Sun Dual 10 GbE PCIe 2.0 Fibre Channel Over Ethernet Software

User's Guide

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Contents

Using This Documentation

This guide provides software installation instructions for the Fibre Channel Over Ethernet (FCoE) software for Oracle's Sun Dual 10GbE PCIe 2.0 adapters. This guide also describes how to configure the FCoE software for 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 guide, 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.

The following topics are included in this section:

Product Notes

For late-breaking information and known issues about this product, refer to the product notes at:

`http://www.oracle.com/pls/topic/lookup?ctx=E25048-01`

Related Documentation

Documentation	Links
All Oracle products	http://www.oracle.com/documentation
Sun Dual 10GbE SFP+ PCIe 2.0 Low Profile Adapter	http://www.oracle.com/pls/topic/lookup?ctx=E19407-01
Sun Dual 10GbE SFP+ PCIe 2.0 ExpressModule	http://www.oracle.com/pls/topic/lookup?ctx=E19254-01
Intel FCoE software	http://downloadcenter.intel.com/SearchResult.aspx?lang=eng&keyword=%fcoe%
Redhat FCoE software	http://docs.redhat.com/docs/en-US/Red_Hat_Storage/index.html
SLES FCoE software	http://www.suse.com/documentation/sles11/

Feedback

Provide feedback on this documentation at:

http://www.oracle.com/goto/docfeedback

Support and Accessibility

Description	Links
Access electronic support through My Oracle Support	http://support.oracle.com For hearing impaired: http://www.oracle.com/accessibility/support.html
Learn about Oracle's commitment to accessibility	http://www.oracle.com/us/corporate/accessibility/index.html

Understanding the FCoE Software

These topics provide an overview of the Fibre Channel Over Ethernet (FCoE) software and installation process:

Description	Links
Review the installation process.	"Installation Overview (Linux)" on page 2 "Installation Overview (Windows)" on page 3
Learn about the software.	"FCoE" on page 3
Familiarize yourself with the system requirements.	"System Requirements" on page 5
Install patches and upgrades.	"OS Patches and Updates" on page 6

Related Information

- "Managing the Driver" on page 9
- "Booting Over a Network" on page 21
- "Configuring the Switch" on page 27
- "Configuring Driver Parameters (Linux)" on page 31

Installation Overview (Linux)

Follow these steps to install the FCoE software on a Linux platform.

Step	Description	Links
1.	Read the product notes for the adapter to obtain any late-breaking news	*Sun Quad 10GbE SFP+ PCIe 2.0 Low Profile Adapter Product Notes* *Sun Quad 10GbE SFP+ PCIe 2.0 ExpressModule Product Notes*
2.	Familiarize yourself with the FCoE software.	"FCoE" on page 3 "System Requirements" on page 5
4.	Install any OS patches or upgrades.	"OS Patches and Updates" on page 6
5.	Enable the driver.	"Enabling the FCoE Software (Linux)" on page 9
6.	Configure the software to boot over the network.	"Boot Over a 10GbE Network (Linux)" on page 21
7.	Configure the switch.	"Configure the Cisco Nexus 5000 Series Switch" on page 27 "Configure the Brocade 8000 Series Switch" on page 28
8.	(Optional) Configure the driver parameters.	"Configuring Driver Parameters (Linux)" on page 31

Related Information

- "Installation Overview (Linux)" on page 2
- "FCoE" on page 3
- "System Requirements" on page 5
- "OS Patches and Updates" on page 6

Installation Overview (Windows)

Follow these steps to install the FCoE software on a Windows platform.

Step	Description	Links
1.	Read the product notes for the adapter to obtain any late-breaking news	*Sun Quad 10GbE SFP+ PCIe 2.0 Low Profile Adapter Product Notes* *Sun Quad 10GbE SFP+ PCIe 2.0 ExpressModule Product Notes*
2.	Familiarize yourself with the FCoE software.	"FCoE" on page 3 "System Requirements" on page 5
4.	Install any OS patches or upgrades.	"OS Patches and Updates" on page 6
5.	Install the driver.	"Installing the FCoE Software (Windows)" on page 15
6.	Configure the software to boot over the network.	"Set Up the FCoE Boot Option ROM (Windows)" on page 23
7.	Configure the switch.	"Configure the Cisco Nexus 5000 Series Switch" on page 27 "Configure the Brocade 8000 Series Switch" on page 28

