

# Gigabit Ethernet Fiber ExpressCard Module

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**AT-2872SX**

## Installation and User's Guide

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# Electrical Safety and Emissions Standards

This product meets the following standards.

## U.S. Federal Communications Commission

### Declaration of Conformity

Manufacturer Name: Allied Telesis, Inc.

Declares that the product: **Gigabit Ethernet Fiber ExpressCard Module**

Model Numbers: **AT-2872SX**

This product complies with FCC Part 15B, Class B Limits:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device must not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### Radiated Energy

Note: This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with instructions, may cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. The user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

## Industry Canada

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

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

## European Union Restriction of the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment

This Allied Telesis RoHS-compliant product conforms to the European Union Restriction of the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment. Allied Telesis ensures RoHS conformance by requiring supplier Declarations of Conformity, monitoring incoming materials, and maintaining manufacturing process controls.

RFI Emissions                      FCC Class B, EN55022 Class B, VCCI Class B, C-TICK, CE

Immunity                              EN55024


Electrical Safety                      EN60950-1 (TUV), UL 60950-1 (cUL<sub>US</sub>)



Laser Safety                              EN60825

# Translated Safety Statements

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**Important:** The  symbol indicates that a translation of the safety statement is available in a PDF document titled “Translated Safety Statements”. This is posted on the Allied Telesis website at <http://www.alliedtelesis.com/support/software/>. Refer to “Where to Find Web-based Documentation and Drivers” on page 13 to navigate to this document.

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# Preface

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This guide contains instructions on how to install the AT-2872SX Gigabit Ethernet Fiber ExpressCard Module on a laptop computer. It also describes how to install the driver software on the AT-2872SX ExpressCard module and configure the driver software. The driver software is supported on the following operating systems:

- ❑ Windows XP™
- ❑ Windows Vista™
- ❑ Windows 7™

The Preface contains the following sections:



- ❑ “Safety Symbols Used in this Document” on page 12
- ❑ “Where to Find Web-based Documentation and Drivers” on page 13
- ❑ “Contacting Allied Telesis” on page 14

## Safety Symbols Used in this Document

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This document uses the safety symbols defined in Table 1.

Table 1. Safety Symbols

Symbol	Meaning	Description
	Caution	Performing or omitting a specific action may result in equipment damage or loss of data.
	Warning	Performing or omitting a specific action may result in electrical shock.

## Where to Find Web-based Documentation and Drivers

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The product documentation for all Allied Telesis products are available in portable document format (PDF) on our web site. Go to <http://www.alliedtelesis.com/support/software/>.

Enter your hardware product model in the **Search by Product Name** field; for example, enter AT-2872SX. You can view the documents online or download them onto your local workstation or server.

## Contacting Allied Telesis

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This section provides Allied Telesis contact information for technical support as well as sales and corporate information.

### Online Support

You can request technical support online by accessing the Allied Telesis Knowledge Base: [www.alliedtelesis.com/support/kb.aspx](http://www.alliedtelesis.com/support/kb.aspx). You can use the Knowledge Base to submit questions to our technical support staff and review answers to previously asked questions.

### Email and Telephone Support

For Technical Support via email or telephone, refer to the Support & Services section of the Allied Telesis web site: [www.alliedtelesis.com](http://www.alliedtelesis.com). Select your country from the list displayed on the website. then select the appropriate menu tab.

### Warranty

For hardware warranty information, refer to the Allied Telesis web site: [www.alliedtelesis.com/support/warranty](http://www.alliedtelesis.com/support/warranty).

### Returning Products

Products for return or repair must first be assigned a return materials authorization (RMA) number. A product sent to Allied Telesis without an RMA number will be returned to the sender at the sender's expense.

To obtain an RMA number, contact the Allied Telesis Technical Support group at our web site: [www.alliedtelesis.com/support/rma](http://www.alliedtelesis.com/support/rma). Select your country from the list displayed on the website. Then select the appropriate menu tab.

### Sales or Corporate Information

You can contact Allied Telesis for sales or corporate information through our web site: [www.alliedtelesis.com](http://www.alliedtelesis.com). To find the contact information for your country, select Contact Us -> Worldwide Contacts.

### Warranty

Go to [www.alliedtelesis.com/support/warranty](http://www.alliedtelesis.com/support/warranty) for specific terms and conditions of the warranty and for warranty registration for the AT-2872SX Gigabit Ethernet Fiber ExpressCard Module.

### Management Software Updates

New releases of management software for our managed products are available on our Allied Telesis web site at [www.alliedtelesis.com/support/software](http://www.alliedtelesis.com/support/software).

Go to "Where to Find Web-based Documentation and Drivers" on page 13 for instructions on navigating to this information.

## Chapter 1

# Introducing the AT-2872SX Gigabit Ethernet Fiber ExpressCard Module

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This chapter provides an introduction to the Allied Telesis AT-2872SX Gigabit Ethernet Fiber ExpressCard Module and contains the following sections:

- ❑ “Functional Description” on page 16
- ❑ “Hardware Features” on page 18
- ❑ “Supported Operating Systems” on page 19
- ❑ “Physical Description” on page 20

## Functional Description

---

The AT-2872SX is a highly integrated Gigabit Ethernet Fiber ExpressCard module based on Broadcom's BCM5708S chipset. It provides an PCI ExpressCard interface with SC connections to multimode fiber.

The AT-2872SX ExpressCard module connects a laptop computer to a Gigabit Ethernet network using fiber optic cabling and a connector that meets 62.5/125  $\mu\text{m}$  or 50/125  $\mu\text{m}$  multimode specifications. This module operates at speeds of 1000 Mbps featuring auto-negotiation.

PC Express Card is the new notebook interface that replaces the PCMCIA Card Bus interface. The PC Express interface is available in 34 mm and 54 mm sizes. You can install the AT-2872SX ExpressCard module in both the 34 mm and 54 mm sizes.

The AT-2872SX ExpressCard module has an SC connector, as show in Figure 1.



Figure 1. AT-2872SX ExpressCard module

### Contents of Your Shipment

The following items are included with your module:

- Antistatic bag (used for protecting the module when stored or shipped). Keep the module in its packaging until ready for installation.
- Plastic enclosure (attached to the module)



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**Note**

The AT-2872SX ExpressCard module is not shipped with a software driver CD. To download new driver software, see "Management Software Updates" on page 14.

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Inform your network supplier of any missing or damaged items. If you need to return the module, you must pack it in the original (or equivalent) packing material or the warranty will be voided. See "Returning Products" on page 14.

The documentation for this module is available in portable document format (PDF) on our web site at [www.alliedtelesis.com](http://www.alliedtelesis.com). To information to view or download these documents, refer to "Where to Find Web-based Documentation and Drivers" on page 13.

## Hardware Features

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The following list of hardware features for the AT-2872SX ExpressCard module applies to all of the supported operating systems:

- ❑ One 1000BASE-SX port with SC multi-mode fiber connector
- ❑ Full and half duplex Media Access Control (MAC)
- ❑ IPv4 Large Send Offload and Checksum Offload (LSO/TCO)
- ❑ Receive Side Scaling (RSS) for multi-core client processors
- ❑ PCI-ExpressCard Interface
- ❑ Statistics for SNMP MIB II, Ethernet-like MIB, and Ethernet MIB (80-2.3z Clause 30)
- ❑ Flow Control (IEEE 802.3x)
- ❑ VLAN Tag support (802.1Q)
- ❑ Ethernet Priority (802.1P)
- ❑ Pre-boot Execution Environment (PXE) v2.1
- ❑ Jumbo Packet Support
- ❑ 48 KB Receive Buffer
- ❑ 8 KB Transmit Buffer
- ❑ Activity LED
- ❑ Interrupt Moderation

## Supported Operating Systems

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The following list describes the supported operating systems for the AT-2872SX ExpressCard module:

- Windows XP
- Windows Vista
- Windows 7

## Physical Description

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This section provides a physical description of the AT-2872SX ExpressCard enclosure and the LED. The enclosure has one fiber port that provides two fiber optic connectors for attaching the module to a compatible link partner (one transmitting and one receiving).

The AT-2872SX ExpressCard module has one LED, as shown in Figure 2. See Table 1 for a description of the LED operating status.

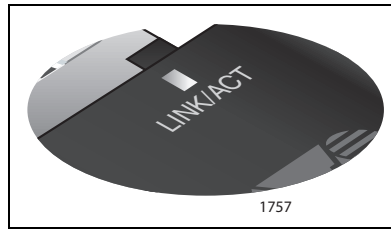


Figure 2. AT-2872SX LED

Table 1. Fiber Optic Port 1000 LED Status

State	Description
Flashing	The port is receiving or transmitting network packets at 1000 Mbps.

## Chapter 2

# Installing the Hardware


---

This chapter contains the following sections:

- ❑ “Reviewing Safety Precautions” on page 22
- ❑ “Pre-Installation Checklist” on page 24
- ❑ “Installing the Module” on page 25
- ❑ “Connecting the Network Cables” on page 30

## Reviewing Safety Precautions

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Please review the following safety precautions before you begin to install the switch or any of its components. The  indicates that a translation of the safety statements is available in a PDF document titled “Translated Safety Statements”. This other product documentation is posted on the Allied Telesis website at <http://www.alliedtelesis.com/support/software/>. Refer to “Where to Find Web-based Documentation and Drivers” on page 13 to navigate to this document.



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**Warning**

This is a “Class 1 LED product”.  L1

---



---

**Warning**


Do not stare into the laser beam.  L2

---



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**Warning**


The fiber optic ports contain a Class 1 laser device. When the ports are disconnected, always cover them with the provided plug. Exposed ports may cause skin or eye damage.  L4

---



---

**Warning**


Do not work on this equipment or cables during periods of lightning activity.  E2

---



---

**Warning**


Operating Temperature: This product is designed for a maximum ambient temperature of 40 degrees C.  E7

---



---

**Warning**


All Countries: Install this product in accordance with local and National Electric Codes.  E8

---



---

**Warning**

Do not look directly at the fiber optic cable ends or inspect the cable ends with an optical lens.  E29

---

**Warning**

The adapter is being installed in a system that operates with voltages that can be lethal. Before you remove the cover of your system, you must observe the following precautions to protect yourself and to prevent damage to the system components:

- Remove any metallic objects or jewelry from your hands and wrists.
  - Use only insulated and non-conducting tools.
  - Verify that the system is powered off and unplugged before accessing the internal components.
  - Installation or removal of adapters must be performed in a static-free environment. The use of a properly grounded wrist strap or other personal antistatic device and an antistatic mat is strongly recommended. ⚡ E39
- 

**Caution**

Do not use excessive force when seating the module, because this may damage the system or the module. If the module resists seating, remove it from the system, realign it, and try again

---

## Pre-Installation Checklist

---

Before you install the module, check the following list:

1. Verify that your laptop is using the latest BIOS.

If you downloaded the module software from the Allied Telesis support website, record the path to where the module driver files reside on your system.

