

NetExtreme II Family Adapters

AT-2973SX
AT-2973T

Installation and User's Guide

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Preface

This guide contains instructions on how to install the AT-2973SX and AT-2973T adapters and configure the adapters using the driver software.



The Preface contains the following sections:

- ❑ “Safety Symbols Used in this Document” on page 10
- ❑ “Where to Find Web-based Guides” on page 11
- ❑ “Contacting Allied Telesis” on page 12
- ❑ “Management Software Updates” on page 12

Safety Symbols Used in this Document

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 Guides

The installation and user guides for all Allied Telesis products are available in portable document format (PDF) on our web site at **www.alliedtelesis.com**. You can view the documents online or download them onto a local workstation or server.

Contacting Allied Telesis

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

Online Support

You can request technical support online by accessing the Allied Telesis Knowledge Base: **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 section of the Allied Telesis web site: **www.alliedtelesis.com/support**.

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. For instructions on how to obtain an RMA number, go to the Support section on our web site at **www.alliedtelesis.com/support/rma.aspx**.

For Sales or Corporate Information

You can contact Allied Telesis for sales or corporate information through our web site at **<http://www.alliedtelesis.com/purchase>**.

Warranty

Go to **www.alliedtelesis.com/warranty** for the specific terms and conditions of the warranty and for warranty registration for the AT-2973SX and AT-2973T adapters.

Management Software Updates

New releases of management software for our managed products are available from either of the following Internet sites:

- ☐ Allied Telesis web site: **www.alliedtelesis.com**
- ☐ Allied Telesis FTP server: **<ftp://ftp.alliedtelesis.com>**

If you prefer to download new software from the Allied Telesis FTP server from your workstation's command prompt, you will need FTP client software and you must log in to the server. Enter "anonymous" for the user name and your email address for the password.

Chapter 1

Introducing the AT-2973SX and AT-2973T Adapters

This chapter provides an introduction to the Allied Telesis AT-2973SX and AT-2973T NetExtreme II Family Adapters and contains the following sections:

- ❑ “Functional Descriptions” on page 14
- ❑ “Features” on page 17
- ❑ “Physical Descriptions” on page 21

Functional Descriptions

The AT-2973SX and AT-2973T Broadcom NetXtreme II adapters are in a new class of Gigabit Ethernet (GbE) converged network interface controller (C-NIC) that can simultaneously perform accelerated data networking and storage networking on a standard Ethernet network. The C-NIC offers acceleration for all popular protocols used in the data center, such as:

- ❑ TCP Offload Engine (TOE) for accelerating TCP over 1 GbE, 2.5 GbE, and 10 GbE
- ❑ Internet Small Computer Systems Interface (iSCSI) offload for accelerating network storage access featuring centralized boot functionality (iSCSI boot)

Note

Separate licences are required for all offloading technologies.

Enterprise networks that use multiple protocols and multiple network fabrics benefit from the C-NICs ability to combine data communications, storage, and clustering over a single Ethernet fabric by boosting server CPU processing performance and memory utilization while alleviating I/O bottlenecks.

The AT-2973SX and AT-2973T adapters include a 10/100/1000-Mbps Ethernet MAC with both half-duplex and full-duplex capability and a 10/100/1000-Mbps PHY. The transceiver is fully compatible with the IEEE 802.3 standard for auto-negotiation of speed.

As part of the company's green range, both products are engineered to reduce power consumption. They incorporate centralized power management features that automatically place idle circuitry into a lower power mode to save energy.

This section provides functional descriptions of the AT-2973SX and AT-2973T adapters.

AT-2973SX Adapter

The AT-2973SX adapter connects a PCI-E compliant server or workstation to a Gigabit Ethernet network using fiber optic cabling and a connector that meets 62.5/125 μm or 50/125 μm multimode specifications. This adapter operates at speeds of 1000 Mbps in full-duplex mode.

The AT-2973SX adapter is show in Figure 1.

