Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module

User's Guide

Part No. 820-7901-11
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Contents

Using This Documentation

This guide provides hardware and software installation instructions for the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module from Oracle. This guide also describes how to configure the `ixgbe` driver for the Oracle Solaris Operating System and the Linux and Microsoft Windows Server operating systems. `ixgbe` is the name of the driver for the Intel 82599-based devices.

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 AMD64, Intel Xeon, or Intel Pentium product families.

Related Documentation

The documents listed as online are available at:

(http://docs.sun.com/app/docs/prod/dual.sfp.fabexp#hic)

Application	Title	Part Number	Format	Location
Product notes	*Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module Product Notes*	820-7902	PDF, HTML	Online
User's guide	*Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module User's Guide*	820-7901	PDF, HTML	Online
Getting started	*Sun Network Interface Card Products Getting Started Guide*	821-1929	Hardcopy	Shipping kit
Safety and compliance	*Important Safety Information for Sun Hardware Systems*	821-1590	Hardcopy	Shipped with server

Documentation, Support, and Training

These web sites provide additional resources:

Sun Function	URL
Documentation	(http:/docs.sun.com)
Support	(http://www.sun.com/support/)
Training	(http://www.sun.com/training/)

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Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module User's Guide, part number 820-7901-11

Understanding the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module

These topics provide an overview of the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module (FEM):

Description	Links
Understand the Fabric Expansion Module.	"Shipping Kit Contents" on page 2 "Product Description" on page 2 "Physical Characteristics" on page 3 "Performance Specifications" on page 4 "Power and Environmental Requirements" on page 5 "Regulatory Compliance" on page 5
Understand the hardware and software requirements.	"Hardware and Software Requirements" on page 6 "OS Patches and Updates" on page 7
Understand how to install the Fabric Expansion Module.	"Installation Overview for Solaris Platforms" on page 8 "Installation Overview for Linux Platforms" on page 9 "Installation Overview for Microsoft Windows Platforms" on page 9

Related Information

- Sun 10GbE adapters web page (`http://www.sun.com/products/networking/ethernet/10gethernetfamily`)
- "Related Documentation" on page ix

Shipping Kit Contents

The carton in which your Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module was shipped should contain the following items:

- Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module
- *Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module Getting Started Guide*

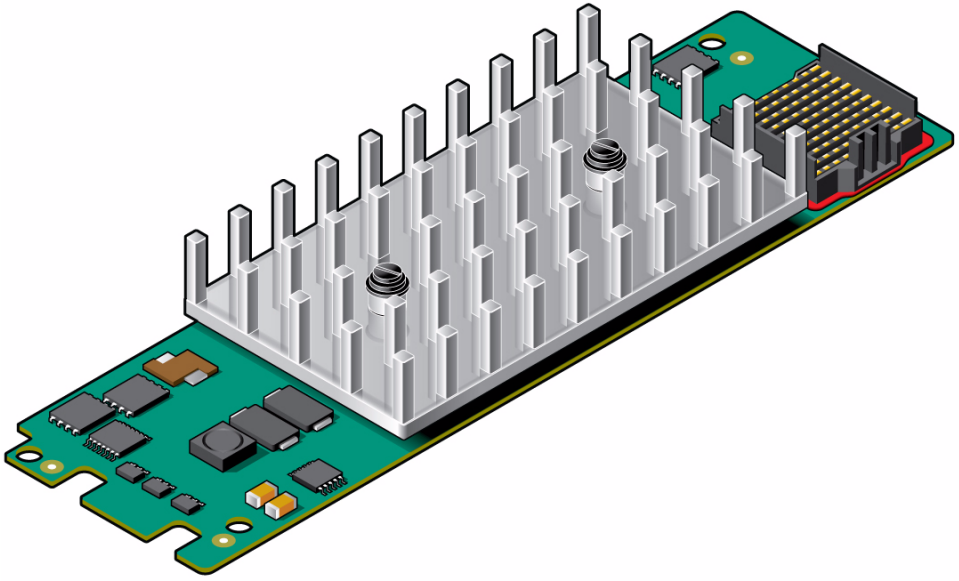
Related Information

- "Product Description" on page 2
- "Related Documentation" on page ix

Product Description

The Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module (FEM) is a 10 Gigabit Ethernet (10GbE) network interface card (NIC) for PCI Express (PCIe) systems. The FEM, shown in the figure, is a XAUI mezzanine card that connects to a compatible Sun Blade server module and provides the following features and benefits:

- Dual 10 Gigabit Ethernet ports
- Intel 82599EB 10 Gigabit Ethernet controller
- Industry PCIe 2.0 compliant
- IEEE 802.3ae 2002 compliant
- Intel I/O Acceleration Technology (I/OAT)
- TCP segmentation offloading (TSO)/large send offloading (LSO)
- Optimized queues – 32 transmit (Tx) and 64 receive (Rx) per port
- Support for most network operating systems (NOS)
- Remote management support
- RoHS compliant, lead-free technology
- Intel PROSet Utility for Windows Device Manager



Related Information

- “Install the FEM in a Server Module” on page 19
- “Product Description” on page 2
- “Physical Characteristics” on page 3
- “Power and Environmental Requirements” on page 5
- “Hardware and Software Requirements” on page 6

Physical Characteristics

Dimension	Measurement
Length	5.5 in. (139.7 mm)
Width	1.38 in. (35 mm)

Related Information

- “Product Description” on page 2
- “Performance Specifications” on page 4

■ “Power and Environmental Requirements” on page 5

Performance Specifications

Feature	Specification
Data rate supported per port	10 Gbit/sec, 1 Gbit/sec
Bus type	PCI Express V2.0, 5.0 gigatransfers/sec
Bus width	x8 lane PCI Express
Conforms to Ethernet standard	802.3
Boot ROM	2 Mbit SPI Flash
Electromagnetic interference (EMI)	FCC Class A

Related Information

■ “Product Description” on page 2
■ “Physical Characteristics” on page 3
■ “Power and Environmental Requirements” on page 5

Power and Environmental 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

Related Information

- "Product Description" on page 2
- "Physical Characteristics" on page 3
- "Performance Specifications" on page 4

Regulatory Compliance

The Sun Dual 10GbE PCIe 2.0 Fabric Expansion Modules (also referred to as host channel adapters or HCAs) are components of the Sun server module in which they are installed. See the Agency certifications of the applicable server module to determine the relevant Agency approvals for the server module and HCA combination.