Related Information

- "FCoE" on page 3
- "System Requirements" on page 5
- "OS Patches and Updates" on page 6

FCoE

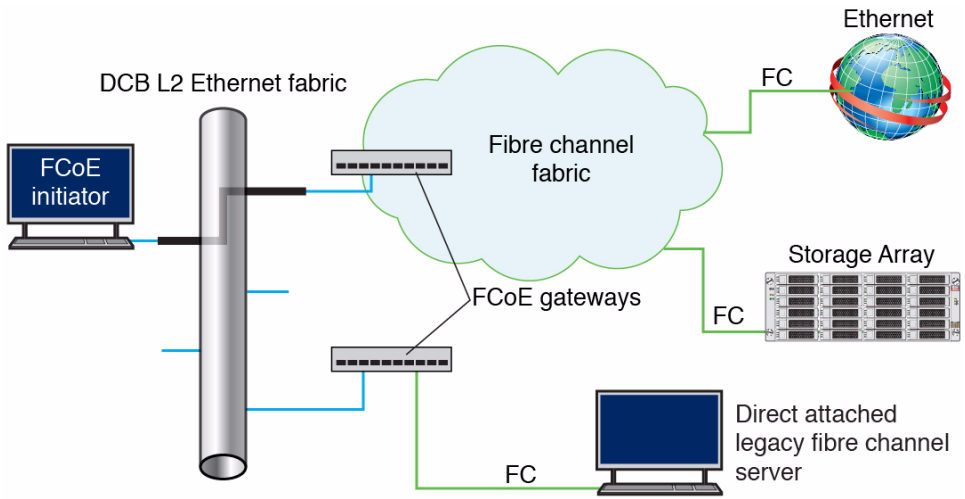
Intel's FCoE software is designed to run on Oracle's 10-gigabit PCIe family of server adapters. FCoE is the encapsulation of the standard Fibre Channel Protocol (FCP) frames as data within standard Ethernet frames. This link-level encapsulation, teamed with an FCoE-aware Ethernet-to-FCP gateway, extends an FCP fabric to include Ethernet-based host connectivity.

Data Center Bridging

Data center bridging (DCB) is a collection of standards-based extensions to classical Ethernet protocols. DCB provides a lossless datacenter transport layer that enables the convergence of LANs and SANs onto a single unified fabric. In addition to supporting FCoE, other applications and protocols leverage these extensions to provide guaranteed bandwidth to traffic classes other than FCoE.

FCoE Topology

FCoE focuses on the encapsulation of frames that are specific to storage class traffic. However, as the following illustration shows, a typical FCoE infrastructure can encapsulate traffic from several sources.



Related Information

- "Installation Overview (Linux)" on page 2
- "System Requirements" on page 5
- "OS Patches and Updates" on page 6

System Requirements

Before installing the FCoE driver, check your system for the following minimum configuration requirements. If you are using an Intel FCoE-capable OEM server system, refer to the instructions provided from the OEM to enable Intel FCoE Remote Boot.

System Hardware Compatibility for Network Adapters

The following list describes the general requirements for network adapters:

- FCoE-capable Intel 82599-based network adapter
- PCIe slot (v1.0a, or newer, 4x, 8x or 16x)
- Latest BIOS for the computer
- At least 4 Gbyte RAM for optimum performance

Supported 64-Bit Operating Systems

The Intel Ethernet FCoE Protocol Driver and Intel FCoE Remote Boot are supported on the following Intel 64 operating systems:

- Microsoft Windows Server 2008 R2 SP1 (with latest service pack) – DataCenter or Enterprise
- Microsoft Windows Server 2008 R2 SP1 (with latest service pack) – DataCenter or Enterprise
- Oracle Linux 6.0
- Red Hat Enterprise Linux 6
- Novell SUSE Linux Enterprise 11, SP1 and SP2

A platform that supports Intel 64 will run in either 64-bit mode or 32-bit compatibility mode. For the platform to run in 64-bit mode, the following requirements must be met:

- System must have a 64-bit BIOS that takes advantage of Intel Extended Memory 64 technology.
- One of the supported 64-bit operating systems must be installed.