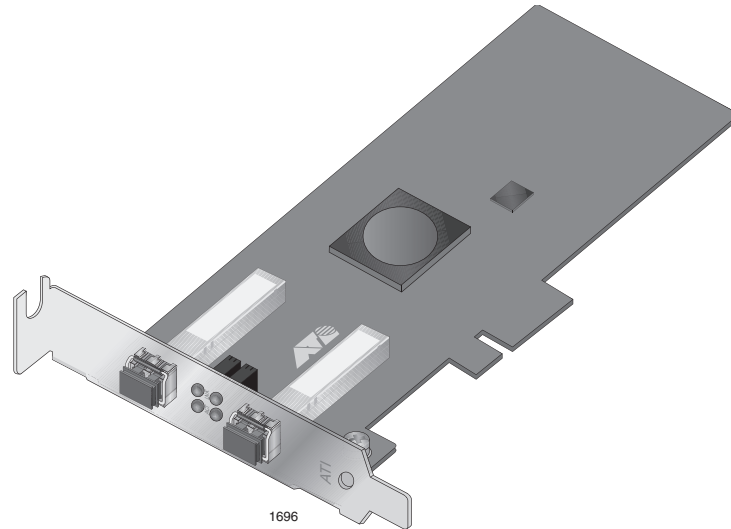


Figure 1. AT-2973SX Adapter

AT-2973T Adapter

The AT-2973T adapter operates at speeds of 10/100/1000T Mbps in both full-duplex and half-duplex modes. This adapter has two twisted-pair connectors and two LEDs, as show in Figure 2.

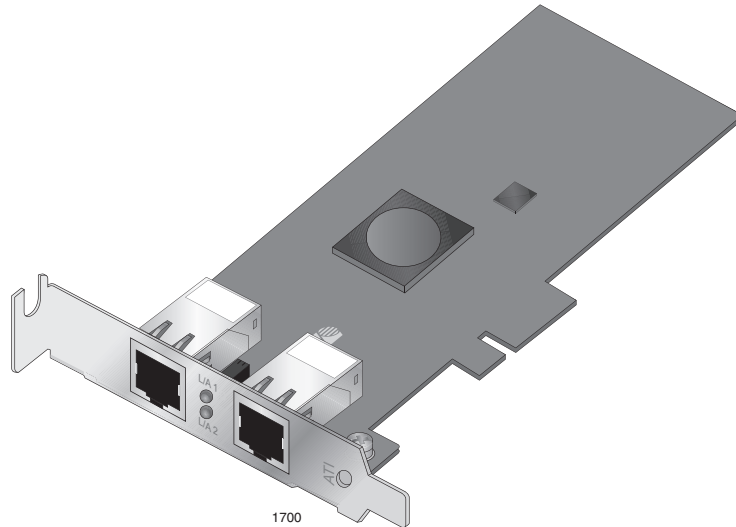


Figure 2. AT-2973T Adapter

Contents of Your Shipment

The following items are included with your adapter:

- ☐ Antistatic bag (used for protecting the adapter when stored or shipped). Keep the adapter in its packaging until ready for installation.
- ☐ Low-profile bracket
- ☐ Standard bracket

Inform your network supplier of any missing or damaged items. If you need to return the adapter, you must pack it in the original (or equivalent) packing material or the warranty will be voided. See “Returning Products” on page 12.

The documentation for these adapters is available in portable document format (PDF) on our web site at **www.alliedtelesis.com**. You can view the documents online or download them onto a local workstation or server.

Features

The following list of features for the AT-2973SX and AT-2973T adapters applies to all of the supported operating systems:

- ❑ TCP Offload Engine (TOE)
- ❑ Internet Small Computer Systems Interface (iSCSI) offload
- ❑ Single-chip solution
 - Integrated 10/100/1000BASE-T transceivers
 - 10/100/1000 triple-speed MAC
 - Host interfaces
 - SerDes interface for optical transceiver connection
 - PCI Express v1.1 x4 and v2.0 compliant (Gigabit Ethernet)
 - Full fast-path TCP offload
 - Zero copy capable hardware
- ❑ Other performance features
 - TCP, IP, UDP checksum
 - TCP segmentation
 - Adaptive interrupts
 - Receive Side Scaling (RSS)
- ❑ Manageability
 - Broadcom Advanced Control Suite 3 diagnostic and configuration software suite
 - Supports PXE 2.0 specification (Linux Red Hat PXE Server, SUSE Linux Enterprise Server, Windows 2000 Server, Windows Server 2003, Windows Server 2008, Intel APITEST, DOS UNDI)
 - Wake on LAN support
 - Statistics for SNMP MIB II, Ethernet-like MIB, and Ethernet MIB (IEEE Std 802.3z, Clause 30)