Related Information

- "Product Description" on page 2
- "Related Documentation" on page ix

Hardware and Software Requirements

Before using the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module, ensure that your system meets the hardware and software requirements in the following table.

Supported Hardware and Operating Systems	Supported Products
Hardware, Sun servers	Platforms supported include: • Sun Blade X6270 server • Sun Blade T6320 server • Sun Blade T6340 server For the most up-to-date supported platforms, check the product web page for the specific server and its I/O options.
Hardware, Sun Network Express Module	The following Network Express Module (NEM) is required to be installed in the Sun server system chassis: • Sun Blade 6000 Ethernet Switched NEM 24p 10GE
Operating systems	Operating systems supported include: • Solaris 10 5/09 OS and Solaris 10 10/09 OS • OpenSolaris 2009.06 OS • Red Hat Enterprise Linux (RHEL) 4.8 (32-bit and 64-bit) and 5.4 (32-bit and 64-bit) • SUSE Linux Enterprise Server (SLSE) 9 SP5 (64-bit), 10 SP3 (64-bit), and 11 (64-bit) • Microsoft Windows Server 2003 (32-bit and 64-bit) • Microsoft Windows Server 2008 SP2 (64-bit) and R2 (64-bit) • VMware ESX 3.5 and 4.0 For the most up-to-date supported operating systems, check the product web page for the specific server.

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/products/networking/ethernet/10gethernetfamily/specs.xml)

Related Information

- *Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module Product Notes*
- "OS Patches and Updates" on page 7

- Sun 10GbE adapters web page
  (http://www.sun.com/products/networking/ethernet/10gethernetfamily)

OS Patches and Updates

Check the *Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module Product Notes* (820-7902) for the latest patches and updates. This document is available at:

(http://docs.sun.com/app/docs/prod/dual.sfp.fabexp#hic)

To download the latest patches, go to:

(http://sunsolve.sun.com/)

In addition:

- Check the product web page at:

  (http://www.sun.com/products/networking/ethernet/10gethernetfamily)
- 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)

Related Information

- *Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module Product Notes*
- "Hardware and Software Requirements" on page 6

Installation Overview for Solaris Platforms

Follow these steps to install the FEM on a Solaris platform.

Step	Description	Links
1.	Understand the fabric expansion module.	"Understanding the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module" on page 1
2.	Verify the driver installation.	"Verify the Driver Version on a Solaris Platform" on page 12
3.	Install the FEM.	"Install the FEM in a Server Module" on page 19
4.	Verify the FEM installation.	"Verify the Installation in a Solaris SPARC System" on page 21 "Verify the Installation in a Solaris x86 System" on page 23
5.	Configure the network.	"Create `/etc/hostname.ixgbe`# Files" on page 25 "Configure the Network Host Files With the `ifconfig` Command" on page 26
6.	Configure the driver parameters.	"Driver Parameters for the Solaris OS" on page 33 "Set `ixgbe` Driver Parameters in the Solaris OS" on page 35
7.	(Optional) Boot over the network.	"Boot Over the Network Using PXE" on page 27 "Boot Solaris x86 and Linux Systems Over a 10GbE Network" on page 27
8.	(Optional) Install the OS over the network.	"Install the Solaris OS Over a 10GbE Network on SPARC Systems" on page 29
9.	(Optional) Configure Jumbo Frames.	"Configure Jumbo Frames in Solaris OS" on page 39
10.	(Optional) Configure VLANs.	"VLAN Overview" on page 42 "VLAN Configuration" on page 44 "Configure Static VLANs in a Solaris Environment" on page 45

Installation Overview for Linux Platforms

Follow these steps to install the FEM on a Linux platform.

Step	Description	Links
1.	Understand the FEM.	"Understanding the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module" on page 1
2.	Install the driver.	"Download and Install the Driver on a Linux Platform" on page 13
3.	Install the FEM.	"Install the FEM in a Server Module" on page 19
4.	Verify the FEM installation.	"Verify the Installation in a Linux System" on page 24
5.	Boot over the network.	"Boot Solaris x86 and Linux Systems Over a 10GbE Network" on page 27
6.	Configure the driver parameters.	"Driver Parameters for Linux" on page 38 "Set Driver Parameters in Linux" on page 39
7.	(Optional) Configure Jumbo Frames.	"Configure Jumbo Frames in Linux" on page 40
8.	(Optional) Configure VLANs.	"VLAN Overview" on page 42 "VLAN Configuration" on page 44 "Configure VLANs in a Linux Environment" on page 47

Installation Overview for Microsoft Windows Platforms

Follow these steps to install the FEM on a Microsoft Windows platform.