The installer for the adapter driver lists only the drivers that are compatible with the currently running operating system. If the system is running in compatibility mode, only IA-32 drivers are available. If the system is running in 64-bit mode, only Intel 64 drivers are available.

Jumbo Frames

The base driver supports FCoE mini-jumbo frames (2.5k bytes), independent of the LAN jumbo frames setting.

Related Information

- "System Hardware Compatibility for Network Adapters" on page 5
- "Supported 64-Bit Operating Systems" on page 5
- "Jumbo Frames" on page 6

OS Patches and Updates

For information and instructions on the latest patches and updates, check the product notes for your adapter.

Note – The Intel FCoE driver and Ethernet driver are validated as an ordered pair. You must update both drivers at the same time.

Use the Intel FCoE support site to determine which drivers, the NDIS miniport and FCoE drivers, have been validated as ordered pairs. The support site also lists the latest certification status for some storage vendors.

`http://www.intel.com/support/network/adapter/x520server/sb/CS-031630.htm?wapkw=fcoe`

To download the most recent drivers for the Windows or Linux OS, go to:

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

Related Information

- "Installation Overview (Linux)" on page 2
- "Installation Overview (Windows)" on page 3

Managing the Driver

These topics explain how to install the `ixgbe` device driver software.

Description	Links
Enable, configure, or remove the driver on a Linux platform.	"Enabling the FCoE Software (Linux)" on page 9
Download, install, or remove the driver on a Windows platform.	"Installing the FCoE Software (Windows)" on page 15

Related Information

- "Understanding the FCoE Software" on page 1
- "Booting Over a Network" on page 21
- "Configuring the Switch" on page 27
- "Configuring Driver Parameters (Linux)" on page 31

Enabling the FCoE Software (Linux)

If you are using the FCoE software in a Linux environment, you do not need to install the FCoE device driver. The driver is installed as part of the kernel.

You can obtain the latest instructions on how to enable FCoE on a system running the SUSE operating system at:

`http://www.suse.com/documentation/sles11/stor_admin/data/cha_fcoe.html`

Use the following tasks to enable the FCoE software:

- "Enable FCoE During the Linux Installation" on page 10

- "Enable FCoE After a Linux Installation" on page 10
- "Set Up the Network Interfaces" on page 11
- "Resolve SAN-Boot Errors (RHEL6.0/OL6.0)" on page 14
- "Remove the FCoE Software Package (Linux)" on page 14

▼ Enable FCoE During the Linux Installation

1. **In Installation Settings, select the FCoE Package.**
2. **Click Details to enter a new window, and select additional installation package.**
3. **Click Search tab.**
4. **In the Search field, type `fcoe`, and click Search.**
5. **Select the FCoE packages, and click Accept.**
   - For the SLES 11 SP2 OS, select the `open-fcoe` file and the `YaST-fcoe-client` packages.
   - For all other Linux operating systems, select the `open-fcoe` file.
6. **Click OK to the questions to get back to the Installation Settings window.**

Related Information

- "Set Up the Network Interfaces" on page 11
- "Resolve SAN-Boot Errors (RHEL6.0/OL6.0)" on page 14
- "Remove the FCoE Software Package (Linux)" on page 14

▼ Enable FCoE After a Linux Installation

If FCoE is installed during OS installation, this procedure is not required.

1. **Select Software in the left pane.**
2. **Select Software Management in the right pane.**
3. **Type `fcoe` in the search field, then click Search.**
   - For the SLES 11 SP2 OS, the `open-fcoe` and the `YaST-fcoe-client` packages should appear in the pane.
   - For all other Linux operating systems, the `open-fcoe` package, and possibly others, should appear in the right pane.
4. **Select the FCoE packages, then click Accept.**

- For the SLES 11 SP2 OS, select the `open-fcoe` file and the `YaST-fcoe-client` packages.
- For all other Linux operating systems, select the `open-fcoe` package and any other FCoE packages that appear in the pane.