- SMBus controller
- ACPI 1.1a compliant (multiple power modes)
- IPMI support
- ❑ Advanced network features
 - Jumbo frames (up to 9 KB). The OS and the link partner must support jumbo frames.
 - Virtual LANs
 - IEEE Std 802.3ad Teaming
 - Smart Load Balancing Teaming
 - Smart Load Balancing TOE Teaming (with the correct configuration)
 - Flow Control (IEEE Std 802.3x)
 - LiveLink™ (supported in both the 32-bit and 64-bit Windows operating systems)
 - Logical Link Control (IEEE Std 802.2)
- ❑ Layer-2 Priority Encoding (IEEE Std 802.1p)
- ❑ High-speed on-chip RISC processor
- ❑ Up to 4 classes of service (CoS)
- ❑ Integrated 96 KB frame buffer memory
- ❑ iSCSI Boot support

TCP Offload Engine (TOE)

The TCP/IP protocol suite is used to provide transport services for a wide range of applications for the Internet, LAN, and for file transfer. The TCP protocol is specifically designed to insure that data packets are delivered error free and in the correct sequence from an application running on one computer to the receiving application. The TCP protocol suite historically has run on the host CPU, but with higher data rates, this consumes a very high percentage of its resources while leaving little resources for the applications. With the use of the Broadcom NetXtreme II adapter and the TCP Offload Engine feature, the TCP/IP processing can be moved to hardware, freeing the CPU for application processing and other higher priority tasks.

The TCP/IP protocol suite is used to provide transport services for a wide range of applications for the Internet, LAN, and for file transfer. Without the TCP Offload Engine, the TCP/IP protocol suite runs on the host CPU, consuming a very high percentage of its resources and leaving little resources for the applications. With the use of the Broadcom NetXtreme II

adapter, the TCP/IP processing can be moved to hardware, freeing the CPU for more important tasks such as application processing.

The Broadcom NetXtreme II adapter's TOE functionality allows simultaneous operation of up to 1024 fully offloaded TCP connections for 1-Gbps network adapters. The TOE support on the adapter significantly reduces the host CPU utilization while preserving the implementation of the operating system stack.

Note

The TOE feature is an optional feature that must be purchased.

Internet Small Computer Systems Interface (iSCSI)

The IETF has standardized the Internet Small Computer Systems Interface (iSCSI). SCSI is a popular protocol that enables systems to communicate with storage devices, using block-level transfer (that is, address data stored on a storage device that is not a whole file). iSCSI maps the SCSI request/response application protocols and its standardized command set over TCP/IP networks.

As iSCSI utilizes TCP as its sole transport protocol, it greatly benefits from hardware acceleration of the TCP processing (that is, use of a TOE). However, iSCSI as a Layer 5 protocol has additional mechanisms beyond the TCP layer. iSCSI processing can also be offloaded, thereby reducing CPU utilization even further.

The Broadcom NetXtreme II adapter targets best-system performance, maintains system flexibility to changes, and supports current and future OS convergence and integration. Therefore, the adapter's iSCSI offload architecture is unique as evident by the split between hardware and host processing.

Note

The iSCSI offload feature is an optional feature that must be purchased.

Power Management

When the system is down waiting for a wake-up signal, the adapter speed connection may be at 10 Mbps or 100 Mbps, but it can return to 1000 Mbit/s when the system is up and running if it is connected to a 1000 Mbps capable switch. For this reason, connect systems that use the Wake on LAN (WOL) feature to a switch capable of both 1000 and 10/100 Mbps speeds.

Note

The WOL feature is supported on the AT-2973T adapter only. It is not supported on the AT-2973SX adapter. For more information, see "Limitations" on page 52.

Note

For specific systems, see your system documentation for information about support of the WOL feature.