Step	Description	Links
1.	Understand the FEM.	"Understanding the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module" on page 1
2.	Install the driver.	"Download and Install the Driver on a Microsoft Windows Platform" on page 16

Step	Description	Links
3.	Install the FEM.	"Install the FEM in a Server Module" on page 19
4.	Verify the FEM installation.	"Verify the Installation in a Linux System" on page 24
5.	(Optional) Configure VLANs.	"VLAN Overview" on page 42 "VLAN Configuration" on page 44 "Configure VLANs in a Microsoft Windows Environment" on page 48

Installing the Driver

The `ixgbe` device driver software comes bundled with Solaris software. These topics explain how to verify that 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 Linux and Microsoft Windows systems.

Description	Links
Verify or remove the driver on a Solaris platform.	"Verify the Driver Version on a Solaris Platform" on page 12 "Remove the Driver From a Solaris Platform" on page 13
Download, install, or remove the driver on a Linux platform.	"Download and Install the Driver on a Linux Platform" on page 13 "Remove the Driver From a Linux Platform" on page 15
Download, install, or remove the driver on a Windows platform.	"Download and Install the Driver on a Microsoft Windows Platform" on page 16 "Remove the Driver From a Microsoft Windows Platform" on page 17

Related Information

- "Installation Overview for Solaris Platforms" on page 8
- "Installation Overview for Linux Platforms" on page 9
- "Installation Overview for Microsoft Windows Platforms" on page 9
- *Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module Product Notes*
- "OS Patches and Updates" on page 7
- "Configuring the Driver Parameters" on page 33

▼ Verify the Driver Version on a Solaris Platform

Solaris 10 5/09 OS is the first release of Solaris to support the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module and other Intel 82599 10GbE controller-based adapters. The Solaris `ixgbe` driver, version 1.0.9 and later, supports both the Intel 82599 and Intel 82598 families of network controllers.

The `ixgbe` drive comes bundled with the Solaris OS. Depending on your version of the Solaris 10 OS, you might or might not need to download the updated driver.

1. **Check the version of the installed driver to ensure that the FEM is properly loaded and is recognized by the Solaris OS.**

```
# modinfo | grep ixgbe
173 7b762000  17998 100   1  ixgbe (Intel 10Gb Ethernet 1.0.9)
```

   If the version number is not 1.0.9 or later, you must install the latest driver patch. See "OS Patches and Updates" on page 7.

Note – If the `ixgbe` driver is not listed, the driver might not be loaded. You can use the `modload` command to load the driver if needed. See the `modload`(1M) man page.

---

2. **Apply the necessary patch to get the latest driver:**

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

   See the `patchadd`(1M) man page for more information.

Related Information

- *Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module Product Notes*
- "OS Patches and Updates" on page 7
- `patchadd`(1M) man page
- `modload`(1M) man page.
- "Remove the Driver From a Solaris Platform" on page 13

▼ Remove the Driver From a Solaris Platform

It is not necessary to remove a driver when its associated device is removed from a system. However, if you want to clean up your file systems or conserve space, you can easily remove a driver.

- **Remove the driver:**

```
# pkgrm SUNWixgbe*
```

See the `pkgrm`(1M) man page for more information.

Related Information

- "Verify the Driver Version on a Solaris Platform" on page 12
- `pkgrm`(1M) man page

▼ Download and Install the Driver on a Linux Platform

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

1. **Log in to your system.**
2. **In a browser, go to this location:**

   `(http://support.intel.com/support/network/adapter/)`
3. **Select the following product:**

   Intel 10 Gigabit XF SR Dual Port Server Adapter
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 PCI-E 10 Gigabit Network Connections under Linux

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

8. **Select this option:**

   Download Network Adapter Driver for PCI-E 10 Gigabit Network Connections under 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 a 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.

   For this example assume that the file is named `ixgbe-2.0.38.2.tar.gz`. The actual file might have different version or subversion numbers.

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

10. **Uncompress and untar the file:**

```
# tar -zxvf ixgbe-2.0.38.2.tar.gz
```

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

```
# cd /temp/ixgbe-2.0.38.2/src
```

12. **Compile the driver source file:**

```
# make
# make install
```

13. **Load the `ixgbe` driver:**

```
# modprobe ixgbe
```

14. **Verify that the `ixgbe` driver has been successfully installed:**

```
# lsmod | grep ixgbe
```

The output should be similar to the following:

```
ixgbe          118052  0
```

15. **Check the `ixgbe` driver version:**

```
# 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:        2.0.38.2ro
description:    Intel(R) 10 Gigabit PCI Express Network Driver
srcversion:     5CFF6AEBA251050F8A4B746
vermagic:       2.6.18-53.el5 SMP mod_unload gcc-4.1
```

Related Information

- "Remove the Driver From a Linux Platform" on page 15

▼ Remove the Driver From a Linux Platform

It is not necessary to remove a driver when its associated device is removed from a system. However, if you want to clean up your file systems or conserve space, you can easily remove a driver.

- **Use the `rmmod` command:**

```
# rmmod ixgbe
```

Related Information

- "Download and Install the Driver on a Linux Platform" on page 13

▼ Download and Install the Driver on a Microsoft Windows Platform

If your system uses the Microsoft Windows Server 2003 or 2008 operating system, perform the following procedure to download and install the device driver.

1. **Log in to your system.**
2. **In a browser, go to this location:**

   (http://support.intel.com/support/network/adapter/)
3. **Select the following product:**

   Intel 10 Gigabit XF SR Dual Port Server Adapter
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
     - Windows Server 2008 Standard x64
   - **For a 32-bit driver:**
     - Windows Server 2003 Standard Edition
     - Windows Server 2008 Standard
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
     - Network Adapter Driver for Windows Vista and Windows Server 2008 x64
   - **For a 32-bit driver:**
     - Network Adapter Drivers for Windows XP and Windows Server 2003
     - Network Adapter Driver for Windows Vista and Windows Server 2008
7. **Review and accept the software license agreement.**
8. **Select the driver name to start the download.**
9. **Click on the `.exe` files to install the driver.**
10. **Follow the instructions in the installation wizard.**

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

    The `autorun` utility automatically runs after you have extracted the files.