5. **Verify Automatic Changes, and click OK.**
6. **Click Install to install the package.**

Related Information

- "Set Up the Network Interfaces" on page 11
- "Resolve SAN-Boot Errors (RHEL6.0/OL6.0)" on page 14
- "Remove the FCoE Software Package (Linux)" on page 14

▼ Set Up the Network Interfaces

1. **For the Oracle Linux 6.*x* OS, switch off UEK, then reconnect the cables to the adapter.**

```
/boot/grub/menu.lst
```

2. **Open the `70-persistent-net.rules` file.**

```
/etc/udev/rules.d/70-persistent-net-rules
```

3. **Record the name and addresses of each of the ports, and reboot the host.**

   If you plan to make changes (for example, changing `ethx` port assignments), you should change them at this point. However, keeping the default settings provides the best results. Any changes will not be reflected until after a reboot or unless you shutdown all of the network interfaces by running the `udevadm` trigger.

4. **In another terminal window, type the `ifconfig -a` command, and compare the `eth`*x* values.**

   where `eth`*x* represents `eth0`, `eth1`, `eth2`, or `eth`*n*, according to the rules in the `70-persistent-net.rules` file.

   If non-FCoE ports (for example, `rje45`) appear in the list, you can use the Network Settings GUI to determine which addresses are FCoE ports.

5. **Configure LLDPad.**

a. **For the SLES 11 SP2 OS, type these commands:**

```
# rclldpad start
# service boot.lldpad start
# service ipmi start
# service ipmievd start
# chkconfig ipmi on
# chkconfig ipmievd on
# chkconfig boot.lldpad on
```

b. **For all other Linux operating systems, type these commands:**

```
# service lldpad start
# chkconfig lldpad on
```

6. **For the SLES 11 SP2 OS, open the YaST-FCoE Client Configuration application, and complete these steps:**

   a. **On the Interfaces tab, ensure that the columns after the FCoE VLAN Interface are set to** `yes`**.**

   b. **On the Services tab, ensure that the FCoE VLAN Interfaces are set to** `when booting`**.**

7. **For each FCoE** `eth`*x* **port being configured, type the following commands, substituting** *x* **for the port number:**

```
# dcbtool sc ethx dcb on
# dcbtool sc ethx app:0 e:1
# dcbtool sc ethx pfc e:1 a:1 w:1
```

8. **Create a configuration file for each FCoE port by repeating the following steps:**

   a. **Create a new** `cfg-ethx` **file for each port, where** *x* **represents the port number.**

```
# cp /etc/fcoe/cfg-ethx /etc/fcoe/cfg-ethx
```

Note – The variable value of *x* should match the digit associated with the port in the names in the `70-persistent-net.rules` file.

---

b. **Open each** `/etc/fcoe/cfg-eth`*x* **file, and add the following line to the top of the file:**

```
Onboot="yes"
```

9. **Start, and check the FCoE service.**

   a. **For the SLES 11 SP2 OS, execute these commands:**

```
# rcfcoe start
# service boot.fcoe start
# chkconfig boot.fcoe on
# reboot
```

   b. **For all other Linux operating systems, execute these commands:**

```
# service fcoe start
# chkconfig fcoe on
# reboot
```

10. **Type the** `ifconfig -a`**,** `fcoeadm -i`**, and** `lsscsi` **commands to verify that FCoE is operational.**

11. **Open the Network Settings windows, and verify that the** `eth`*x* **values match the values that are in the** `/etc/udev/rules.d/70-persistent-net.rules` **file.**

    If the values do not match, make the network settings match the values that are in the `70-persistent-net.rules` file.

    If your TCP/IP connection into the Cisco or Brocade switch is through a VLAN trunk, you must create the VLAN at this point in the installation. The VLAN should have the IP address, netmask, and gateway of the port. The associated `eth`*x* port will not have an IP address. For instructions on how to create the VLAN, refer to these sites:

    - `http://access.redhat.com/knowledge/docs/Red_Hat_Enterprise_Linux/`
    - `http://www.cyberciti.biz/tips/howto-configure-linux-virtual-local-area-network-vlan.html`

Related Information

- "Enable FCoE During the Linux Installation" on page 10
- "Enable FCoE After a Linux Installation" on page 10
- "Resolve SAN-Boot Errors (RHEL6.0/OL6.0)" on page 14
- "Remove the Driver (Windows)" on page 19

▼ Resolve SAN-Boot Errors (RHEL6.0/OL6.0)

The Red Hat Enterprise Linux 6.0 or Oracle Linux 6.0 instance on an external volume might not boot properly after the installation because of a mismatch in the `/etc/fstab` values.