**Adaptive
Interrupt
Frequency**

The adapter driver intelligently adjusts host interrupt frequency based on traffic conditions to increase overall application throughput. When traffic is light, the adapter driver interrupts the host for each received packet, minimizing latency. When traffic is heavy, the adapter issues one host interrupt for multiple, back-to-back incoming packets, preserving host CPU cycles.

**ASIC with
Embedded RISC
Processor**

The core control for Broadcom NetXtreme II adapters resides in a tightly integrated, high-performance ASIC. The ASIC includes a RISC processor. This functionality provides the flexibility to add new features to the card and adapts it to future network requirements through software downloads. This functionality also enables the adapter drivers to exploit the built-in host offload functions on the adapter as host operating systems are enhanced to take advantage of these functions.

**Supported
Operating
Environments**

The Broadcom NetXtreme II adapter has software support for the following operating systems:

- ☐ Microsoft® Windows® (32-bit and 64-bit extended)
- ☐ Microsoft Windows Vista™ (32-bit and 64-bit extended)
- ☐ Microsoft Windows XP™ (32-bit and 64-bit extended)
- ☐ Microsoft Windows 7™ (32-bit and 64-bit extended)
- ☐ Linux® (32-bit and 64-bit extended)
- ☐ MS-DOS®
- ☐ ESX Server (VMware)

Physical Descriptions

This section provides descriptions of the AT-2973SX and AT-2973T faceplates and LEDs.

AT-2973SX Adapter Physical Description

The faceplate on the AT-2973SX adapter provides two fiber optic connectors for attaching the adapter to a compatible link partner. See Figure 3 for an illustration of the adapter's faceplate.

The AT-2973SX adapter has two fiber ports and two LEDs per port, as shown in Figure 3 and described in Table 1. The state of the network link and activity is indicated by a single LED located adjacent to the port connector.

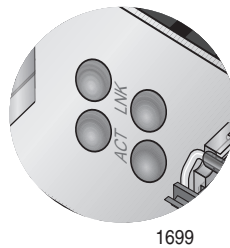


Figure 3. AT-2973SX Faceplate

For fiber optic Ethernet connections, see Table 1.

Table 1. Network Link and Activity Indicated by the RJ-45 Port LEDs

Port LED	LED Appearance	Network State
Link LED	Off	No link (cable disconnected)
	Continuously illuminated	Link
Activity LED	Off	No network activity
	Blinking	No network activity

AT-2973T
Adapter Physical
Description

The faceplate on the AT-2973T adapter provides two twisted-pair connectors for attaching the adapter to a compatible link partner. See Figure 4 for an illustration of the adapter’s faceplate.

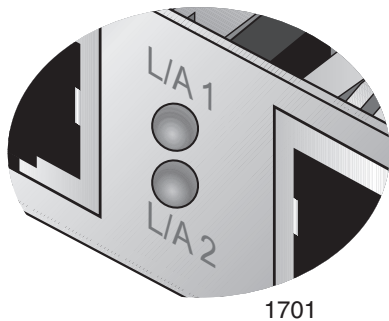


Figure 4. AT-2973T Faceplate

For copper-wire Ethernet connections, the state of the network link and activity is indicated by the LEDs on the RJ-45 connector, as described in Table 2.

Table 2. Network Link and Activity Indicated by the RJ-45 Port LEDs

Port LED	LED Appearance	Network State
Link LED	Off	No link (cable disconnected)
	Continuously illuminated	Link
Activity LED	Off	No network activity
	Blinking	No network activity

Chapter 2

Installing the Hardware


This chapter contains the following sections:

- ❑ “Reviewing Safety Precautions” on page 24
- ❑ “Pre-Installation Checklist” on page 26
- ❑ “Replacing the Bracket” on page 27
- ❑ “Installing a Network Adapter Card” on page 29
- ❑ “Connecting the Network Cables” on page 33

Reviewing Safety Precautions

Please review the following safety precautions before you begin to install a network adapter card.

Note

The  indicates that a translation of the safety statement is available in a PDF document titled “Translated Safety Statements” on the Allied Telesis website at www.alliedtelesis.com.



Warning

This is a “Class 1 LED product”.  L1




Warning

Do not stare into the laser beam.  L2




Warning

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




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

Note

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



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.