Related Information

- "Remove the Driver From a Microsoft Windows Platform" on page 17

▼ Remove the Driver From a Microsoft Windows Platform

It is not necessary to remove a driver when its associated device is removed from a system. However, if you want to clean up your file systems or conserve space, you can easily remove a driver.

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.**

Related Information

- "Download and Install the Driver on a Microsoft Windows Platform" on page 16

Installing the Fabric Expansion Module

These topics describe how to install the FEM and verify the installation.

Description	Links
Install the Fabric Expansion Module (FEM).	"Install the FEM in a Server Module" on page 19
Verify the FEM installation.	"Verify the Installation in a Solaris SPARC System" on page 21 "Verify the Installation in a Solaris x86 System" on page 23 "Verify the Installation in a Linux System" on page 24 "Verify the Installation in a Microsoft Windows System" on page 24

Related Information

- "Installation Overview for Solaris Platforms" on page 8
- "Installation Overview for Linux Platforms" on page 9
- "Installation Overview for Microsoft Windows Platforms" on page 9

▼ Install the FEM in a Server Module

The following instructions describe the basic tasks required to install the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module from Oracle inside a blade server module. Refer to your blade server's system installation or server manual for detailed FEM instructions.

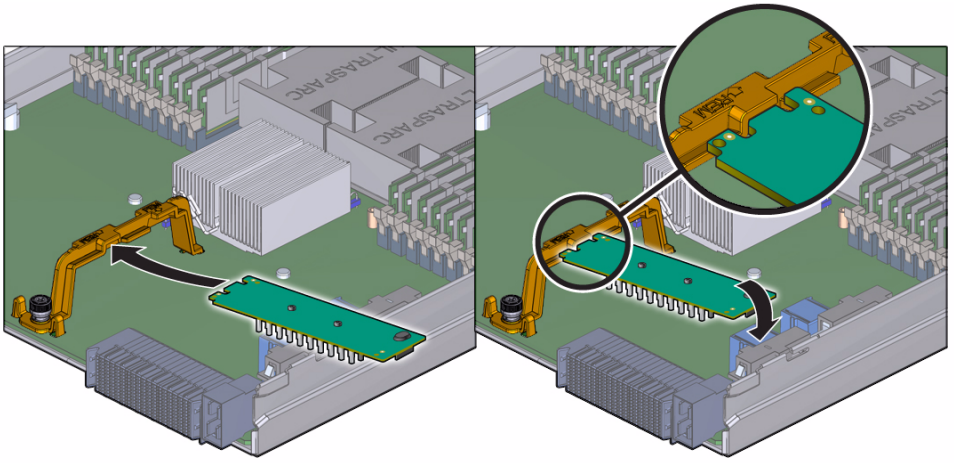
1. Halt and power off your system.

2. **Attach the adhesive copper strip of the antistatic wrist strap to the server module chassis. Wrap the other end twice around your wrist, with the adhesive side against your skin.**
3. **Perform an orderly shutdown of the server module.**
4. **Remove the server module from the system chassis**
5. **Remove the cover from the server module.**
6. **Locate the FEM connectors on the server module.**
7. **Ensure that you do use the correct connector. Look for the FEM label on the connectors.**

Caution – Do not use the connectors labeled REM.

8. **Slide the FEM card at an angle into the support bracket, then press it carefully into the connector.**
9. **Replace the cover on the server module.**
10. **Reinstall the server module into the chassis.**

    Refer to the server module's service manual for specific instructions.



▼ Verify the Installation in a Solaris SPARC System

Note – Verification is not required if your system supports dynamic reconfiguration (DR).

1. **Power on the system.**
2. **When the banner appears, press the Stop-A key sequence to interrupt the boot process and display the OpenBoot (`ok`) prompt.**
3. **List the network devices on your system:**

```
ok show-nets
a) /pci@400/pci@0/pci@9/network@0,1
b) /pci@400/pci@0/pci@9/network@0
c) /pci@400/pci@0/pci@8/pci@0/pci@4/network@0,1
d) /pci@400/pci@0/pci@8/pci@0/pci@4/network@0
e) /pci@400/pci@0/pci@8/pci@0/pci@2/network@0,1
f) /pci@400/pci@0/pci@8/pci@0/pci@2/network@0
g) /pci@400/pci@0/pci@2/network@0,1
h) /pci@400/pci@0/pci@2/network@0
q) NO SELECTION
Enter Selection, q to quit: q
```

If you do not see the device listed, check that the FEM is properly seated. If necessary, reinstall the FEM. See "Install the FEM in a Server Module" on page 19.

Note – Checking the `.properties` output for each device is the surest way to identify the device.