1. **Open the `/etc/fstab` file.**
2. **Find the following lines:**

```
/dev/mapper/vg_ai4270m21-lv_home /home            ext4
  defaults,_netdev 1 2
UUID=dce3bd61-ed1c-4538-96b6-e16f91881a09 /boot   ext4
  defaults,_netdev 1 2
```

3. **Change the bit `dump/fsck` bits to `0 0`.**

```
/dev/mapper/vg_ai4270m21-lv_home /home            ext4
  defaults,_netdev 0 0
UUID=dce3bd61-ed1c-4538-96b6-e16f91881a09 /boot   ext4
  defaults,_netdev 0 0
```

Related Information

- "Enable FCoE During the Linux Installation" on page 10
- "Enable FCoE After a Linux Installation" on page 10
- "Set Up the Network Interfaces" on page 11
- "Remove the FCoE Software Package (Linux)" on page 14

▼ Remove the FCoE Software Package (Linux)

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 the driver.

- **Remove the FCoE software.**
  - For Oracle Linux 6.0 and Red Hat, use YUM.
  - For SUSE, use YaST.

Related Information

- "Enable FCoE During the Linux Installation" on page 10
- "Enable FCoE After a Linux Installation" on page 10
- "Resolve SAN-Boot Errors (RHEL6.0/OL6.0)" on page 14

Installing the FCoE Software (Windows)

These topics describe how to install the FCoE software in a Windows environment.

Upgrade Guidelines for Software Release 15.4 (Windows)

Upgrades for Windows Software Release 16.2 are supported when FCoE Boot is enabled or the Windows paging file is on an FCoE target. You must upgrade an FCoE-booted system only by using the Intel PROSet for Window Device Manager installer. A reboot is required to complete the upgrade.

Caution – Do not update the X520 base driver by using the Windows Update method. The FCoE stack and base driver need to be the same version. If you use the Windows Update method to update the X520 base driver, the FCoE stack might become out of sync with the X520 driver. This situation could cause the system to become inoperable, generating a blue screen.

The Windows FCoE stack has recently changed the way it creates the WWPN initiator. The first two bytes of the WWPN previously contained a 2 followed by the FCoE fabric VLAN ID. The VLAN ID is no longer added to the WWPN, and the first two bytes are now 20:00. After upgrading from Release 15.4, you must zone the new WWPN for each initiator port.

Related Information

- "Validation and Storage Certification" on page 16
- "Hotfixes (Windows)" on page 16

Validation and Storage Certification

The software components for FCoE are composed of two major components, the Ethernet base driver and the FCoE driver. The components are developed and validated as an ordered pair. Avoid scenarios, either through upgrades or Windows updates, in which the Ethernet driver version is not the version released with the corresponding FCoE driver.

Note – Individually upgrading or downgrading the FCoE driver does not work. The entire FCoE package must be the same version. Upgrade the entire FCoE package using Intel Network Connections only.

If you uninstalled the Intel Ethernet Virtual Storage miniport driver for FCoE, you must find the same version that you uninstalled and reinstall the driver. Otherwise, you must uninstall and then reinstall the entire FCoE package.

Intel and the storage vendors try to ensure that their respective products operate with each other as expected for every version that is released. However, given the large number of releases, you must use your storage vendor's support matrix to ensure that the versions deployed for the Intel Ethernet Protocol driver have been tested as an integrated set.

Related Information

- "Upgrade Guidelines for Software Release 15.4 (Windows)" on page 15
- "Validation and Storage Certification" on page 16

Hotfixes (Windows)

These hotfixes are needed for specific use cases.