- Make sure to use only insulated or nonconducting tools.
 - Verify that the system is powered OFF and unplugged before accessing 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 devices and an antistatic mat is strongly recommended.
-

Pre-Installation Checklist

Before you install an adapter card, check the following list:

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

Note

If you acquired the adapter software from the Allied Telesis support website, enter the path to where the adapter driver files reside on your system.

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

**Caution**

Do not attempt to install a damaged adapter. If the adapter is damaged, report it to Allied Telesis. See "Contacting Allied Telesis" on page 12.

Replacing the Bracket

Both the AT-2973SX and AT-2973T adapters are shipped with the low-profile bracket attached to the adapter. Depending on your PC, you may need to replace the bracket attached to your adapter.

The following procedure describes how to remove the low-profile bracket from the adapter and replace it with the standard bracket. You can also use this procedure to remove the standard bracket and replace it with the low-profile bracket.

To replace the low-profile bracket with the standard bracket, perform the following procedure:

1. Remove the screws that attach the bracket to the adapter. See Figure 5.

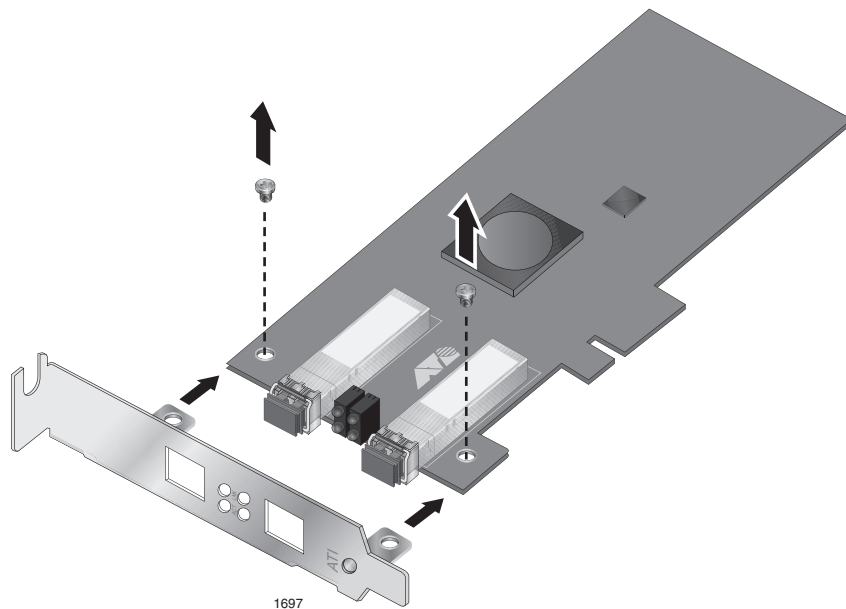


Figure 5. Removing the Low-Profile Bracket

2. Align the tabs of the standard bracket with the holes on the adapter and fasten the screws onto the adapter. See Figure 6.