2. If your laptop is active, shut it down.
3. When the system shut down is complete, power OFF and unplug your system.
4. Holding the module by the edges, remove it from its shipping package and place it on an antistatic surface.
5. Check the module for visible signs of damage, particularly on the edge connector.



### **Caution**

Do not attempt to install a damaged module. If the module is damaged, report it to Allied Telesis. See “Contacting Allied Telesis” on page 14.

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## Installing the Module

---

The following instructions describe how to install the AT-2872SX ExpressCard module in a laptop equipped with an ExpressCard interface slot. This procedure applies to laptops with either 34 mm or 54 mm interface slots. For laptop computers, the 54 mm interface is the more common interface. Therefore, the installation illustrations in this manual use the 54 mm interface.

For additional details about performing these tasks on your particular PC, refer to the manual that was supplied with your laptop.

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**Note**

Allied Telesis recommends that you turn off your PC before installing the AT-2872SX ExpressCard module.

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**Note**

To perform this procedure, you need to supply a pen.

---

To install an AT-2872SX ExpressCard module, perform the following procedure:

1. Review the "Pre-Installation Checklist" on page 24 and "Reviewing Safety Precautions" on page 22.

Before installing the module, ensure the laptop power is OFF and unplugged from the power outlet.

2. Select the 34 mm or 54 mm ExpressCard slot.

See Figure 3 on page 26 for an example of the 54 mm ExpressCard slot.

---

**Note**

If you do not know how to identify an ExpressCard slot, refer to your laptop documentation.

---



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Figure 3. Selecting the ExpressCard Slot

3. Use a pen and press the button toward the laptop and to the left. See Figure 4 on page 27.

The button pops out along with the plate. See Figure 5 on page 27.

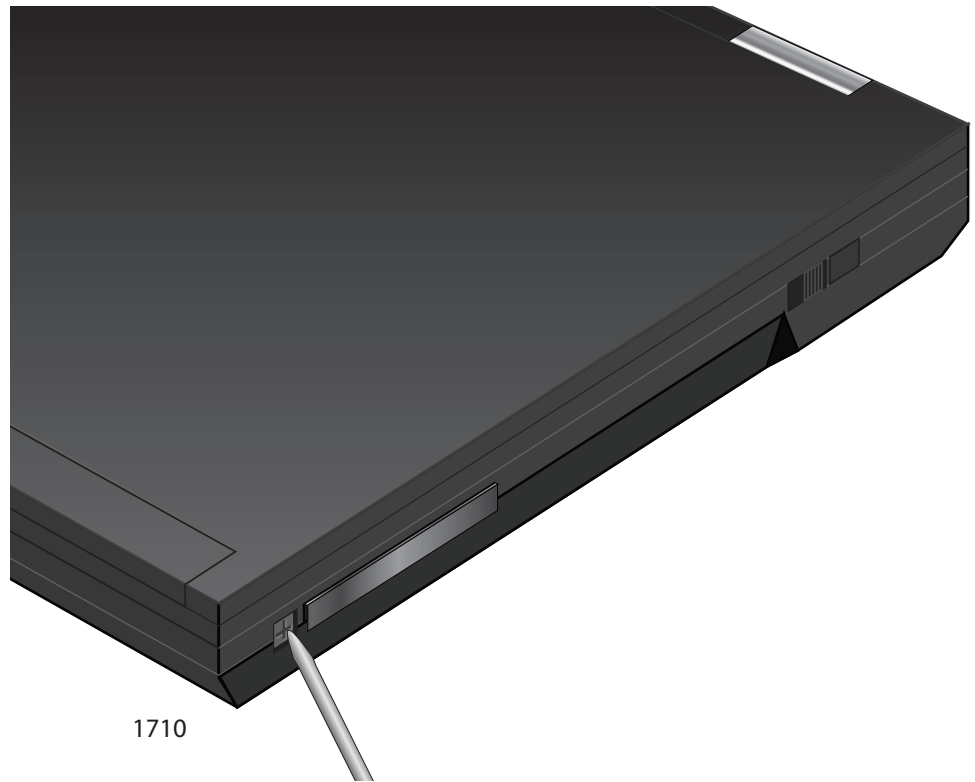


Figure 4. Pressing the Button

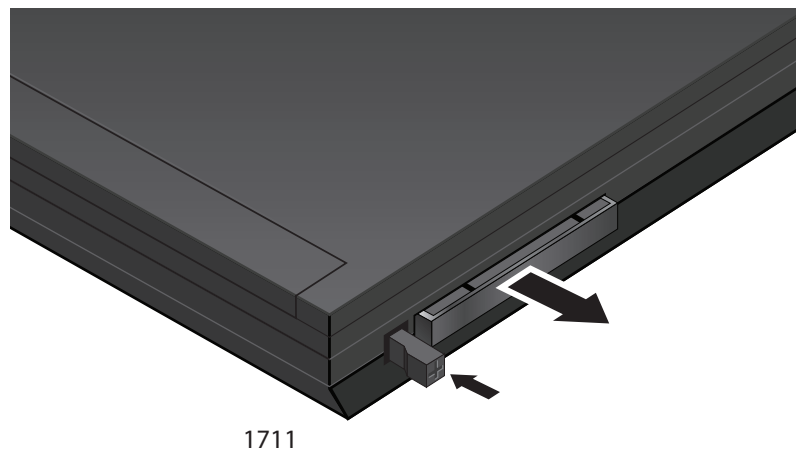


Figure 5. Removing the Faceplate From PCI ExpressCard Slot

4. Remove the plate from the laptop. See Figure 6.

Keep the plate in a safe place. You may need it for future use.

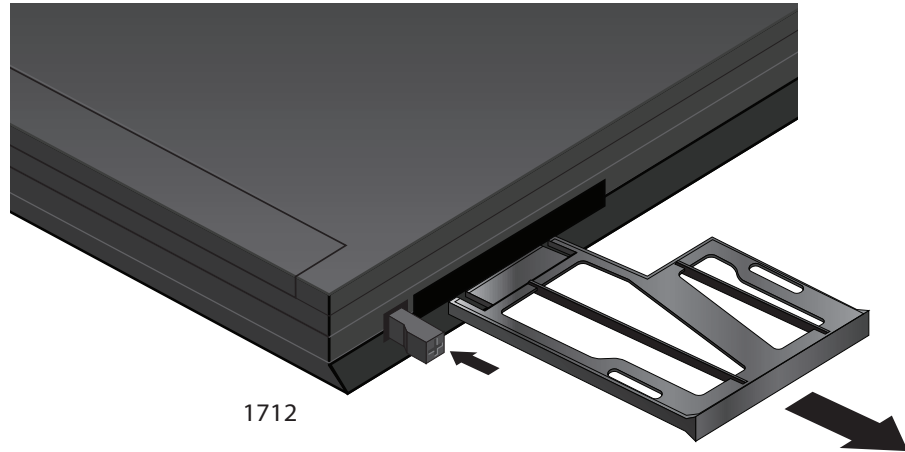


Figure 6. Removing the Plate

5. For the 54 mm ExpressCard slot, align the module to the left side of the slot. See Figure 7.

For laptops with the 34 mm ExpressCard slot, the module fits snugly into the slot.

6. Applying even pressure at both corners of the module, push the module until it is firmly seated in the ExpressCard slot. See Figure 7.



Figure 7. Inserting the Module

7. Make sure the module is seated securely.
8. Power the system on.

Once the system returns to proper operation, the module hardware is fully installed. Next, connect the network cables. See “Connecting the Network Cables” on page 30.

## Connecting the Network Cables

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The AT-2872SX ExpressCard module has two fiber optic connectors (transmit and receive) for attaching the system to a compatible link partner, or an IEEE 802.3z compliant Gigabit Ethernet switch.

The module requires a fiber optic cable. For specifications for this cable, see the AT-2872SX ExpressCard module data sheet.

After you install the cables, see the appropriate chapter for software driver installation and configuration information. See one of the following chapters:

- ❑ Chapter 3, “Installing the Windows Drivers” on page 33
- ❑ Chapter 4, “Installing the Linux Drivers” on page 49

To connect a network cable to the module, do the following:

1. Connect one end of the cable to the module.
2. Connect the other end of the cable to the appropriate Ethernet fiber optic port.

After you connect the system to the network and power is supplied, the AT-2872SX ExpressCard module attempts to establish the connection at 1000 Mbps in auto-negotiation mode.

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### Note

Since the port on the AT-2872SX ExpressCard module operates in auto-negotiate mode only, the end nodes connected to the AT-2872SX ExpressCard module must also be configured to operate in the Auto-Negotiate mode. If an end node is configured to a specific duplex in a manual mode, it will not respond to the Auto-Negotiate protocol from the AT-2872SX ExpressCard module. (The speed is determined from the link pulses, however, so the speed is always detected correctly.) As a result, the port setting on the AT-2872SX ExpressCard module will end up at half-duplex. If the end node is manually configured to full-duplex, there will be a duplex mismatch and data will be lost. If the end node is manually configured to half-duplex, both ports will have the speed and duplex match up correctly. Refer to “Configuring the Speed and Duplex Settings” on page 46 for more information.

---

### Note

After the cable is properly connected at both ends, the module port LED is functional. See “Physical Description” on page 20 for a description of the LED operation.

---

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**Note**

For instructions that describe how to clean the fiber optic connector, see Appendix B “Cleaning Fiber Optic Connectors” on page 73

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## Chapter 3

# Installing the Windows Drivers

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This chapter provides procedures to install and remove the driver software for all of the Windows Operating Systems supported by the AT-2872SX ExpressCard module. In addition, it describes how to display and change adapter properties including power management options. This chapter covers the following topics:

- ❑ “Installing the Windows Driver Software” on page 34
- ❑ “Removing the Device Drivers” on page 42
- ❑ “Using the NetXtreme II Monolithic Driver” on page 43
- ❑ “Inserting the NetXtreme II Monolithic Driver in a WinPE 2.0 Image” on page 45
- ❑ “Displaying or Changing the Properties of the Adapter” on page 48

## Installing the Windows Driver Software

---

This chapter describes how to install all of the following Windows Operating Systems:

- ❑ Microsoft Windows XP (32-bit and 64-bit extended)
- ❑ Microsoft Windows Vista (32-bit and 64-bit extended)
- ❑ Microsoft Windows 7 (32-bit and 64-bit extended)

The Windows driver software for all of the Windows Operating Systems is available for download from the Allied Telesis website at:

**www.alliedtelesis.com**. To navigate to this document, refer to “Where to Find Web-based Documentation and Drivers” on page 13 for more information.