Windows Server 2008

This hotfix is for all Windows Server 2008 (R1 and R2) releases:

- KB983554 - High-performance storage devices fix

Multipath I/O

These hotfixes are for multipath I/O (MPIO) environments:

- Windows 2008 R1 SP2

- KB970525 - MPIO
- KB972797 - MS DSM
- KB974646 - NTFS
- KB976748 - MPIO - reboot fix
- KB979743 - MPIO - write errors
- KB981379 - MS DSM - target issues

- Windows 2008 R2
  - KB979743 - MPIO - write errors
  - KB981379 - MS DSM - target issues
- Windows 2008 R2 SP1
  - KB2406705 - MPIO timers

    You can obtain additional information about these registry settings at:

    http://technet.microsoft.com/en-us/library/ee619749(WS.10).aspx

    Set the `PathRecoveryInterval` value to 60.
  - KB2522766, KB2670762, KB2522766 - MPIO

    When using FCoE with Axiom600 and MPIO, set the registry settings to the following values:

    `UseCustomPathRecoveryInterval` to `1`.

    `PathRecoveryInterval` to `15`.

    `PDORemovePeriod` to `30`.

    Access the MPIO parameters here:

    `HKLM\System\CurrentControlSet\Services\mpio\Parameters`

iSCSI Over DCB

This hotfix is for the iSCSI over DCB (QOS binding) environment:

- Windows 2008 R1 SP2
  - KB2518021

Related Information

- "Upgrade Guidelines for Software Release 15.4 (Windows)" on page 15
- "Validation and Storage Certification" on page 16

▼ Download and Install the Driver (Windows)

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

Caution – You must install the driver before you install the low profile adapter or ExpressModule to prevent a nonrecoverable error.

---

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. **Start the** `PROWin`*xx*`.exe` **application.**

   where *xx* is the bit number of the OS (for instance, 32 or 64).
5. **Within the installer, select all of the unchecked options, including the FCoE option (SNMP is only necessary if the host has SNMP installed).**
6. **Power off the host after completion of the installation, and install the FCoE adapter.**
7. **Power on the host, and restart the** `PROWin`*xx*`.exe` **application.**

   where *xx* is the bit number of the OS (for instance, 32 or 64).
8. **Select any new options that have appeared.**
9. **Connect the Fibre Channel cables, and configure the storage.**
10. **Reboot the host.**
11. **Log in, and verify that the storage is available in the Server Manager - Disk Management window.**

    If not, check the properties of the Network Adapters and Storage Controllers in the Device Manager and the Storage Configuration Administration windows.

Related Information

- "Remove the Driver (Windows)" on page 19

▼ Remove the Driver (Windows)

Normally, 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

- "Upgrade Guidelines for Software Release 15.4 (Windows)" on page 15
- "Validation and Storage Certification" on page 16
- "Hotfixes (Windows)" on page 16
- "Download and Install the Driver (Windows)" on page 18

▼ Verify the Functionality of the Network Interface

The following instructions use `eth3` as the FCoE interface. The interface name in your network environment is likely to be different.

1. **After you install the FCoE package, activate the interface.**

```
# ifconfig eth3 up
```

2. **Ensure that the link is established and active at 10Gb speed to the network switch.**

```
# ethtool eth3

Settings for eth3:
Speed: 10000Mb/s
Link detected: yes
```

If you do not see the link detected, check the cabling and correct any issues before you proceed.

Related Information

- "Enabling the FCoE Software (Linux)" on page 9
- "Installing the FCoE Software (Windows)" on page 15

Booting Over a Network

These topics describe how to boot the OS over a network.

Description	Links
Set up the network to boot the Linux OS.	"Boot Over a 10GbE Network (Linux)" on page 21
Set up the ROM for Windows.	"Set Up the FCoE Boot Option ROM (Windows)" on page 23

Related Information

- "Understanding the FCoE Software" on page 1
- "Managing the Driver" on page 9
- "Configuring the Switch" on page 27

▼ Boot Over a 10GbE Network (Linux)

1. **Type the `ifconfig -a` command to obtain the MAC address.**

   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 fibre cable into the FCoE port.**
4. **Power on the system.**
5. **Press the F2 key 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 the 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 `open-fcoe.pkg` software.**

10. **After the Linux OS installation completes, boot the newly installed OS by using BIOS to change the boot device priority to Boot from Hard Disk.**

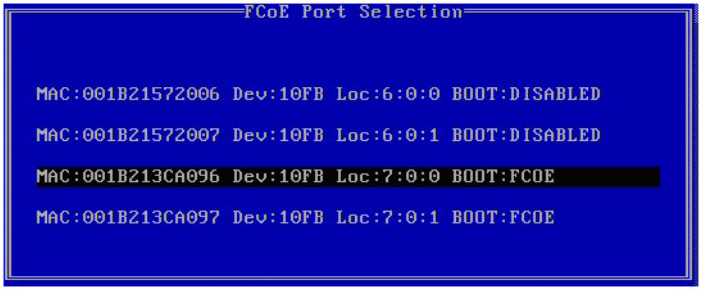
    Unless the boot device priority is changed, the OS installation process will repeat.