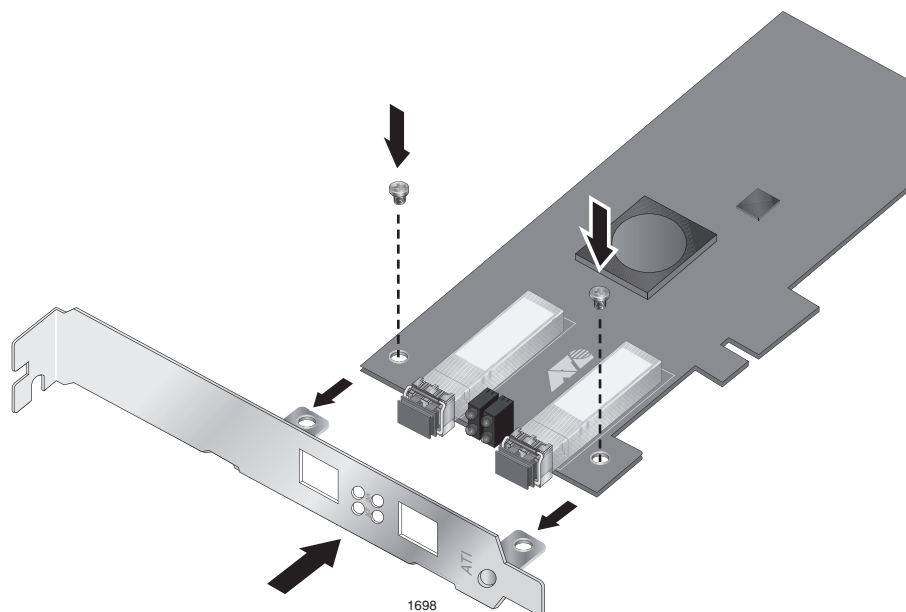


Figure 6. Fastening Screws onto Standard Bracket

Installing a Network Adapter Card

The following instructions apply to installing both the AT-2973SX and AT-2973T adapters in most systems. For details about performing these tasks on your particular system, refer to the manuals that were supplied with your system.

Note

To perform this procedure, you need to supply a Phillips-head screw.

To install an AT-2973SX or AT-2973T adapter, perform the following procedure:

1. Review the “Pre-Installation Checklist” on page 26 and “Reviewing Safety Precautions” on page 24.

Before installing the adapter, ensure the system power is OFF and unplugged from the power outlet, and that proper electrical grounding procedures have been followed.



Warning

High voltage inside the system presents a safety hazard. Make sure the power is off before removing the cover.

2. Remove the system cover and select any appropriate empty PCI slot. See Figure 7 on page 30.

If you do not know how to identify an appropriate PCI slot, refer to your system documentation.

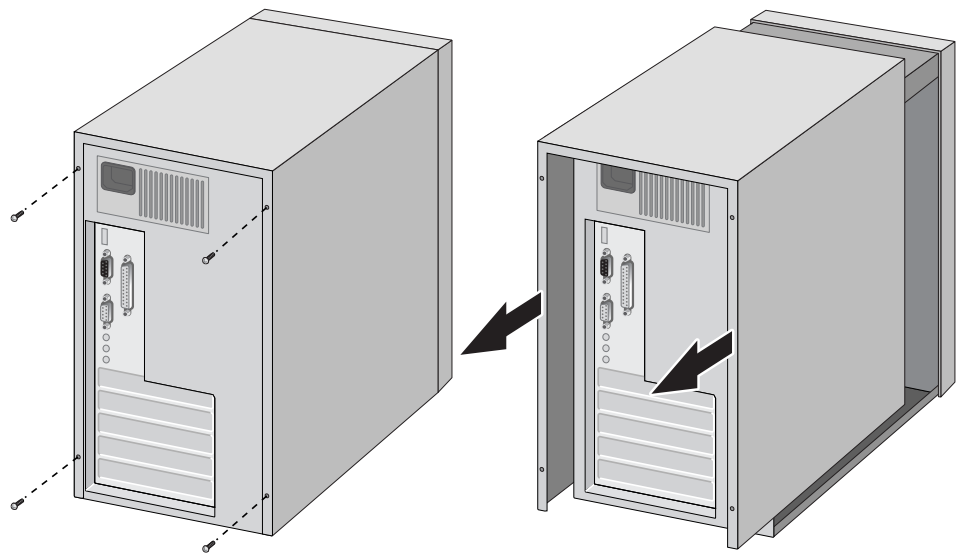


Figure 7. Removing the PC Cover

3. Select an empty, non-shared PCI slot and remove the faceplate.

Keep the faceplate in a safe place. You may need it for future use. See Figure 8.

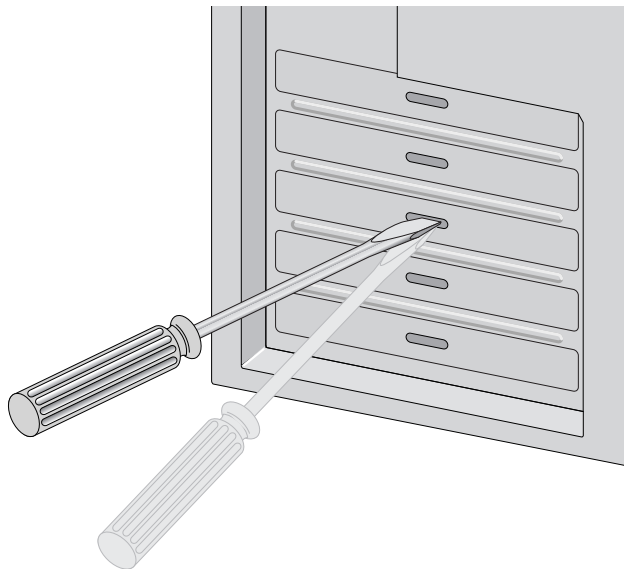


Figure 8. Removing the Faceplate From PCI Slot

Note

If you cannot locate or do not know how to find an appropriate PCI slot, refer to the documentation that came with your system.