4. **Check the `.properties` output for each device.**

   The following examples assume that `/pci@400/pci@0/pci@9/network@0` is a port on the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module.

   a. **Move to the device directory:**

```
ok cd /pci@400/pci@0/pci@9/network@0
```

b. Display properties for the device:

```
ok .properties
```

The output will be similar to the following:

```
assigned-addresses        82500010 00000000 10800000 00000000 00800000
                          81500018 00000000 02001000 00000000 00000020
                          82500020 00000000 10300000 00000000 00004000
                          82500030 00000000 10400000 00000000 00400000
reg                       00500000 00000000 00000000 00000000 00000000
                          03500010 00000000 00000000 00000000 00080000
                          01500018 00000000 00000000 00000000 00000020
                          03500020 00000000 00000000 00000000 00004000
                          02500030 00000000 00000000 00000000 00080000
local-mac-address         00 1b 21 4a ab 9c
phy-type                  xgf
version                   Sun Dual 10GbE SFP+ PCIe 2.0 FEM FCode 1.5 09/09/04
board-model               375-3648-01
model                     x4871a-z/4871a-z
compatible                pciex8086,10f7.108e.7b12.1
                          pciex8086,10f7.108e.7b12
                          pciex8086,10f7.1
                          pciex8086,10f7
                          pciexclass,020000
                          pciexclass,0200
address-bits              00000030
max-frame-size            00002400
network-interface-type    ethernet
device_type               network
name                      network
fcode-rom-offset          0000f000
interrupts                00000001
cache-line-size           00000010
class-code                00020000
subsystem-id              00007b12
subsystem-vendor-id       0000108e
revision-id               00000001
device-id                 000010f7
vendor-id                 00008086
```

c. Type the following when you finish looking at the `.properties` values:

```
ok device-end
```

Related Information

- "Install the FEM in a Server Module" on page 19

▼ Verify the Installation in a Solaris x86 System

1. **Power on the system.**
2. **Check the driver version on your system:**

```
# modinfo|grep ixgbe
173 7b762000  17998 100   1  ixgbe (Intel 10Gb Ethernet 1.0.9)
```

If the version number is not 1.0.9 or newer, you must install the latest driver patch. See "OS Patches and Updates" on page 7.

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/pci8086,3410@9/pci108e,7b12@0" 0 "ixgbe"
"/pci@0,0/pci8086,3410@9/pci108e,7b12@0,1" 1 "ixgbe"
```

Related Information

- "Install the FEM in a Server Module" on page 19

▼ Verify the Installation in a Linux System

- **Verify the new network interface instances corresponding to the FEM:**

```
# 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
```

Related Information

- "Install the FEM in a Server Module" on page 19

▼ Verify the Installation in a Microsoft Windows System

1. **Click Control Panel.**
2. **Click Network Connection.**

   If the driver is installed correctly, the Ethernet adapter interfaces labeled as "Intel(R) 82599 10 Gigabit Dual Port Network Connection" will be displayed at the Network Connection window screen.
3. **In the Administration Tool, click Computer Management, Device Manager, and Network Adapter.**
4. **Check the driver version.**

   The minimum Windows Server 2003 and 2008 driver version is `14.3`.

Related Information

- "Install the FEM in a Server Module" on page 19

Configuring the Network

These topics describe how to configure the network.

Description	Links
Configure the network for a Solaris system.	"Create `/etc/hostname.ixgbe#` Files" on page 25 "Configure the Network Host Files With the `ifconfig` Command" on page 26
Boot over the network.	"Boot Over the Network Using PXE" on page 27 "Boot Solaris x86 and Linux Systems Over a 10GbE Network" on page 27
Install the Solaris OS over the network.	"Install the Solaris OS Over a 10GbE Network on SPARC Systems" on page 29

Related Information

- "Installation Overview for Solaris Platforms" on page 8
- "Installation Overview for Linux Platforms" on page 9
- "Installation Overview for Microsoft Windows Platforms" on page 9

▼ Create `/etc/hostname.ixgbe#` Files

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. In the new files, only insert a text hostname, then save and exit.

2. **Edit the `/etc/hosts` file to include an IP address and hostname for each `ixgbe` interface (that is, for each `/etc/hostname.ixgbe#` file).**

3. **Boot the Solaris OS.**

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

Related Information

- "Configure the Network Host Files With the `ifconfig` Command" on page 26
- Solaris 10 System Administrator Collection

▼ Configure the Network Host Files With the `ifconfig` Command

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. **Get the `ixgbe` instances:**

```
# dladm show-dev
```

   The output might include lines similar to the following:

```
nxge0           link: up        speed: 1000  Mbps   duplex: full
nxge1           link: unknown   speed: 0     Mbps   duplex: unknown
nxge2           link: unknown   speed: 0     Mbps   duplex: unknown
nxge3           link: unknown   speed: 0     Mbps   duplex: unknown
e1000g0         link: unknown   speed: 0     Mbps   duplex: half
e1000g1         link: unknown   speed: 0     Mbps   duplex: half
ixgbe0          link: up        speed: 10000 Mbps   duplex: full
ixgbe1          link: up        speed: 10000 Mbps   duplex: full
```

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

   Your `ifconfig` command might look similar to the following:

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

Related Information

- "Create `/etc/hostname.ixgbe#` Files" on page 25
- `ifconfig`(1M) man page
- Solaris 10 System Administrator Collection

▼ Boot Over the Network Using PXE

PXE network boot is an environment to boot computers using a network interface independently of available data storage devices (such as hard disks) or installed operating systems. No boot media is required on the client system. With PXE, you can install an x86 based client over the network by using DHCP.

- **Boot over the network using PXE.**

  Refer to "x86: Overview of Booting and Installing Over the Network With PXE" in the *Solaris 10 Installation Guide: Network-Based Installations* for more information at:

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

Related Information

- "Boot Solaris x86 and Linux Systems Over a 10GbE Network" on page 27
- *Solaris 10 Installation Guide: Network-Based Installations*

▼ Boot Solaris x86 and Linux Systems Over a 10GbE Network

1. **Obtain the MAC address of the first FEM port by checking the label of the card.**

   For the adapter, 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 associated SPF+ tranceiver port on the Network Express Module (NEM).**
4. **Power on the system.**
5. **Press the F2 key or the Control-E keys to go to the BIOS menu.**
6. **Go to the Boot - Boot Device Priority screen 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 BIOS.**

   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 installation 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.

Related Information

- *Solaris 10 Installation Guide: Network-Based Installations*
- Solaris 10 System Administrator Collection

▼ Install the Solaris OS Over a 10GbE Network on SPARC Systems

The *Solaris Advanced Installation Guide* describes the full procedure for installing the Solaris Operating System over the network.

1. **Prepare an installation server and a client system for installing the Solaris Operating System over the network.**

   a. **Create an installation server that contains the image of the Solaris CD.**

   b. **Set up the client system to be installed over the network.**

      The *Solaris Advanced Installation Guide* describes how to create the installation server and set up the client systems

---

Note – If you want to install the client system over a network that is not part of the same subnet, you must also create a boot server. The *Solaris Advanced Installation Guide* describes how to create a boot server.

---

2. **On the installation server, find the `root` directory of the client system by searching the `/etc/bootparams` file.**