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### Note

Windows 7 may install an older version of the AT-2872SX driver. Allied Telesis recommends that you use the latest version of the driver available on our Allied Telesis website. To find this driver, refer to “Where to Find Web-based Documentation and Drivers” on page 13 for more information.

---

When Windows first starts after a hardware device such as an AT-2872SX ExpressCard module has been installed, or after the existing device driver has been removed, the operating system automatically detects the hardware and prompts you to install the driver software for that device.

The two methods used to install the software drivers on all of the Windows Operating Systems supported by the AT-2872SX ExpressCard module are the Installer and Silent installation. The Installer uses a graphical interactive mode. The Silent Installation is a command-line interface for unattended installation. See the following sections:

- ❑ “Using the Installer” on page 35
- ❑ “Using Silent Installation” on page 39

---

### Note

These instructions are based on the assumption that your adapter was not factory installed. If your controller was installed at the factory, the driver software has been installed for you.

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### Note

Before installing the driver software, verify that the Windows operating system has been upgraded to the latest version with the latest service pack applied.

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**Note**

A network device driver must be physically installed before the Broadcom NetXtreme II Controller can be used with your Windows operating system. There is no installation CD. You must download the drivers.

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**Note**

Allied Telesis recommends that you not perform hot insertions or hot removal when the OS is up and running. We recommend that you insert or remove the adapter only when the system is powered down.

---

**Using the Installer**

The Installer is a graphical interactive installation mode. To install the AT-2872SX driver on a Windows Operating System, do the following:

1. When the **Found New Hardware Wizard** appears, click **Cancel**.

See Figure 8.



Figure 8. Found New Hardware Wizard Page

2. From the driver directory, select the setup.exe file and **Run**.

The Broadcom NetXtreme II Driver Installer - InstallShield Wizard Page is displayed. See Figure 9 on page 36.

---

**Note**

There is a setup.exe file for the 32-bit operating system and another for the 64-bit operating system. You can use each installer on Win XP, Vista, and Windows 7.

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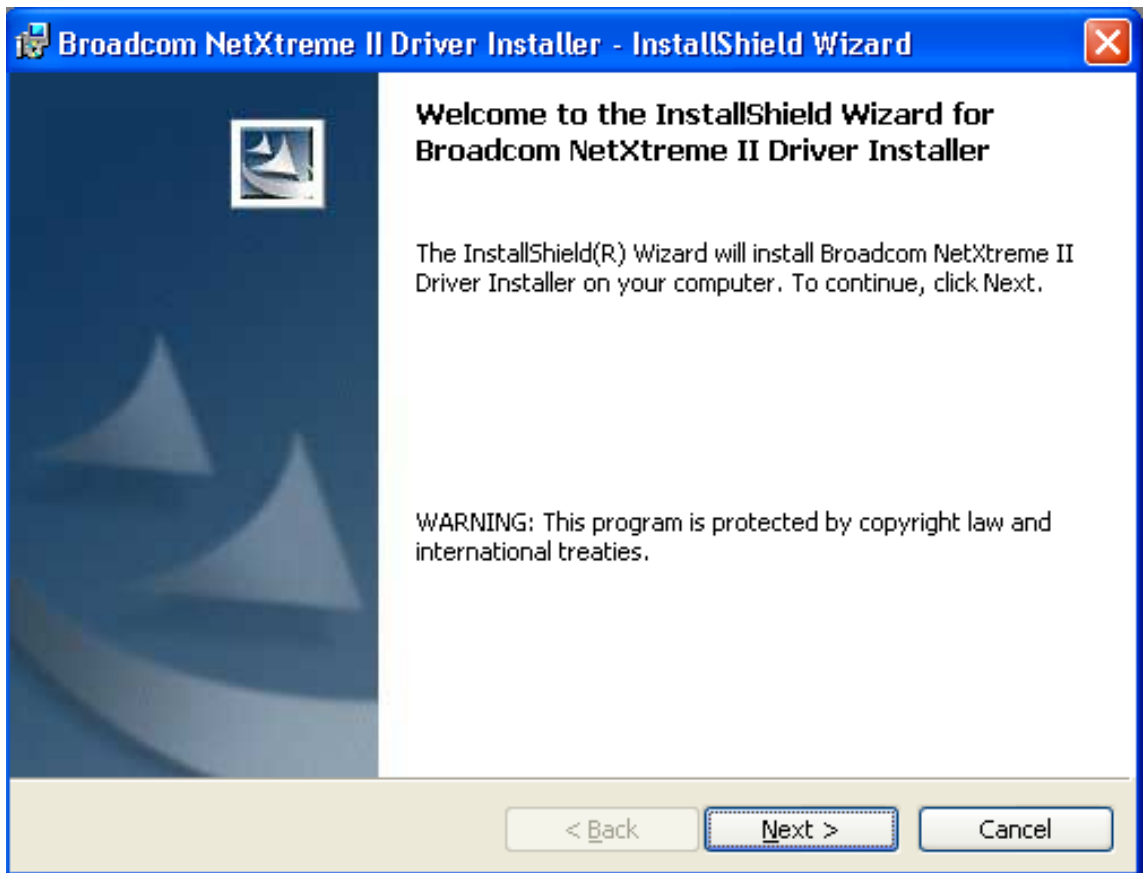


Figure 9. Broadcom NetXtreme II Driver Installer - InstallShield Wizard Page

3. Click **Next** to continue.

The License Agreement Page is displayed. See Figure 10 on page 37.

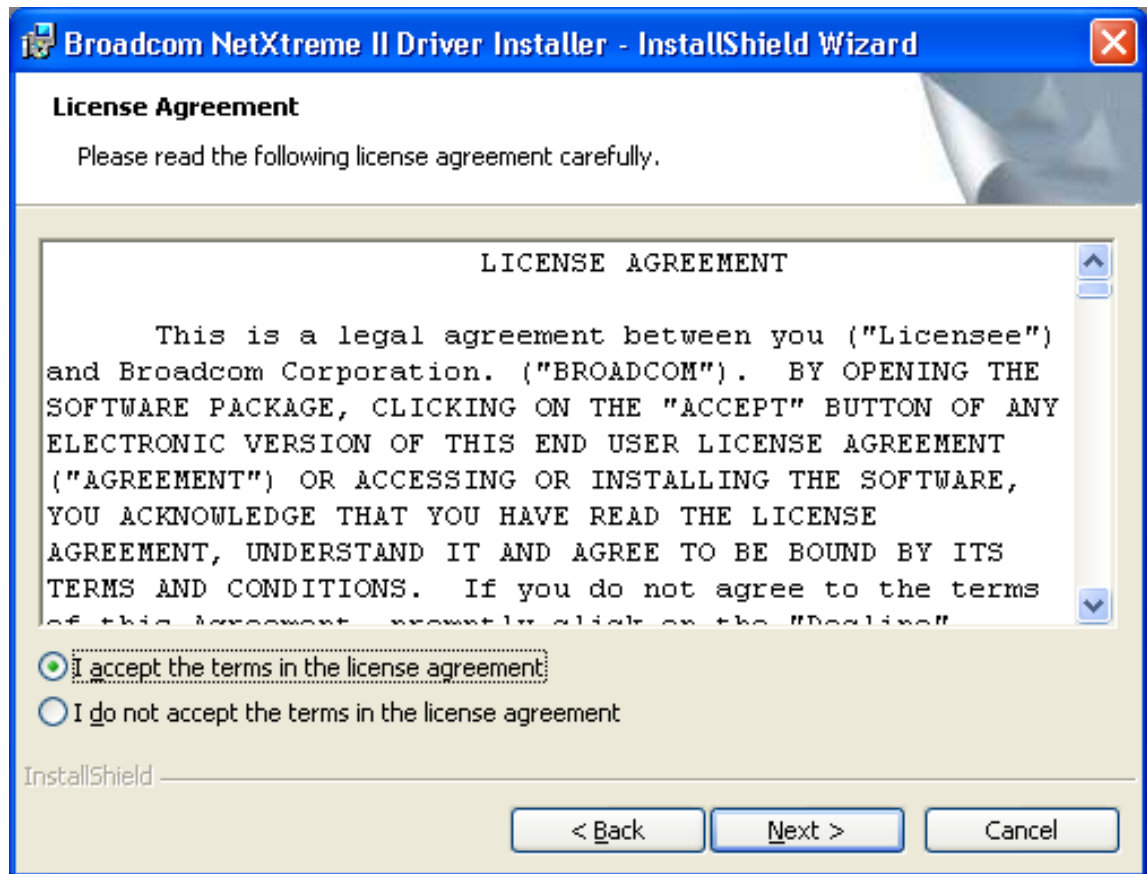


Figure 10. License Agreement Page

4. After you review the license agreement, click **I accept the terms in the license agreement** and then click **Next** to continue.

The Ready to Install the Program Page is displayed. See Figure 11 on page 38.

