `VLAN` **with** *ID* **(for example, type** `Vlan10`**).**

8. **Click Internet Protocol (TCP/IP).**

9. **Click Use the following IP address.**

10. **Type the IP address.**

11. **Click Subnet Mask.**

    The value `255.255.255.0` is displayed.

12. **Click OK.**

13. **Repeat** Step 3 **through** Step 10 **until all the network ports are VLAN configured.**

Note – Ensure that the firewall is configured to allow VLAN traffic. Otherwise, the VLAN might not operate properly.

Configuring Bonding for Multiple Interfaces

▼ To Configure Bonding for Multiple `ixgbe` Interfaces

1. Use the `modprobe` command to configure the mode:

```
# modprobe bonding mode=balance-rr miimon=100 max_bonds=1
```

In this command,

- `max_bonds` is the number of bond interfaces to be created.
- `mode` specifies the bonding policy. (This example uses `balance-rr`.)

2. Use the `ifconfig` command to create the bond:

```
# ifconfig bond0   192.2.2.15 netmask 255.255.255.0 broadcast 192.2.2.255
# ifenslave bond0 eth4 eth5
```

In this command `bond0` is the bonding device.

3. Configure the `bond`*n* **interfaces.

In this example, two bonds (`bond0` and `bond1`) are configured:

```
# modprobe bonding mode=balance-rr miimon=100 max_bonds=2
# ifconfig bond0   192.2.2.15 netmask 255.255.255.0 broadcast 192.2.2.255
# ifenslave bond0 eth4 eth5
# ifconfig bond1   193.2.2.15 netmask 255.255.255.0 broadcast 193.2.2.255
# ifenslave bond1 eth6 eth7
```

Refer to Linux documentation for more information.

▼ To Remove Bonding

- **Use the `rmmod` command to remove bonding:**

```
# rmmod bonding
```

Sun Dual 10GbE SFP+ PCIe ExpressModule Specifications

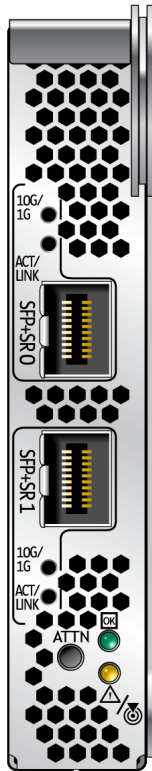This appendix lists the specifications for Oracle's Sun 10GbE XFP SR PCI Express Card. This appendix contains the following sections:

Connectors

FIGURE A-1 shows the connectors for the Sun 10GbE XFP SR PCI Express Card.

FIGURE A-1 Sun Dual 10GbE SFP+ PCIe ExpressModule Connectors (unpopulated)

Technical Features

TABLE A-1   Performance Specifications

Feature	Specification
Data rate supported per port	10 Gigabit (Gb)
Bus type	PCI Express 2.0
Bus width	x8 lane PCI Express
Conforms to Ethernet Standard	802.3
Boot ROM	2 Mbit SPI Flash
Electromagnetic Interference (EMI)	FCC Class A

Physical Characteristics

TABLE A-2   Physical Characteristics

Dimension	Measurement
Length	6.62 in. (168.2 mm)
Width	4.25 in. (108 mm)
Power LED (green)	
Attention LED (yellow)	
Attention button (recessed)	
Activity LED (each port)	Green: 10 GbE link Yellow: 1 GbE link

Power and Environmental Requirements

TABLE A-3   Card Power Requirements

Specification	Measurement
Typical power consumption	14W (1.17A at 12V) dual port
Main host power supply	12 V ± 15%
Operating temperature	35 to 70 °C (95 to 158 °F) module inlet temperature
Storage temperature	-40 to 70 °C (-40 to 158 °F)
Storage humidity	90% noncondensing relative humidity at 35 °C
Airflow	2 to 12 CFM

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V