```
# grep client-name /etc/bootparams
client_name root=server-name:/netinstall/Solaris_10/Tools/Boot
install=server-name:/netinstall boottype=:in rootopts=:rsize=32768
```

   In this example, the `root` directory for the Solaris 10 client is `/netinstall`. In Step 4, you would replace *root-directory* with `/netinstall`.

Note – If the `root` directory is not found in the `/etc/bootparams` file, refer to the *Solaris Advanced Installation Guide* for configuration instructions.

---

3. **On the installation server, download the Sun Dual 10GbE PCIe 2.0 `ixgbe` driver onto the hard drive.**

   You can download the driver from the following web site:

   `(http://www.sun.com/download/)`

4. **On the installation server, install the Sun Dual 10GbE PCIe 2.0 software to the client's `root` directory, as determined in Step 2.**

   Replace *root-directory* with the location of the client's `root` directory.

```
# cd directory-where-driver-was-downloaded
# ls SUNWixgbe*
# pkgadd -R root-directory/Solaris_10/Tools/Boot -d . SUNWixgbe.v
```

Note – If the preceding commands do not work correctly, refer to the documentation for your version of the Solaris Operating System.

---

5. **On the client system, shut down and halt the system to get to the OpenBoot (`ok`) prompt.**

```
# shutdown -i0 -g0 -y. . .
(shutdown command messages omitted)
. . .
ok
```

6. **At the `ok` prompt, find the device path of the 10-Gigabit Ethernet device.**

   You should see the full paths and names of the network devices, similar to the example below.

```
ok show-nets
a) /pci@400/pci@0/pci@9/network@0,1
b) /pci@400/pci@0/pci@9/network@0
c) /pci@400/pci@0/pci@8/pci@0/pci@4/network@0,1
d) /pci@400/pci@0/pci@8/pci@0/pci@4/network@0
e) /pci@400/pci@0/pci@8/pci@0/pci@2/network@0,1
f) /pci@400/pci@0/pci@8/pci@0/pci@2/network@0
g) /pci@400/pci@0/pci@2/network@0,1
h) /pci@400/pci@0/pci@2/network@0
q) NO SELECTION
Enter Selection, q to quit: q
```

7. **At the `ok` prompt, boot the client system using the full device path of the 10-Gigabit Ethernet device, for example:**

```
ok boot /pci@400/pci@0/pci@9/network@0
```

The boot takes about 3 minutes to complete. Then you see a menu for continuing to install the Solaris OS.

8. **Proceed with the Solaris Operating System installation.**

Refer to the *Solaris Advanced Installation Guide* for more information about installing the Solaris Operating System over the network.

9. **Install the Sun Dual 10GbE PCIe 2.0 FEM software on the client system.**

The software installed in Step 4 is required to boot the client system over the 10-Gigabit Ethernet interface. You now must install the software in order for the operating system to use the client's 10-Gigabit Ethernet interfaces in normal operation.

Before installing the `SUNWixgbe` driver, ensure that the client system does not already have the driver installed.

```
# pkginfo | grep SUNWixgbe
```

- If the software is installed, this command will return the package name you typed in. In that case, skip to Step 10.
- If the software is not installed, install the software from the download center at `(http://www.sun.com/download/)`.

10. **Confirm that the network host files have been configured correctly during the Solaris installation.**

Although the Solaris software installation creates the client's network configuration files, you might need to edit these files to match your specific networking environment. See "Configure the Network Host Files With the `ifconfig` Command" on page 26 for more information about editing these files.

11. **Display the configuration information for all datalinks or the specified datalink.**

By default, the system is configured to have one datalink for each known network device.

```
# dladm show-dev
nxge0           link: up        speed: 1000  Mbps   duplex: full
nxge1           link: unknown   speed: 0     Mbps   duplex: unknown
nxge2           link: unknown   speed: 0     Mbps   duplex: unknown
nxge3           link: unknown   speed: 0     Mbps   duplex: unknown
e1000g0         link: unknown   speed: 0     Mbps   duplex: half
```