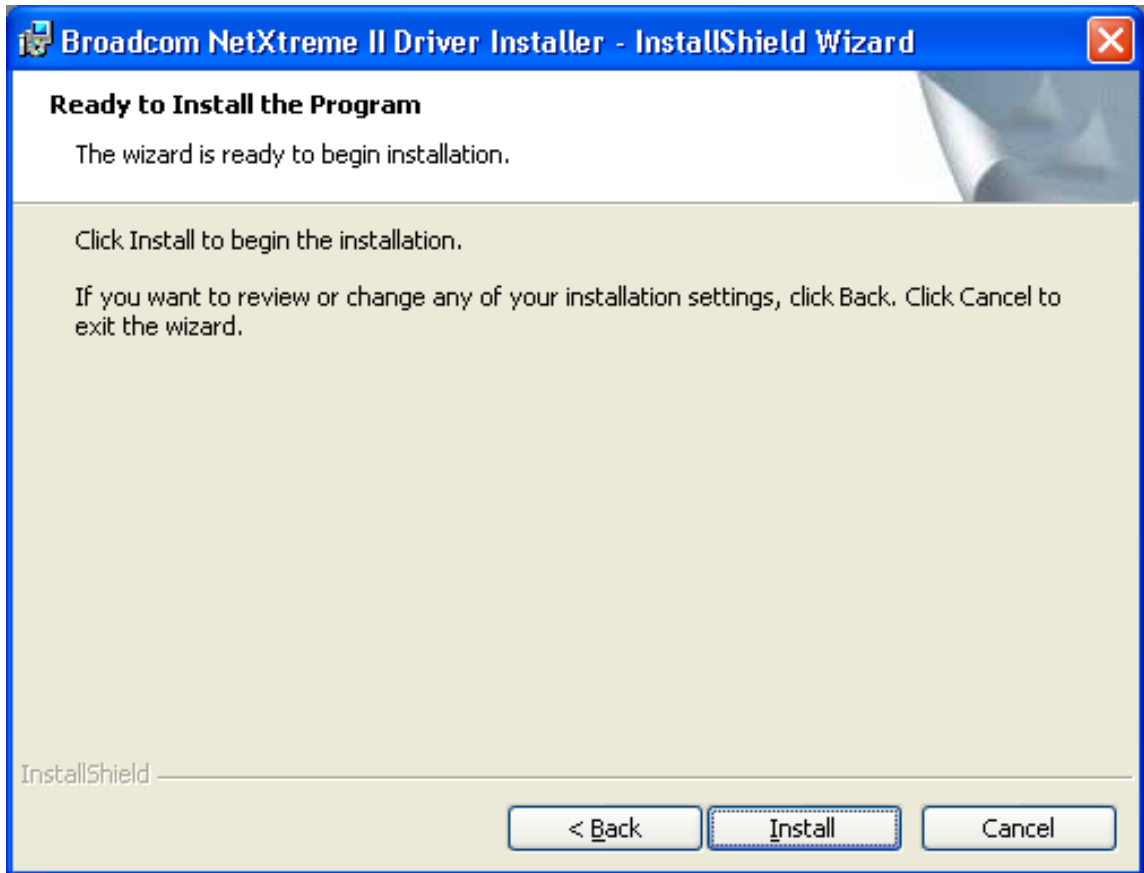


Figure 11. Ready to Install the Program Page

5. Click **Install**.

The InstallShield Wizard Completed Page is displayed. See Figure 12 on page 39.

---

**Note**

A TCP Chimney message appears with Windows 7 installation.

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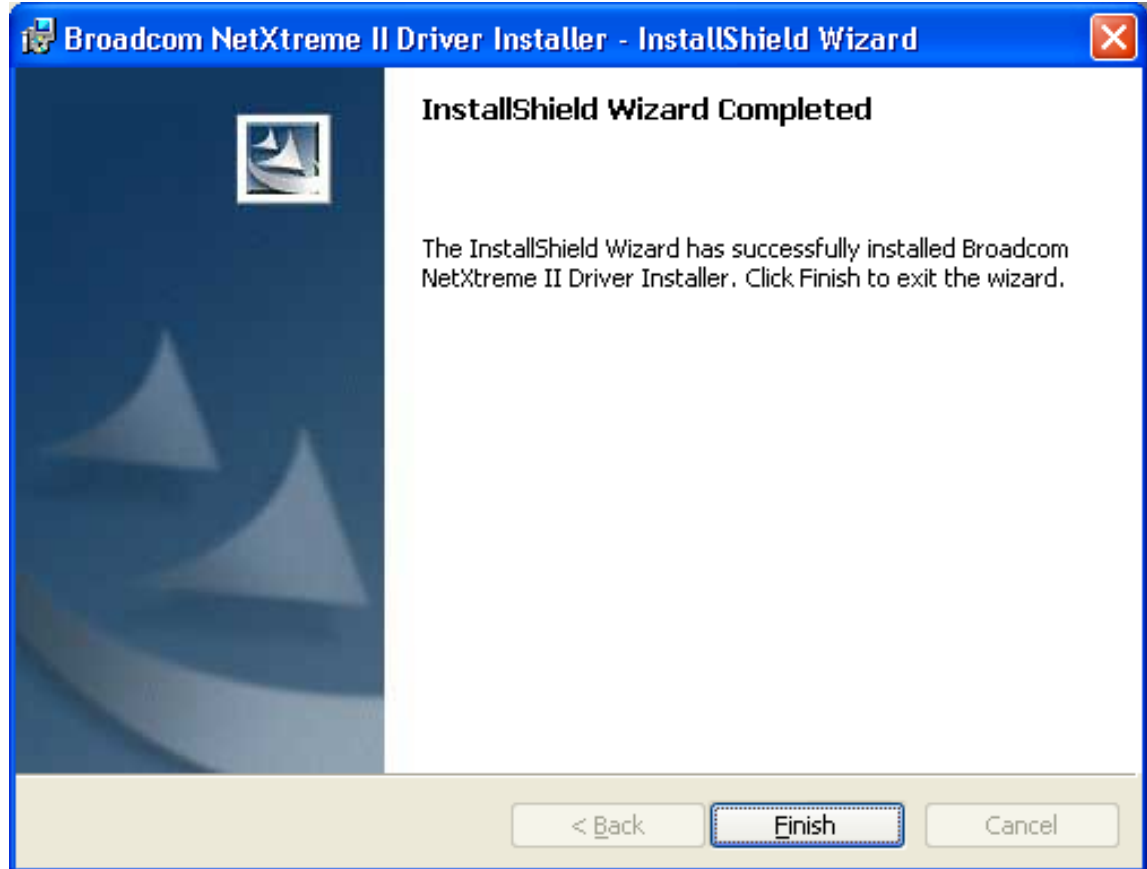


Figure 12. InstallShield Wizard Completed Page

6. Click **Finish** to close the wizard.
7. The installer determines if a system restart is necessary. Follow the on-screen instructions.

## Using Silent Installation

Silent installation provides a command-line silent mode which allows for unattended installation. This section discusses the various ways to perform a silent installation on all of the Windows Operating Systems supported by the AT-2872SX ExpressCard module. See the following:

- "Performing a Silent Install" on page 40
- "Performing a Silent Install and Creating a Log File" on page 40
- "Performing a Silent Upgrade" on page 40
- "Performing a Silent Uninstall" on page 40
- "Performing a Silent Reinstall" on page 41

---

**Note**

All commands are case sensitive.

---

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**Note**

User must “Run as Administrator” for Vista when using “msiexec” for “silent” install or uninstall procedures.

---

---

**Note**

For detailed instructions and information about unattended installs, refer to the Silent.txt file in the DrvInst folder.

---

### **Performing a Silent Install**

To perform a silent install from within the installer source folder, type the following:

```
setup /s /v/qn
```

or

```
msiexec /i "BDrv5706.msi" /qn
```

### **Performing a Silent Install and Creating a Log File**

To perform a silent install and create a log file at (f:\1testlog.txt), type the following:

```
setup /s /v"/qn /L f:\1testlog.txt"
```

### **Performing a Silent Upgrade**

To perform a silent upgrade from within the installer source folder, type the following:

```
setup /s /v/qn
```

### **Performing a Silent Uninstall**

There are two ways to perform a silent uninstall— from the installer source folder and from the any folder.

In some circumstances, you must reboot your system before uninstallation can continue. If you used REBOOT=ReallySuppress to suppress the reboot, the uninstallation may be suspended. You will need to reboot manually for the uninstallation to continue.



To perform a silent uninstall from within the installer source folder, type the following:

```
msiexec /x "BDrv5706.msi" /qn
```

To perform a silent uninstall from any folder, type the following:

```
msiexec /x "{F0DA8A3F-1457-419E-96F4-235DD3EF41E1}" /qn
```

---

**Note**

The hexadecimal number above may differ from your current installer. Check the Key name corresponding with the Broadcom Advanced Control Suite 3 (BACS) application in HKLM\Software\Microsoft\Windows\CurrentVersion\Uninstall for the correct hexadecimal number.

---

### Performing a Silent Reinstall

To perform a silent reinstall of the same installer, type the following:

```
setup /s /v"/qn REINSTALL=ALL"
```

---

**Note**

The REINSTALL switch should only be used if the same installer is already installed on the system. If upgrading an earlier version of the installer, use setup /s /v/qn as listed above.

---

## Removing the Device Drivers

---

This section discusses how to remove the device drivers.

### **Windows XP**

To remove the device drivers, do the following:

1. In Control Panel, double-click **Add or Remove Programs**.
2. Click **Broadcom NetXtreme II GigE Driver Installer**, and then click **Remove**. Follow the on screen prompts.
3. Click **Yes** to restart your system.

- or -

4. Click **No** to restart your system at a later time. Click **OK** to acknowledge that the installation has been suspended. The uninstallation of the driver is postponed until the next restart of your system.

### **Vista and Windows 7**

To remove the device drivers, do the following:

1. Go to Programs and Features
2. Highlight "Broadcom Net Xtreme II Driver Installer"
3. Select "Uninstall" from the top menu.

## Using the NetXtreme II Monolithic Driver

---

The NetXtreme II, based on its advanced functionalities, uses a software architecture that includes a Virtual Bus Device (VBD) to extend functionalities beyond basic network connectivity. Microsoft, however, does not currently support this architecture when loading an operating system through its Windows Deployment Services (WDS), which was previously known as Remote Installation Services (RIS), or for the deployment agent used in the Automated Deployment Services (ADS). Therefore, a separate driver was created to accommodate these Microsoft deficiencies. This driver is known as the NetXtreme II monolithic driver, but it is sometimes referred to as the RIS driver.

The NetXtreme II monolithic driver was developed to work only for the text mode portion of a WDS legacy installation and to establish connectivity with a deployment agent for ADS. It is not intended to be used as a driver loaded in the running state of an operating system. The exception to this would be when used for the Windows Preinstallation Environment (WinPE).

For WDS, this driver is used similarly to any other network adapter driver for supporting network connectivity after the PXE boot to the WDS server. When placed in the I386 or AMD64 directory (depending on the version of the operating system being deployed), the monolithic driver is called to establish that there is driver support for the NetXtreme II adapter included in the WDS legacy image.

For ADS, the driver is placed in the PreSystem directory on the server running ADS to establish connectivity with the deployment agent on remote systems with NetXtreme II adapters when booting from PXE.

While Windows PE 2005 natively supports the VBD architecture, it was found that using the "minint" switch in the startnet.cmd file does not. The minint switch performs a limited scan of the system bus to identify network devices only and, therefore, does not support the VBD architecture. Since only network connectivity is required in Windows PE, the only supported driver is the monolithic driver for the NetXtreme II adapter in this environment as well. Place the b06nd.inf file in the INF directory within the Windows PE image, and place the appropriate driver file (b06nd51a.sys for x64-based builds or b06nd51.sys for x86-based builds) in the driver's directory. If Windows PE is deployed as a flat image from a RIS or WDS server, you must also place both the b06nd.inf and the appropriate driver file in the I386 or AMD64 directory containing the image. If the RIS or WDS server is running Windows 2000 Server and deploying an x86 WinPE image, you may need to include the Windows 2000 monolithic driver file (b06nd50x.sys) in the I386 directory.