4. Remove the network adapter card from the shipping package and store the packaging material in a safe location.

**Caution**

Wear a grounding device and observe electrostatic discharge precautions when installing the network adapter card in a system. Failure to observe this caution could result in damage to the card.

5. Applying even pressure at both corners of the card, push the adapter card until it is firmly seated in the appropriate PCI slot.

Make sure the card is securely seated. To insert the network adapter card, see Figure 9.

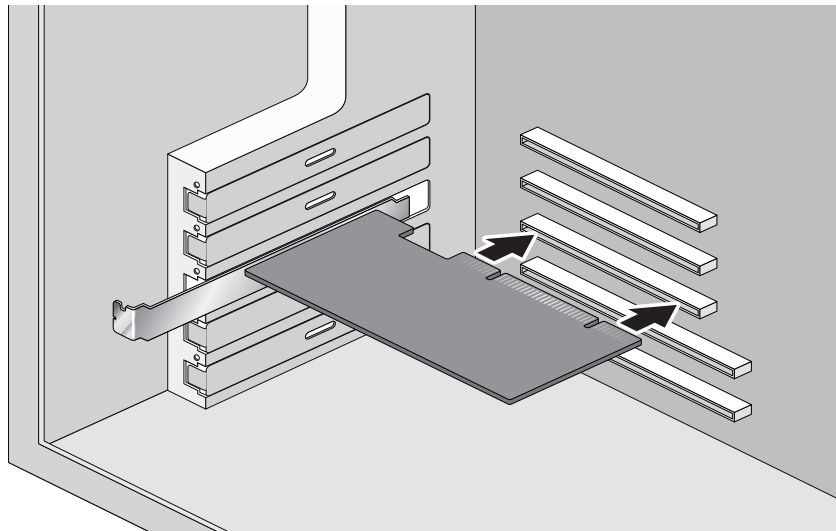


Figure 9. Inserting the Adapter with a High-profile Bracket

**Caution**

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

6. Secure the network adapter card to the chassis with a Phillips-head screw (not provided). See Figure 10 on page 32.

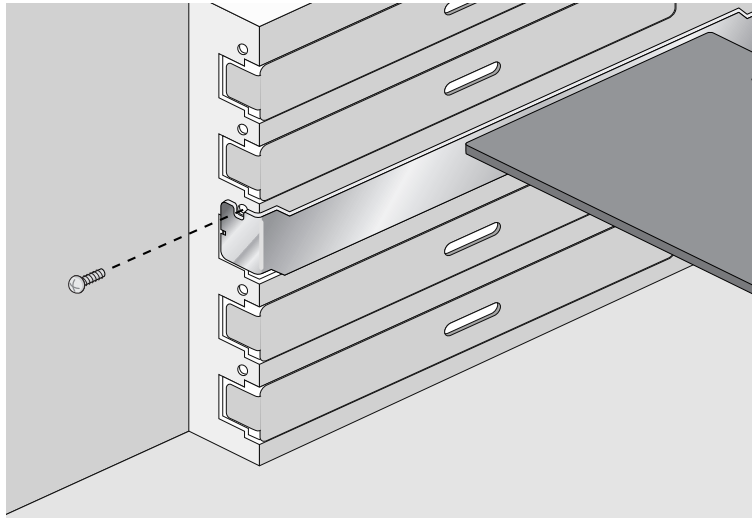


Figure 10. Securing the Adapter with a High-profile Bracket

7. Replace the system's cover and secure it with the screws removed in Step 2.
8. Disconnect any personal antistatic devices.
9. Power the system on.

Once the system returns to proper operation, the adapter hardware is fully installed. Next, connect the network cables. See "Connecting the Network Cables" on page 33.