```
e1000g1       link: unknown   speed: 0     Mbps   duplex: half
ixgbe0        link: up        speed: 10000 Mbps   duplex: full
ixgbe1        link: up        speed: 10000 Mbps   duplex: full
```

Related Information

- *Solaris Advanced Installation Guide*
- *Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module Product Notes*
- "Verify the Driver Version on a Solaris Platform" on page 12

Configuring the Driver Parameters

The `ixgbe` device driver controls the FEM's interfaces. You can manually set the `ixgbe` device driver parameters to customize each device in your system.

These topics describe how to configure driver parameters.

Description	Links
Configure the driver parameters for the Solaris OS.	"Driver Parameters for the Solaris OS" on page 33 "Set `ixgbe` Driver Parameters in the Solaris OS" on page 35 "Solaris OS Performance Variables" on page 36 "Improve Performance in the Solaris OS" on page 36
Configure the driver parameters for Linux.	"Driver Parameters for Linux" on page 38 "Set Driver Parameters in Linux" on page 39
Configure Jumbo Frames.	"Configure Jumbo Frames in Solaris OS" on page 39 "Configure Jumbo Frames in Linux" on page 40

Related Information

- "Installation Overview for Solaris Platforms" on page 8
- "Installation Overview for Linux Platforms" on page 9
- "Installation Overview for Microsoft Windows Platforms" on page 9

Driver Parameters for the Solaris OS

Each `ixgbe` channel provides 10000BASE-T networking interfaces. The `ixgbe` driver is capable of supporting 10000 Mbit/sec, full-duplex.

The following table describes the functions of the Solaris driver parameters.

Type	Keyword	Description
Jumbo Frames	`default_mtu=`*u*	Size of the default MTU (payload without the Ethernet header). Allowed values: `1500` to `15500` (default = `1500`)
Flow Control	`flow_control`	Ethernet flow control. Allowed values: `0` - Disable `1` - Receive only `2` - Transmit only `3` - Receive and transmit (default)
Transmit Queues Number	`tx_queue_number`	Number of the transmit queues. Allowed values: `1` to `32` (default = `1`) for Solaris 10 5/09 `1` to `128` (default = `8`) for Solaris 10 10/09
Transmit Queue Size	`tx_ring_size`	Number of the transmit descriptors per transmit queue. Allowed values: `64` to `4096` (default = `512` for Solaris 10 5/09 and default = `1024` for Solaris 10 10/09)
Receive Queues Number	`rx_queue_number`	Number of the receive queues. Allowed values: `1` to `32` (default = `1`) for Solaris 10 5/09 `1` to `128` (default = `8`) for Solaris 10 10/09
Receive Queue Size	`rx_ring_size`	Number of the transmit descriptors per transmit queue. Allowed values: `64` to `4096` (default = `512` for Solaris 10 5/09 and default = `1024` for Solaris 10 10/09)

Note – The final values of `tx_queue_number` and `rx_queue_number` are decided by the number of interrupt vectors obtained by the driver. These values might be less than the specified values because of limited interrupt vector number.

Related Information

- "Set `ixgbe` Driver Parameters in the Solaris OS" on page 35
- "Solaris OS Performance Variables" on page 36
- "Improve Performance in the Solaris OS" on page 36

▼ Set ixgbe Driver Parameters in the Solaris OS

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 "pciex8086,10f7"
```

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/pci8086,3410@9/pci108e,7b12@0" 0 "ixgbe"
"/pci@0,0/pci8086,3410@9/pci108e,7b12@0,1" 1 "ixgbe"
```

   In the preceding example:

   - 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.

Note – To identify a PCIe device unambiguously in the `ixgbe.conf` file, use the name, parent name, and the unit address for the device. In the example, the name is `pciex8086,10f7`, the parent is `/pci@0,0/pci8086,3410@9`, and the unit address is `0`. Refer to the `pci`(4) man page for more information about the PCIe device specification.

---

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 = "pciex8086,10f7"
parent = "/pci@0,0/pci8086,3410@9"
unit-address = "0"
flow_control = 3;
```

4. **Save the `ixgbe.conf` file.**
5. **Reboot the system.**

Related Information

- "Driver Parameters for the Solaris OS" on page 33
- "Solaris OS Performance Variables" on page 36
- "Improve Performance in the Solaris OS" on page 36
- `pci`(4) man page

Solaris OS Performance Variables

Based on system configuration, you might need to tune some system and driver variables to appropriate values for better performance in Solaris. For example:

- `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`).
- `ddi_msix_alloc_limit`, `pcplusmp:apic_multi_msi_max`, and `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.
- `ip:ip_soft_rings_cnt` should be tuned based on system type.

Related Information

- "Improve Performance in the Solaris OS" on page 36
- "Driver Parameters for the Solaris OS" on page 33

▼ Improve Performance in the Solaris OS

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

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.**

Related Information

- "Solaris OS Performance Variables" on page 36
- "Driver Parameters for the Solaris OS" on page 33
- "Set `ixgbe` Driver Parameters in the Solaris OS" on page 35

Driver Parameters for Linux

The following table lists the tunable `ixgbe` driver parameters for Linux operating systems and describes their function.

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.
`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.

Related Information

- "Driver Parameters for Linux" on page 38
- "Set Driver Parameters in Linux" on page 39
- "Configure Jumbo Frames in Linux" on page 40

▼ Set Driver Parameters in Linux

- **Use the `ethtool` utility or the `configtool` utility to set parameters on a Linux platform.**

Related Information

- "Driver Parameters for Linux" on page 38

▼ Configure Jumbo Frames in Solaris OS

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

1. **Add the following line in the `/kernel/drv/ixgbe.conf` file:**

```
default_mtu = desired-frame-size
```

   The *desired-frame-size* value can range from `1500` to `15500`.