In cases where adding the Windows 2000 monolithic driver still does not work, apply the following modification to the b06nd.inf file located in the I386 directory as follows:

1. Locate [Manufacturer] header within the file.
2. Review the line below it which reads: %brcm% = broadcom, ntx86, ntamd64, ntia64 or equivalent.
3. Modify that line to read: %brcm% = broadcom.ntx86, ntamd64, ntia64. The change made replaces the comma and space after "broadcom" with a period.
4. Save the file.
5. Restart the RIS service (binlsvc) or WDS services (wdsserver).

## Inserting the NetXtreme II Monolithic Driver in a WinPE 2.0 Image

---

By default, the monolithic driver is not included in the boot.wim and install.wim files that come with the Microsoft Windows Server 2008/Vista CD. Microsoft's Windows Automated Installation Kit (AIK) allows you to modify the default boot.wim and install.wim files, and create WinPE 2.0 images to include the NetXtreme II monolithic driver in the Windows Server 2008/Vista installation.

To insert Broadcom's NetXtreme II monolithic driver in a WinPE 2.0 image (Vista/Windows Server 2008), download AIK from <http://www.microsoft.com/downloads/Search.aspx?displaylang=en> and install.

After installing AIK, copy the latest monolithic driver to a directory on the local hard drive of the system you installed the AIK. Follow the procedure below to insert the monolithic driver into a WinPE 2.0 boot image.

To insert the monolithic driver into a WinPE 2.0 boot image, do the following:

1. From All Programs, open Windows AIK and select **Windows PE Tools Command prompt**.
2. At the command prompt, run the copyype.cmd script. The script requires two arguments: hardware architecture and destination location.

```
copyype.cmd <arch> <destination>
```

For example: copyype x86 c:\VistaPEx86

---

### Note

The directory structure c:\VistaPEx86 is used throughout this procedure.

---

3. Mount the base image to a local directory so that you can add or remove packages by typing:

```
imagex /mountrw c:\VistaPEx86\winpe.wim 1  
c:\VistaPEx86\mount
```

4. Place the monolithic driver and inf file in c:\drivers\x32\ by typing:

```
peimg /inf=c:\Drivers\x32\b06nd.inf  
c:\VistaPEx86\mount\windows
```

AIK inserts the driver into the WinPE 2.0 image.

5. To complete the customization of the image, prepare the image for deployment, type:

```
peimg /prep c:\VistaPEX86\mount\windows
```

6. When asked to continue and have the program prepare the image for deployment, type:

```
yes
```

7. To commit the changes to the original image file (Winpe.wim), type:

```
imagex /unmount c:\VistaPEX86\mount /commit
```

8. To replace the default Boot.wim file in the \ISO directory with your new custom image, type:

```
copy c:\VistaPex86\winpe.wim  
c:\VistaPEX86\ISO\sources\boot.wim
```

### Creating a Bootable CD ROM

To create a bootable CD-ROM, do the following:

1. On your technician computer, at the command prompt, create an .iso file by typing:

```
oscdimg -n -bc:\VistaPEX86\etfsboot.com  
c:\VistaPEX86\ISO C:\VistaPEX86\VistaPEX86.iso
```

2. Burn the iso image to a CD.

## Configuring the Speed and Duplex Settings

Since the typical environment where the NetXtreme II monolithic driver is used does not provide the means to configure advanced network adapter properties, the driver file (b06nd.inf) was modified to include a section that allows it to be configured for a specific speed and/or duplex. This provides a more robust connection to the network as it allows the adapter to match the settings of its link partner (for example, a switch, router, etc.).

To manually configure the speed and duplex, do the following:

1. Open the b06nd.inf file with a text editor like Microsoft Notepad or WordPad.
2. Perform a search on the file for “Registry parameters” to locate the section that will allow you to configure the adapter speed/duplex.

Once located, notice the following information:

```
[params_utp]
```

```
hkr, , req_medium,          2, "0"
```

```
[params_fiber]
```

```
hkr, , req_medium,          2, "65283"
```

These make up two separate sections that can be configured: one for standard RJ-45 copper interfaces (params\_utp) and one for fiber devices (params\_fiber).

- As described in the file, replace the value above in quotation marks under the correct section, depending upon the network adapter in your system. The available values are shown below.

Options for copper interfaces:

- Auto (1 Gbps is enabled when that speed is supported) = "0"
- 10 Mbps Half Duplex = "65794"
- 10 Mbps Full Duplex = "258"
- 100 Mbps Half Duplex = "66050"
- 100 Mbps Full Duplex = "514"

Options for fiber interfaces:

- Auto (1 Gbps is enabled when that speed is supported) = "0"
- 1 Gbps Full Duplex = "771"
- Auto with 1 Gbps Fallback = "33539"
- Hardware default = "65283"

An example is provided in the file showing how to configure a copper interface for a 10 Mbps Full Duplex connection. The example is shown below.

- hkr, , req\_medium, 2, "258"

## Displaying or Changing the Properties of the Adapter

---

To display or change the properties of the Broadcom network adapter, do the following:

1. In Control Panel, click **Broadcom Control Suite 3**.
2. Click the Advanced section of the **Configurations** tab.
3. For a detailed description of the available properties as well as for instructions for viewing and changing the value of a particular property, see the *Broadcom Advanced Control Suite 3 User Guide* available from our website. To navigate to this document, refer to “Where to Find Web-based Documentation and Drivers” on page 13 for more information.



## Chapter 4

# Installing the Linux Drivers

---

This chapter provides procedures to install the Linux drivers for the AT-2872SX ExpressCard module

This chapter contains the following topics:

- ❑ “Introduction” on page 50
- ❑ “Installing Linux Driver Software” on page 52

## Introduction

---

This chapter discusses the Linux drivers for the Broadcom NetXtreme II network adapters and describes how to install them. For a description of the drivers, see Table 2.

Table 2. Broadcom NetXtreme II Linux Drivers

Linux Driver	Description
bnx2 cnic	Indicates the Linux drivers for the AT-2872SX ExpressCard module. The bnx2 driver is the networking driver and the cnic driver supports additional features required by the bnx2i iSCSI offload driver. The bnx2i iSCSI driver is packaged separately.
bnx2i	Indicates the Linux driver that enables iSCSI offload on the AT-2872SX ExpressCard module.

### Limitations

This section describes the testing limitations of the following Linux drivers:

- ❑ “bnx2 Driver” on page 50
- ❑ “bnx2i Driver” on page 51

#### bnx2 Driver

The current version of the driver has been tested on 2.4.x kernels (starting from 2.4.24) and all 2.6.x kernels. The driver may not compile on kernels older than 2.4.24.

Testing is concentrated on i386 and x86\_64 architectures. Only limited testing has been done on other architectures. Minor changes to some source files and Makefile may be needed on some kernels. Additionally, the Makefile does not compile the cnic driver on kernels older than 2.6.16. iSCSI offload is only supported on 2.6.16 and newer kernels.

Support for the 2.4.21 kernels is provided in Red Hat Enterprise Linux 3.

## bnx2i Driver

The current version of the driver has been tested on 2.6.x kernels, starting from 2.6.18 kernel. The driver may not compile on older kernels with the exception of SLES 10 SP1, which runs 2.6.16.46 kernel. SUSE upgraded the `iscsi_transport` kernel module in SLES 10 SP1. In addition, Broadcom iSCSI offload initiators is supported on SLES 10 SP1. Testing is concentrated on i386 and x86\_64 architectures, Red Hat EL5, and SUSE 10 SP1 distributions.

## Packaging

The Linux driver is released in the packaging formats shown in Table 3. The `netxtreme2` package contains the `bnx2` (1 Gb network adapter) and drivers for source RPM and compressed tar.

Table 3. Linux Driver Packaging

Format	bnx2 Driver	bnx2i (iSCSI) Driver
Source RPM	<code>netxtreme2-version.src.rpm</code>	<code>bnx2i-version.src.rpm</code>
Compressed tar	<code>netxtreme2-version.tar.gz</code>	<code>bnx2i-version.tar.gz</code>
Supplemental tar	<code>netxtreme2_sup-version.tar.gz</code>	<code>bnx2i_sup-version.tar.gz</code>

Identical source files to build the driver are included in both RPM and TAR source packages. The supplemental tar file contains additional utilities such as patches and driver diskette images for network installation.

The following updated open-iSCSI components are released in source RPM format:

- ❑ `iscsi-initiator-utils-6.2.0.868-0.7c.src.rpm`: updated open-iscsi for Red Hat 5 distributions
- ❑ `open-iscsi-2.0.707-0.25b.src.rpm`: updated open-iscsi components for SLES 10 SP1 distribution
- ❑ `open-iscsi-2.0.707-0.44b.src.rpm`: updated open-iscsi components for SLES 10 SP2 distribution

## Installing Linux Driver Software

---

There are two ways to install the Linux driver software— from the Source RPM Package or build the driver from the source TAR file. See the following sections:

- ❑ “Installing the Source RPM Package” on page 52
- ❑ “Building the Driver from the Source TAR File” on page 54

---

**Note**

If a bnx2 or bnx2i driver is loaded and you update the Linux kernel, you must recompile the driver module if it was installed using the source RPM or the TAR package.

---

### Installing the Source RPM Package

The procedure in this section describes how to install the Source RPM Package. The examples in the following procedure refer to the bnx2 driver, but also apply to the bnx2i driver.

To install the Source RPM Package, do the following:

1. Enter the following command:

```
rpm -ivh netxtreme2-version.src.rpm
```

2. Change the directory to the RPM path and build the binary driver for your kernel (the RPM path is different for each Linux distribution):

```
cd /usr/src/redhat,OpenLinux,turbo,packages,rpm ...
```

```
rpm -bb SPECS/bnx2.spec
```

or

```
rpmbuild -bb SPECS/bnx2.spec (for RPM version 4.x.x)
```

---

**Note**

During your attempt to install a source RPM package, the following message may be displayed: error: cannot create %sourcedir /usr/src/redhat/SOURCES

The most likely cause of the error is that the rpm-build package has not been installed. Locate the rpm-build package on the Linux installation media and install it using the following command: rpm -ivh rpm-build-version.arch.rpm

Complete the installation of the source RPM.

---

3. Install the newly built package which includes the driver and man page:

```
rpm -ivh RPMS/i386/bnx2-version.arch.rpm
```

If you are installing over an existing distribution that may already contain an older version of the driver, the `--force` option is needed.