▼ Set Up the FCoE Boot Option ROM (Windows)

You can use FCoE to boot an operating system only in legacy BIOS mode. Upgrades for Windows OS Release 16.2 are supported when FCoE Boot is enabled or when the Windows paging file is on an FCoE target. You must upgrade an FCoE-booted system only through the Intel PROSet for Windows Device Manager. A reboot is required to complete the upgrade.

1. **Power on, or reset, the system.**
2. **Press Ctrl-D when the** `Press <Ctrl-D> to run setup...` **message is displayed.**

   After you press Ctrl-D, the Intel Ethernet FCoE Boot Port Selection menu is displayed.

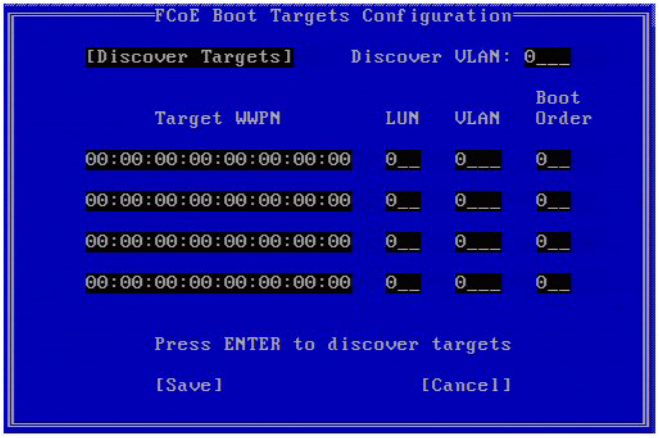


   This screen displays a list of Intel FCoE Boot-capable adapters. For each adapter port, the following fields are displayed:

   - Associated SAN MAC address
   - PCI device ID
   - PCI bus, device, and function location
   - FCoE Boot status

   Up to 10 FCoE Boot-capable ports can be displayed within the Port Selection menu. If there are more Intel FCoE Boot-capable adapters, these are not listed in the Selection menu.

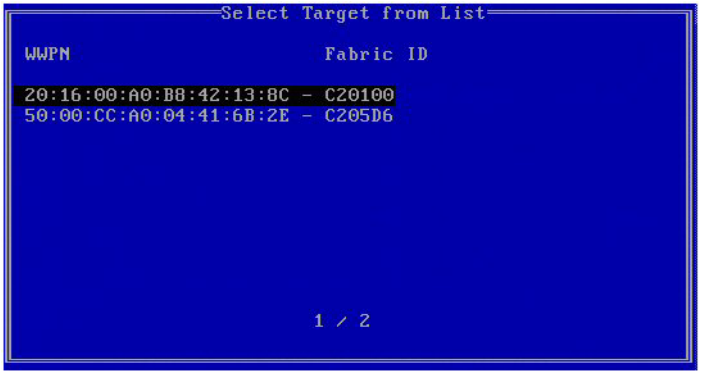
3. **Highlight the desired port, and press Enter to display the FCoE Boot Targets Configuration menu.**



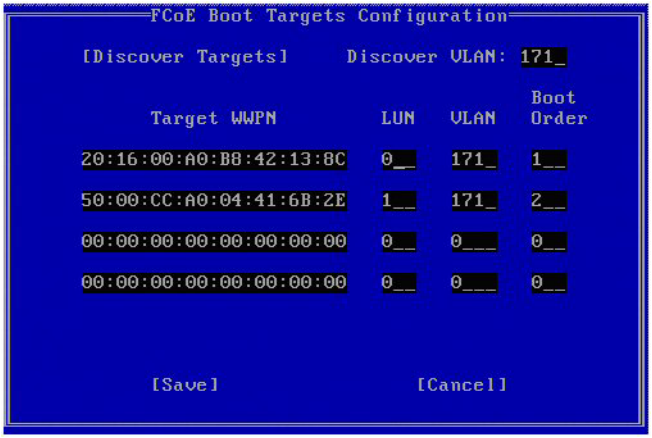
Discover Targets is highlighted by default. If the Discover VLAN value that is displayed is not correct, enter the correct value.