2. **Reboot the server.**

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

   For example, where the device name is `ixgbe0`, the following command increases MTUs to the maximum:

```
# ifconfig ixgbe0 plumb mtu 15360 up
```

Related Information

- "Driver Parameters for the Solaris OS" on page 33
- `ifconfig`(1M) man page

▼ Configure Jumbo Frames in Linux

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 9000  up
```

Related Information

- "Driver Parameters for Linux" on page 38
- `ifconfig`(1M) man page

Configuring VLANs

These topics describe how to configure VLANs.

Description	Links
Understand VLAN.	"VLAN Overview" on page 42 "VLAN Configuration" on page 44
Configure VLANs.	"Configure Static VLANs in a Solaris Environment" on page 45 "VLAN Naming Format" on page 46 "Configure VLANs in a Linux Environment" on page 47 "Configure VLANs in a Microsoft Windows Environment" on page 48

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.

Related Information

- "Installation Overview for Solaris Platforms" on page 8
- "Installation Overview for Linux Platforms" on page 9
- "Installation Overview for Microsoft Windows Platforms" on page 9
- Solaris 10 System Administrator Collection

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, you can define 128 VLANs for each VLAN-aware card on your server. However, you can increase this number by changing the system parameters.

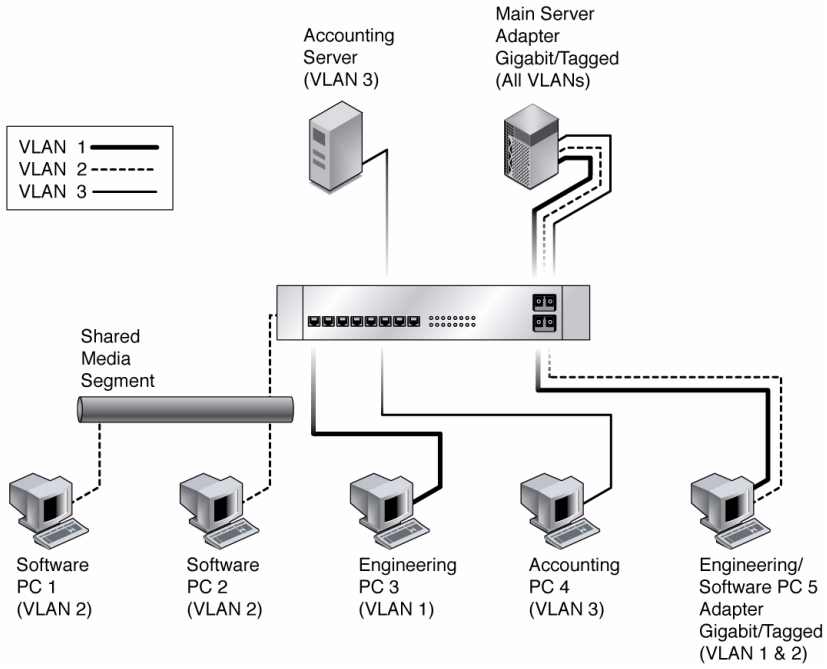
If your network does not require multiple VLANs, you can use the default configuration, in which case no further configuration is necessary.

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.

The following figure shows an example network that uses VLANs.



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 VLAN 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 VLAN is a software development group.
- VLAN 3 includes the Main Server, the Accounting Server, and Client 4. This VLAN is an accounting group.

The Main Server is a high-use server that must be accessed from all VLANs and IP subnets. The server has a Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module 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 Dual 10GbE PCIe 2.0 Fabric Expansion Module 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.

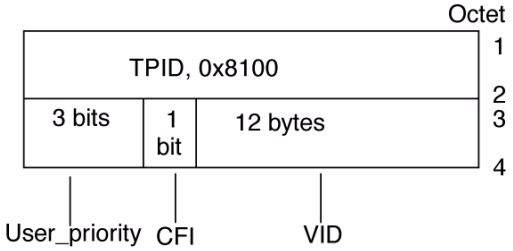
Related Information

- "VLAN Configuration" on page 44
- "Configure Static VLANs in a Solaris Environment" on page 45
- "Configure VLANs in a Linux Environment" on page 47
- "Configure VLANs in a Microsoft Windows Environment" on page 48

VLAN Configuration

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). The following figure shows the 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.

Related Information

- "VLAN Overview" on page 42
- "Configure Static VLANs in a Solaris Environment" on page 45
- "Configure VLANs in a Linux Environment" on page 47
- "Configure VLANs in a Microsoft Windows Environment" on page 48

▼ 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.**

   See "VLAN Naming Format" on page 46.

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. **Use 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 preceding examples, the second NIC output for `ixgbe224002` was plumbed and enabled (that is, used the `up` option), but had no IP address. By default, the netmask and broadcast addresses 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 address is not set.

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

Related Information

- "VLAN Naming Format" on page 46
- "VLAN Overview" on page 42
- "VLAN Configuration" on page 44
- Solaris 10 System Administrator Collection
- `ifconfig`(1M) man page

VLAN Naming Format

When configuring VLANs, use the following naming format, which includes both the VID and the physical point of attachment (PPA):

VLAN logical PPA = 1000 * VID + *Device-PPA*

For example, 123000 = 1000 * 123 + 0.
So the VLAN interface will be `ixgbe123000`.

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

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

VLAN logical PPA = 1000 * *VID* + *Device-PPA*

Thus, 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 Oracle's Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module 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.

Related Information

- "Configure Static VLANs in a Solaris Environment" on page 45

▼ Configure VLANs in a Linux Environment

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

```
# modprobe ixgbe
```

2. **Plumb the adapter's 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 (`eth6` in this example):**

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

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

Related Information

- "VLAN Overview" on page 42
- "VLAN Configuration" on page 44

▼ Configure VLANs in a Microsoft Windows Environment

1. **Click Control Panel.**
2. **Click Network Connection.**
3. **Click the folder icon from the sub-manual bar.**
4. **Right-click the Sun Dual 10GbE PCIe 2.0 Fabric Expansion Module 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.

Related Information

- "VLAN Overview" on page 42
- "VLAN Configuration" on page 44

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