Depending on the kernel, the driver is installed to one of the following paths:

#### 2.4.x kernels

```
/lib/modules/kernel_version/kernel/drivers/net/  
bnx2.o
```

#### 2.6.x kernels

```
/lib/modules/kernel_version/kernel/drivers/net/  
bnx2.ko
```

For the bnx2i driver, the driver is installed on one of the following paths:

- **2.6.16 kernels and newer (bnx2 driver)**

```
/lib/modules/kernel_version/kernel/drivers/  
net/bnx2.ko
```

```
/lib/modules/kernel_version/kernel/drivers/  
net/cnic.ko
```

- **2.6.16 kernels and newer (bnx2i driver)**

```
/lib/modules/kernel_version/kernel/drivers/  
iscsi/bnx2i.ko
```

4. To load the driver, enter the following:

```
insmod bnx2
```

or

```
modprobe bnx2
```

5. To load the cnic driver (if applicable), enter the following:

```
insmod cnic.ko
```

or

```
modprobe cnic
```

To configure the network protocol and address, refer to the documentation

provided with your operating system.

## Building the Driver from the Source TAR File

This procedure describes how to build the bnx2 and bnx2i Linux drivers from the Source TAR file. See the following sections:

- “Building the bnx2 Driver” on page 54
- “Building the bnx2i Driver” on page 55

### Building the bnx2 Driver

To build the bnx2 Linux driver from the Source TAR file, do the following:

1. Create a directory and extract the TAR files to the directory:

```
tar xvzf netxtreme2-version.tar.gz
```

2. Build the driver bnx2.ko (or bnx2.o) as a loadable module for the running kernel. Enter the following commands:

```
cd bnx2-version/src  
make
```

3. Test the driver by loading it (first unload the existing driver, if necessary). Enter the following commands:

```
rmmod bnx2  
insmod bnx2.o  
modprobe crc32 && insmod bnx2.o
```

or, for Linux 2.6 kernels:

```
rmmod bnx2  
insmod bnx2.ko
```

No message should be returned if this command runs properly

4. Load the cnic driver, if applicable. Enter the following command:

```
insmod cnic.ko
```

5. Install the driver and man page by entering the following command:

```
make install
```

---

#### Note

See the “Installing the Source RPM Package” on page 52 for the location of the installed driver.

---

To configure the network protocol and address after building the driver, refer to the manuals supplied with your operating system.

### Building the bnx2i Driver

The following procedure describes how to build the bnx2i Linux driver from the Source TAR file.

1. Create a directory and extract the TAR files to the directory by entering the following command:

```
tar xvzf bnx2-version.tar.gz
```

2. Build the driver bnx2.ko as a loadable module for the running kernel by entering the following command:

```
cd bnx2i-version/drivermake
```

3. Test the driver by loading it (first unload the existing driver, if necessary). Enter the following commands:

```
rmmod bnx2i
insmod bnx2i.ko
```

4. Install the driver and man page, by entering the following command:

```
make install
```

---

#### Note

See the “Installing the Source RPM Package” on page 52 for the location of the installed driver.

---

5. Install the user daemon (bnx2id), by entering the following commands:

```
cd ${DRV_BASE}/driver
make install_usr
```

The `make install_usr` command installs the bnx2id binary under /sbin.

6. To use Broadcom iSCSI, see “Load and Run Necessary iSCSI Software Components” on page 56 to load the necessary software components.

## Load and Run Necessary iSCSI Software Components

Broadcom iSCSI Offload software suite consists of 3 kernel modules and a user daemon. You can load the required software components either manually or through system services.

1. Unload existing driver & kill the user daemon if necessary. Do the following:

Manual:

```
rmmmod bnx2i  
pkill -9 bnx2id
```

Using system service:

```
service bnx2id stop
```

2. Load the iSCSI driver and the user daemon. Do the following:

Manual:

```
bnx2id  
  
insmod bnx2i.ko
```

or

```
modprobe bnx2i
```

Using system service:

```
service bnx2id start
```

## Unloading the Linux Driver

You can unload, or remove, the Linux Driver from an RPM or TAR installation. See the following:

- ❑ “Unloading the Driver from an RPM Installation” on page 56
- ❑ “Unloading the Driver from a TAR Installation” on page 57

### Unloading the Driver from an RPM Installation

This section describes how to unload, or remove, a Linux driver from an RPM installation.

---

#### Note

The examples used in this procedure refer to the bnx2 driver, but also apply to the bnx2i driver.

---



---

**Note**

On 2.6 kernels, it is not necessary to bring down the eth# interfaces before unloading the driver module.

---

---

**Note**

If the cnic driver is loaded, unload the cnic driver before unloading the bnx2 driver.

---

---

**Note**

Before unloading the bnx2i driver, disconnect all active iSCSI sessions to targets.

---

To unload the driver, use ifconfig to bring down all eth# interfaces opened by the driver, and then type the following:

```
rmmod bnx2
```

If the driver was installed using the rpm command, enter the following command to remove it:

```
rpm -e netxtreme2
```

### Unloading the Driver from a TAR Installation

If the driver was installed using make install from the tar file, manually delete the bnx2.o or bnx2.ko driver file from the operating system. See "Installing the Source RPM Package" on page 52 for the location of the installed driver.

## Patching PCI Files (Optional)

This is an optional procedure that describes how to patch PCI files for identification by other vendors.

For hardware detection utilities, such as Red Hat kudzu, to properly identify bnx2 supported devices, you may need to update a number of files containing PCI vendor and device information.

---

**Note**

The examples used in this procedure refer to the bnx2 driver, but also apply to the bnx2i driver.

---

Apply the updates by running the scripts provided in the supplemental tar file. For example, on Red Hat Enterprise Linux, apply the updates by entering the following commands:

```
./patch_pcitbl.sh /usr/share/hwdata/pcitable
pci.updates
/usr/share/hwdata/pcitable.new bnx2

./patch_pciids.sh /usr/share/hwdata/pci.ids
pci.updates
/usr/share/hwdata/pci.ids.new
```

Next, back up the old files and then rename the new files by entering the following copy commands:

```
cp /usr/share/hwdata/pci.ids /usr/share/hwdata/
old.pci.ids

cp /usr/share/hwdata/pci.ids.new /usr/share/hwdata/
pci.ids

cp /usr/share/hwdata/pcitable /usr/share/hwdata/
old.pcitable

cp /usr/share/hwdata/pcitable.new /usr/share/hwdata/
pcitable
```

## Network Installations

For network installations through NFS, FTP, or HTTP (using a network boot disk or PXE), a driver disk that contains the bnx2 driver may be needed. The driver disk images for the most recent Red Hat and SuSE versions are included. Boot drivers for other Linux versions can be compiled by modifying the Makefile and the make environment. Further information is available from the Red Hat website, <http://www.redhat.com>.

## Setting Values for Optional Properties

You can set values for optional properties for the bnx2 and bnx2i Linux drivers. See the following:

- “Setting Optional Properties for the bnx2 Driver” on page 58
- “Setting Optional Properties for the bnx2i Driver” on page 59

### Setting Optional Properties for the bnx2 Driver

The **disable\_msi** optional property can be supplied as a command line argument to the `insmod` or `modprobe` command. The property can also be set in the `modprobe.conf` command. See the man page for more information. All other driver settings can be queried and changed using the `ethtool` utility. See the `ethtool` man page for more information. The `ethtool` settings do not persist across a reboot or module reload. The `ethtool` commands can be put in a startup script such as `/etc/rc.local` to preserve the settings across a reboot.

---

**Note**

Some combinations of property values may conflict and result in failures. The driver cannot detect all conflicting combinations.

---

This property is used to disable Message Signal Interrupts (MSI). The property is valid only on 2.6 kernels that support MSI. However, this property cannot be used on 2.4 kernels. By default, the driver enables MSI if it is supported by the kernel. It runs an interrupt test during initialization to determine if MSI is working. If the test passes, the driver enables MSI. Otherwise, it uses legacy INTx mode. Enter the following to set the bnx2 driver:

```
insmod bnx2.ko disable_msi=1
```

or

```
modprobe bnx2 disable_msi=1
```

### Setting Optional Properties for the bnx2i Driver

Optional parameters **en\_tcp\_dack**, **error\_mask1** and **error\_mask2** can be supplied as command line arguments to the insmod or modprobe command for the bnx2i driver.

#### **error\_mask1** and **error\_mask2**

Use “Config FW iSCSI Error Mask #” to configure certain iSCSI protocol violations to be treated either as a warning or a fatal error. All fatal iSCSI protocol violations result in session recovery (ERL 0). These are bit masks. By default, all violations are treated as errors.

**Caution**

Do not use the **error\_mask** parameter if you are not sure about the consequences. These values are to be discussed with Broadcom development team on a case-by-case basis. This is a mechanism to work around iSCSI implementation issues on the target side and without proper knowledge of iSCSI protocol details, users are advised not to experiment with these parameters.

---

#### **en\_tcp\_dack**

The “Enable TCP Delayed ACK” parameter enables or disables the TCP delayed ACK feature on off-loaded iSCSI connections. By default, TCP delayed ACK is ENABLED. To set the en\_tcp\_dack parameter in the bnx2i driver, enter the following command:

```
insmod bnx2i.ko en_tcp_dack=0
```

or

`modprobe bnx2i en_tcp_dack=0`

Default: ENABLED

### **sq\_size**

Use the “Configure SQ size” parameter to select the send-queue size for off-loaded connections. The SQ size determines the maximum SCSI commands that can be queued. Also, SQ size has a bearing on the number of connections that can be off-loaded; as QP size increases, the number of connections supported decreases. With the default values, the AT-2872SX ExpressCard module can offload 28 connections.

Defaults: 128

Range: 32 to 128

---

#### **Note**

Broadcom validation is limited to a power of 2; for example, 32, 64, 128.

---

### **rq\_size**

Use the “Configure RQ size” parameter to choose the size of asynchronous buffer queue size per off-loaded connections. The RQ size is not required to be greater than 16 because it is used to place iSCSI ASYNC/NOP/REJECT messages and SCSI sense data.

Defaults: 16

Range: 16 to 32

---

#### **Note**

Broadcom validation is limited to a power of 2; for example, 16, 32.

---

### **event\_coal\_div**

The Event Coalescing Divide Factor parameter is a performance tuning parameter used to moderate the rate of interrupt generation by the iscsi firmware.

Defaults: 1

Valid values: 1, 2, 4, 8

### **bnx2i\_nopout\_when\_commands\_active**

The “iSCSI NOOP even when connection is not idle” parameter enables the offload initiator to send iSCSI NOP-OUT on wire even when the link is not truly idle. This parameter was introduced to avoid unnecessary

session recoveries induced by some older targets when iSCSI NOP-OUT and iSCSI CMD pdus are intermixed. Newer iSCSI target systems are immune to this condition and this parameter is turned ON for quite some time.

Defaults: 1

Values: Binary parameter, 0/1

The parameters can also be set in the modprobe.conf command. See the man page for more information.