4. **Highlight Discover Targets, and press Enter to show the targets that are associated with the Discover VLAN value.**

Note – Under Target WWPN, if you know the desired WWPN, you can manually enter it or press Enter to display a list of previously discovered targets.



5. **Highlight the desired target from the list, and press Enter.**



6. **Manually fill in the LUN and Boot Order values.**

   The valid values for the boot order are 0-4. A 0 value means that no boot order is followed or that the target is ignored and that this port should not be used to connect to the target. Boot order values of 1-4 can only be assigned once to a target across all of the FCoE Boot enabled ports.

   The VLAN value is 0 by default. If the displayed VLAN is correct, you can enter the VLAN manually and execute the Discover Targets tool on that VLAN.

7. **Click Save.**

   After the Discover Targets function is executed, the Option ROM attempts to remain logged into the fabric until the FCoE Boot Targets Configuration menu is exited.

8. **Press Esc to leave the screen.**

Configuring the Switch

These topics describe how to configure the Cisco Nexus 5000 Series and Brocade 8000 Series switches.

Related Information

- "Understanding the FCoE Software" on page 1
- "Managing the Driver" on page 9
- "Configuring Driver Parameters (Linux)" on page 31

▼ Configure the Cisco Nexus 5000 Series Switch

For the Cisco Nexus switch, you first create a virtual interface to bind the Ethernet port to the FC forwarder (FCF).

The following instructions use port 1/3 as the example port.

1. **Before you configure the switch, download and install the latest switch firmware from:**

   `http://www.cisco.com/cisco/web/support/index.html`

2. **Enable the trunk mode for an Ethernet port.**

```
# configure
# interface ethernet 1/3
# switchport mode trunk
# spanning-tree port type edge trunk
# exit
```

3. **Create a VFC.**

```
# configure
# interface vfc 3
# bind interface ethernet 1/3
# no shutdown
# exit
```

Note – For more configuration information, go to the Cisco Nexus 5000 series switches documentation at:
http://www.cisco.com/en/US/products/ps9670/tsd_products_support_series_home.html

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▼ Configure the Brocade 8000 Series Switch

The following instructions use port 1/3 as the example port and VLAN 101 as the example VLAN value.

1. **Before you configure the switch, download and install the latest firmware from:**

   http://www.brocade.com/services-support/index.page

Caution – The Brocade 8000 Series switch is not designed for multi-hop FCoE. Thus, if you use an ExpressModule, the switch works only in the pass-through mode.

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2. **Set the mode for the switch.**

```
# configure terminal
# interface tengigabitethernet 1/3
# switchport
# switchport mode converged
```

For the `configure terminal` command to function properly, you must have already executed the `cmsh` command.

3. **Activate the VLAN.**

```
# vlan classifier activate group 1 vlan 101
# no shutdown
# cee default
# exit
```

Note – For more configuration information, go to the Brocade website at:
http://www.brocade.com/products/all/switches/index.page

Configuring Driver Parameters (Linux)

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

Description	Links
Configure the driver parameters for Linux.	"Driver Parameter Settings (Linux)" on page 32 "Set Driver Parameters (Linux)" on page 31
Configure jumbo frames.	"Configure Jumbo Frames (Linux)" on page 33

Related Information

- "Understanding the FCoE Software" on page 1
- "Managing the Driver" on page 9
- "Booting Over a Network" on page 21
- "Configuring the Switch" on page 27

▼ Set Driver Parameters (Linux)

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

Related Information

- "Driver Parameter Settings (Linux)" on page 32
- "Configure Jumbo Frames (Linux)" on page 33

Driver Parameter Settings (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 enables 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

- "Set Driver Parameters (Linux)" on page 31
- "Configure Jumbo Frames (Linux)" on page 33

▼ Configure Jumbo Frames (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 Parameter Settings (Linux)" on page 32
- "Set Driver Parameters (Linux)" on page 31
- `ifconfig`(1M) man page

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