## Checking the bnx2 Driver Defaults

The bnx2 driver defaults to the following settings:

**Speed:** Autonegotiation with all speeds advertised

**Flow Control:** Autonegotiation with RX and TX advertised

**MTU:** 1500 (range is 46–9000)

**RX Ring Size:** 255 (range is 0–4080)

**RX Jumbo Ring Size:** 0 (range 0–16320) adjusted by the driver based on MTU and RX Ring Size

**TX Ring Size:** 255 (range is (MAX\_SKB\_FRAGS+1)–255). MAX\_SKB\_FRAGS varies on different kernels and different architectures. On a 2.6 kernel for x86, MAX\_SKB\_FRAGS is 18.

**Coalesce RX Microseconds:** 18 (range is 0–1023)

**Coalesce RX Microseconds IRQ:** 18 (range is 0–1023)

**Coalesce RX Frames:** 6 (range is 0–255)

**Coalesce RX Frames IRQ:** 6 (range is 0–255)

**Coalesce TX Microseconds:** 80 (range is 0–1023)

**Coalesce TX Microseconds IRQ:** 80 (range is 0–1023)

**Coalesce TX Frames:** 20 (range is 0–255)

**Coalesce TX Frames IRQ:** 20 (range is 0–255)

**Coalesce Statistics Microseconds:** 999936 (approximately 1 second) (range is 0–16776960 in increments of 256)

**MSI:** Enabled (if supported by the 2.6 kernel and the interrupt test passes)

**TSO:** Enabled (on 2.6 kernels)

**WoL:** Initial setting based on NVRAM's setting

## Checking Driver Messages

The following are the most common sample messages that may be logged in the `/var/log/messages` file for the `bnx2` and `bnx2i` drivers. Use `dmesg -n <level>` command to control the level at which messages appear on the console. Most systems are set to level 6 by default. To see all messages, set the level higher.

- “Checking the `bnx2` Driver Messages” on page 62
- “Checking `bnx2i` Driver Messages” on page 63

### Checking the `bnx2` Driver Messages

The following are the most common `bnx2` driver messages:

#### Driver Sign on

```
Broadcom NetXtreme II Gigabit Ethernet Driver  
bnx2 v1.6.3c (July 23, 2007)
```

#### CNIC Driver Sign on

```
Broadcom NetXtreme II cnic v1.1.19 (Sep 25, 2007)
```

#### NIC Detected

```
eth#: Broadcom NetXtreme II BCM5708 1000Base-T (B0)  
PCI-X 64-bit 133MHz found at mem f6000000, IRQ 16, node  
addr 0010180476ae
```

```
cnic: Added CNIC device: eth0
```

#### Link Up and Speed Indication

```
bnx2: eth# NIC Link is Up, 1000 Mbps full duplex
```

#### Link Down Indication

```
bnx2: eth# NIC Link is Down
```

#### MSI enabled successfully (`bnx2` only)

```
bnx2: eth0: using MSI
```

## Checking bnx2i Driver Messages

The following are the most common bnx2i driver messages:

### BNX2I Driver signon

```
Broadcom NetXtreme II iSCSI Driver bnx2i v1.0.30 (Sep
29, 2007)
```

### Network port to iSCSI transport name binding

```
bnx2i: netif=eth2, iscsi=bcm570x-050000
bnx2i: netif=eth1, iscsi=bcm570x-030c00
```

### Driver completes handshake with iSCSI offload-enabled CNIC device

```
bnx2i [05:00.00]: ISCSI_INIT passed
```

---

#### Note

This message is displayed only when the user attempts to make an iSCSI connection.

---

### Driver detects iSCSI offload is not enabled on the CNIC device

```
bnx2i: iSCSI not supported, dev=eth3
bnx2i: bnx2i: LOM is not enabled to offload iSCSI
connections, dev=eth0
```

### Driver unable to allocate TCP port for iSCSI connection

```
bnx2i: run 'bnx2id' daemon to alloc TCP ports
```

### Exceeds maximum allowed iSCSI connection offload limit

```
bnx2i: unable to allocate iSCSI context resources
```

### Network route to target node and transport name binding are two different devices

```
bnx2i: conn bind, ep=0x... ($ROUTE_HBA) does not belong
to hba $USER_CHOSEN_HBA
```

where

ROUTE\_HBA is the net device on which connection was offloaded based on route information

USER\_CHOSEN\_HBA is the HBA to which target node is bound (using iscsi transport name)

### **Target cannot be reached on any of the CNIC devices**

bnx2i: check route, cannot connect using cnic

### **Network route is assigned to network interface, which is down**

bnx2i: check route, hba not found

### **Attempting to offload iSCSI connection onto a Jumbo Frame-enabled device**

bnx2i: eth# network i/f mtu is set to #mtu

bnx2i: iSCSI HBA can support mtu of 1500

---

#### **Note**

Change **mtu** to **1500** using ifconfig and restart the interface in order to offload iSCSI connections.

---

### **SCSI-ML initiated host reset (session recovery)**

bnx2i: attempting to reset host, #3

### **CNIC detects iSCSI protocol violation - Fatal errors**

```
bnx2i: iscsi_error - wrong StatsN rcvd
bnx2i: iscsi_error - hdr digest err
bnx2i: iscsi_error - data digest err
bnx2i: iscsi_error - wrong opcode rcvd
bnx2i: iscsi_error - AHS len > 0 rcvd
bnx2i: iscsi_error - invalid ITT rcvd
bnx2i: iscsi_error - wrong StatsN rcvd
bnx2i: iscsi_error - wrong DataSN rcvd
bnx2i: iscsi_error - pend R2T violation
bnx2i: iscsi_error - ERL0, U0
bnx2i: iscsi_error - ERL0, U1
bnx2i: iscsi_error - ERL0, U2
bnx2i: iscsi_error - ERL0, U3
bnx2i: iscsi_error - ERL0, U4
bnx2i: iscsi_error - ERL0, U5
bnx2i: iscsi_error - ERL0, U
bnx2i: iscsi_error - invalid resi len
bnx2i: iscsi_error - MRDSL violation
bnx2i: iscsi_error - F-bit not set
bnx2i: iscsi_error - invalid TTT
bnx2i: iscsi_error - invalid DataSN
bnx2i: iscsi_error - burst len violation
bnx2i: iscsi_error - buf offset violation
bnx2i: iscsi_error - invalid LUN field
```



```

bnx2i: iscsi_error - invalid R2TSN field
bnx2i: iscsi_error - invalid cmd len1
bnx2i: iscsi_error - invalid cmd len2
bnx2i: iscsi_error - pend r2t exceeds
MaxOutstandingR2T value
bnx2i: iscsi_error - TTT is rsvd
bnx2i: iscsi_error - MBL violation
bnx2i: iscsi_error - data seg len != 0
bnx2i: iscsi_error - reject pdu len error
bnx2i: iscsi_error - async pdu len error
bnx2i: iscsi_error - nopin pdu len error
bnx2i: iscsi_error - pend r2t in cleanup
bnx2i: iscsi_error - IP fragments rcvd
bnx2i: iscsi_error - IP options error
bnx2i: iscsi_error - urgent flag error

```

### **CNIC detects iSCSI protocol violation - non-FATAL, warning**

```

bnx2i: iscsi_warning - invalid TTT
bnx2i: iscsi_warning - invalid DataSN
bnx2i: iscsi_warning - invalid LUN field

```

---

#### **Note**

The driver needs to be configured to consider certain violations as warning and not as a critical error.

---

### **Driver puts a session through recovery**

```

conn_err - hostno 3 conn 03fbcd00, iscsi_cid 2 cid
a1800

```

### **Reject iSCSI PDU received from the target**

```

bnx2i - printing rejected PDU contents

```

```

[0]: 1 ffffffffa1 0 0 0 0 20 0
[8]: 0 7 0 0 0 0 0 0
[10]: 0 0 40 24 0 0 ffffffff80 0
[18]: 0 0 3 fffffff88 0 0 3 4b
[20]: 2a 0 0 2 fffffffc8 14 0 0
[28]: 40 0 0 0 0 0 0 0

```

### **Open-iSCSI daemon handing over session to driver**

```

bnx2i: conn update - MBL 0x800 FBL 0x800MRDSL_I 0x800
MRDSL_T 0x2000

```

## Teaming with Channel Bonding

With the Linux drivers, you can team adapters together using the bonding kernel module and a channel bonding interface. For more information, see the Channel Bonding information in your operating system documentation.

## Statistics

Detailed statistics and configuration information can be viewed using the ethtool utility. See the ethtool man page for more information.

## Linux iSCSI Offload

This section describes how to install and run Linux iSCSI applications.

The following recommendations apply to offloading Linux iSCSI programs:

- Not all Broadcom NetXtreme II adapters support iSCSI offload.
- The iSCSI session will not recover after a hot remove and hot plug.
- The iSCSI driver/firmware will not offload iSCSI connections onto a jumbo frame-enabled CNIC device.
- For MPIO to work properly, iSCSI nopout should be enabled on each iSCSI session. Refer to open-iscsi documentation for procedures on setting up noop\_out\_interval and noop\_out\_timeout values.
- In the scenario where multiple CNIC devices are in the system and the system is booted via Broadcom's iSCSI boot solution, ensure that the iscsi node under /etc/iscsi/nodes for the boot target is bound to the NIC that is used for booting.

See the following sections:

- “Installing User Application - bnx2id” on page 66
- “Installing Open iSCSI User Applications” on page 67
- “Binding iSCSI Target to Broadcom NX2 iSCSI Transport Name” on page 68
- “Making Connections to iSCSI Targets” on page 68
- “Maximizing Offload iSCSI Connections” on page 69

### Installing User Application - bnx2id

The **bnx2id** application should be installed under /sbin when bnx2i RPM package is installed. See “Installing the Source RPM Package” on page 52 for information. Run the **bnx2id** daemon before attempting to create iSCSI connections. The driver does not establish connections to the iSCSI target without the daemon's assistance.

#### bnx2id

The bnx2id daemon requires mknod and sh shell, which are standard on any regular server. For iSCSI boot using NetXtreme II offload support, binaries for mknod and sh need to be bundled into initrd image.

## Installing Open iSCSI User Applications

Install and run the open-iscsi programs, **iscsid** and **iscsiadm**, from the Broadcom distributed open-iscsi packages. See “Packaging” on page 51 for details. All pre-installed open-iscsi packages need to be removed before the Broadcom iSCSI-supported packages can be installed.

To install and run the **iscsid** and **iscsiadm** programs, do the following:

1. Remove all existing open-iscsi packages.

RHEL5

```
rpm -e iscsi-initiator-utils
```

SLES10 SP1

```
rpm -e open-iscsi
```

2. Install the source RPM package. Type the following:

```
rpm -ivh <open-iscsi-package-name>.src.rpm
```

3. CD to the RPM path and build the binary driver for your kernel. Enter:

```
cd /usr/src/{redhat,OpenLinux,turbo,packages,rpm
..}
```

```
rpm -bb SPECS/<open-iscsi-package-name>.spec
```

or

```
rpmbuild -bb SPECS/<open-iscsi-package-name>.spec
(for RPM version 4.x.x)
```

---

### Note

The RPM path is different for each Linux distribution.

---

4. Install the newly built package. Type:

```
rpm -ivh RPMS/<arch>/<open-iscsi-package-
name>.<arch>.rpm
```

where <arch> is the machine architecture such as i386.

```
rpm -ivh RPMS/i386/<open-iscsi-package-
name>.i386.rpm
```

5. Start the daemon. Type:

```
iscsid
```

## Binding iSCSI Target to Broadcom NX2 iSCSI Transport Name

By default, the open-iscsi daemon connects to discovered targets using software initiator (transport name = 'tcp'). Users who wish to offload an iSCSI connection onto CNIC device should explicitly change the transport binding of the iSCSI node. This can be done using **iscsiadm** cli utility as follows:

```
iscsiadm --mode node --targetname iqn.2004-
06.com.broadcom:tg1 \
        --portal 192.168.1.100 --op=update \
        --name=node.transport_name --
value=${XPORT_NAME}
```

where XPORT\_NAME=bcm570x-xyyyzz

xx - pci bus number of the NX2 device  
yy - pci device number of the NX2 device  
zz - pci function number of the NX2 device

Network interface to iscsi transport name binding can be obtained by executing the following.

```
dmesg | grep "bnx2i: netif"
```

Sample output in a system with two NetXtreme II devices:

```
bnx2i: netif=eth1, iscsi=bcm570x-050000
bnx2i: netif=eth0, iscsi=bcm570x-030000
```

If you wish to switch back to use the software initiator, enter the following:

```
iscsiadm --mode node --targetname iqn.2004-
06.com.broadcom:tg1 \
        --portal 192.168.1.100 --op=update \
        --name=node.transport_name --value=tcp
```

## Making Connections to iSCSI Targets

Refer to open-iscsi documentation for a comprehensive list of **iscsiadm** commands. This is a sample list of commands to discovery targets and to create iscsi connections to a target.

### Adding static entry

```
iscsiadm -m node -p <ipaddr[:port]> -T iqn.2007-
05.com.broadcom:target1 -o new
```

**iSCSI target discovery using 'SendTargets'**

```
iscsiadm -m discovery --type sendtargets -p  
<ipaddr[:port]>
```

**Login to target using 'iscsiadm' command**

```
iscsiadm --mode node --targetname <iqn.targetname> --  
portal <ipaddr[:port]> --login
```

**List all drives active in the system**

```
'fdisk -l'
```

**Maximizing Offload iSCSI Connections**

With default driver parameters set, which includes 128 outstanding commands, bnx2i can offload a maximum of 28 iSCSI connections. This is not a hard limit, but simple on-chip resource allocation math. The bnx2i driver can offload > 28 connections by reducing the shared queue size which, in turn, limits the maximum outstanding tasks on a connection. See "Setting Values for Optional Properties" on page 58 for information on sq\_size and rq\_size. Driver logs the following message to syslog when the maximum allowed connection offload limit is reached - "bnx2i: unable to allocate iSCSI context resources."



# Appendix A

# Specifications

---

## Physical Specifications

---

This section provides the dimensions and weight of the module.

Dimensions: 13.7 cm x 3.4 cm (5.4 in. x 1.3 in.)

Weight: 45.36 g (.10 lbs.)

## Environmental Specifications

---

The following environmental specifications apply to the AT-2872SX ExpressCard module:

Operating Temperature: 0°C to 40°C (+32°F to +104°F)

Storage Temperature: -20°C to +70°C (-4°F to +158°F)

Operating Humidity: 30% to 90% (noncondensing)

Storage Humidity: 10% to 95% (noncondensing)

Maximum Operating Altitude: 3,048 m (10,000 ft.)

## Power Specifications

---

The following power specifications apply to the AT-2872SX ExpressCard module:

Operating Voltage: 3.3V

Power Consumption: 3.4 Watts, @ +3.3V

## Performance Specification

---

The following performance specification apply to the AT-2872SX ExpressCard module:

MTBF	1,650,000 hours
------	-----------------

## Operating Specifications

---

The following operating specifications apply to the AT-2872SX ExpressCard module:

Output Optical Power (min/max):	-9.5/-1.5 dBm
---------------------------------	---------------

Input Optical Power (min):	-17 dBm
----------------------------	---------

Wavelength:	850 nm
-------------	--------



## Appendix B

# Cleaning Fiber Optic Connectors

---

The fiber optic connector consists of a fiber optic plug and its adapter. The end of the fiber optic cable is held in the core of the ferrule in the plug. Light signals are transmitted through the core of the fiber. Even minor smudges or dirt on the end face of the fiber, completely invisible to the naked eye, can disrupt light transmission and lead to failure of the component or of the entire system. Therefore, it is of utmost importance to clean all fiber optic connectors before use.

Figure 13 shows the ferrule in an SC connector.

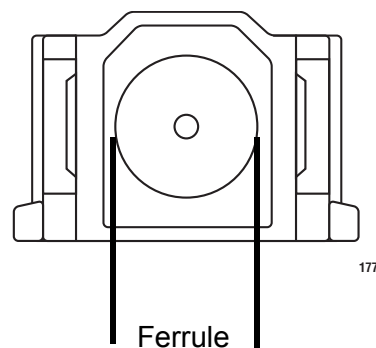


Figure 13. Ferrule in an SC Connector Plug

Figure 14 shows part of the end face of an unclean and clean ferrule.

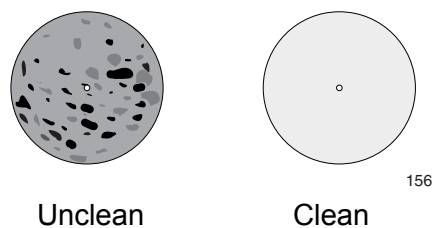


Figure 14. Unclean and Clean Ferrule

This appendix provides the following procedures:

- ❑ “Using a Cartridge-Type Cleaner” on page 74
- ❑ “Using a Swab” on page 76

## Using a Cartridge-Type Cleaner

---

Fiber optic cartridge cleaners are available from many vendors and are typically called “cartridge cleaners,” as shown in Figure 15.



Figure 15. Cartridge Cleaner

---

**Note**

Do not use compressed air or aerosol air to clean a fiber optic connector.

---

To clean a fiber optic connector using a cartridge cleaner, do the following.

1. With one hand, hold the cartridge cleaner and push the lever on the cleaning cartridge in the direction of the arrow to expose the cleaning surface, as shown in Figure 16.
2. Place the ferrule tip on the exposed cleaning surface and rub the ferrule in a downward direction, as shown in Figure 16.

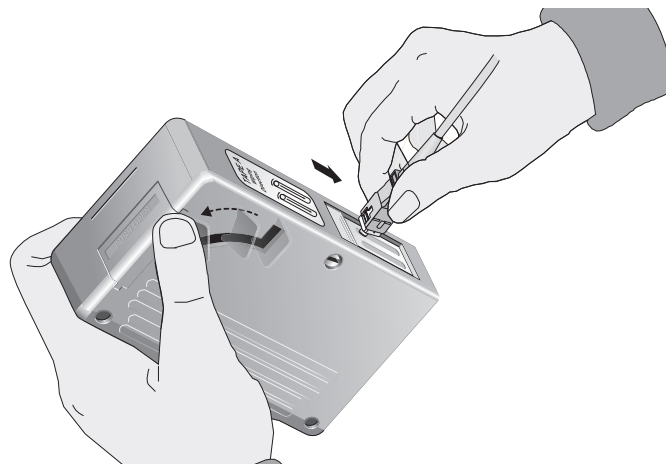


Figure 16. Rubbing the Ferrule Tip on the Cleaning Surface

---

**Note**

Rub the ferrule tip on the cleaning surface in one direction only.

---

3. When you reach the end of the cleaning surface, pick up the ferrule tip, rotate and place it at the top and rub downwards at least 2 times.



---

**Caution**

Failing to pick up the ferrule tip when you reach the bottom of the cleaning surface can result in static electricity that can damage the fiber optic cable.

---

4. If desired, repeat steps 3 and 4.
5. If a fiber inspection scope is available, use the scope to inspect the ferrule end face to make sure that it is clean.
6. Reconnect the cable to the port or protect the ferrule tip with a dust cap.

---

**Note**

Always keep a dust cap on a fiber optic cable when it is not in use.

---

---

**Note**

Do not touch the end face of the ferrule in the connector.

---

## Using a Swab

---

Specially treated swabs (stick cleaners) are available for cleaning inside connector adapters or hard-to-reach ferrule tips. These swabs, often referred to as “lint free” or “alcohol free” swabs, are available from many vendors, as shown in Figure 17. Stick cleaners are available in both 2.5 mm and 1.25 mm sizes for use on SC and MU connectors respectively.

---

**Note**

NEVER use a household cotton swab and/or alcohol to clean a fiber optic connector. This may leave a residue on the ferrule tip.

---

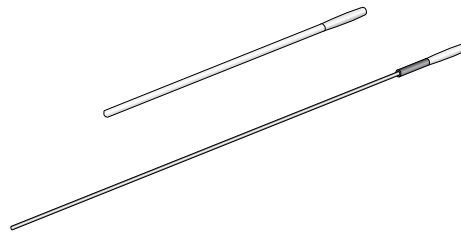


Figure 17. Lint-Free and Alcohol-Free Swabs

---

**Note**

Do not use compressed air or aerosol air to clean a fiber optic connector.

---

To clean a recessed ferrule using a swab, do the following.

1. Insert the swab into the adapter as shown in Figure 16 and rub the ferrule tip with the swab.

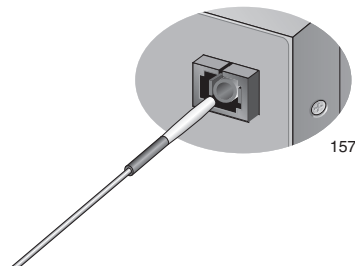


Figure 18. Cleaning a Recessed Ferrule

2. If desired, repeat step 1.

3. If a fiber inspection scope is available, use the scope to inspect the connector to make sure that it is clean and to check for scratches, pits, or other problems that may affect performance.

---

**Note**

Always keep a dust cap on a fiber optic cable when it is not in use.

---



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