Connecting the Network Cables

The AT-2973SX adapter has two fiber optic connectors (each with a transmit and receive) for attaching the system to a compatible link partner, or an IEEE 802.3z compliant Gigabit Ethernet switch. The AT-2973T adapter has two twisted-pair connectors.

For the AT-2973SX adapter you need a fiber optic cable. For specifications for this cable, see the AT-2973SX adapter data sheet.

Note

For information about cleaning a fiber optic connector, see Appendix B “Cleaning Fiber Optic Connectors” on page 131.

For the AT-2973T adapter, you need a twisted-pair cable. For pin signals and pinout information, see “10/100/1000Base-T Twisted-Pair Port Connectors” on page 128 and “Console Port Pinouts” on page 130.

To connect a network cable to the adapter, perform the following procedure:



Warning

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

1. Connect one end of the cable to the adapter.
2. For the AT-2973SX adapter, connect the other end of the cable to the appropriate Ethernet fiber optic port. For the AT-2973T adapter, connect the other end of the cable to another twisted pair port.

Note

After the cable is properly connected at both ends, the adapter port LEDs should be functional. See “Physical Descriptions” on page 21 for a description of LED operation for each adapter model. For driver installation and configuration instructions, refer to the software configuration for a specific driver.

After you connect the system to the network and power is supplied, the AT-2973SX adapter attempts to establish the connection at 1000 Mbps full-duplex only.

Chapter 3

Installing Broadcom Boot Agent Driver Software

This chapter provides information about how to install the Broadcom Boot Agent Driver Software:

- ❑ “Overview” on page 36
- ❑ “Setting Up MBA in a Client Environment” on page 38
- ❑ “Setting Up MBA in a Server Environment” on page 40

Overview

Both the AT-2973SX and AT-2973T Broadcom NetXtreme II adapters support Preboot Execution Environment (PXE). Multi-Boot Agent (MBA) is a software module that allows your network computer to boot with the images provided by remote servers across the network. The Broadcom MBA driver complies with the PXE 2.1 specification and is released with both monolithic and split binary images. This provides flexibility to users in different environments where the motherboard may or may not have built-in base code.

The MBA module operates in a client/server environment. A network consists of one or more boot servers that provide boot images to multiple computers through the network. The Broadcom implementation of the MBA module has been tested successfully in the following environments:

- ❑ **Linux Red Hat PXE Server.** Broadcom PXE clients are able to remotely boot and use network resources (NFS mount, and so forth) as well as perform Linux installations. In the case of a remote boot, the Linux universal driver binds seamlessly with the Broadcom Universal Network Driver Interface (UNDI) and provides a network interface in the Linux remotely-booted client environment.
- ❑ **Intel APITEST.** The Broadcom PXE driver passes all API compliance test suites.
- ❑ **MS-DOS UNDI.** The MS-DOS Universal Network Driver Interface (UNDI) seamlessly binds with the Broadcom UNDI to provide a network adapter driver interface specification (NDIS2) interface to the upper layer protocol stack. This allows computers to connect to network resources in an MS-DOS environment.
- ❑ **Remote Installation Service (RIS).** The Broadcom PXE clients are able to remotely boot to a Windows 2000 Server or a Windows Server 2003 (SP1 and older) system running RIS to initialize and install Windows Server 2003 and prior operating systems. To extend functionalities beyond basic network connectivity when loading an operating system through RIS, see “Using the NetXtreme II Monolithic Driver” on page 83.
- ❑ **Windows Deployment Service (WDS).** For Windows Server 2003 SP2, RIS was replaced by WDS, which offers a Broadcom PXE client to install Windows operating systems, including Windows Vista and Windows Server 2008. To extend functionalities beyond basic network connectivity when loading an operating system through WDS, see “Using the NetXtreme II Monolithic Driver” on page 83.
- ❑ **Automated Deployment Service (ADS).** The Broadcom PXE client can connect to a Windows Server 2003 system and run a deployment agent that allows one to perform some administrative functions, including, but not limited to, deploying a Windows Server 2003 image.

To extend functionalities beyond basic network connectivity when loading an operating system through ADS, see “Using the NetXtreme II Monolithic Driver” on page 83.

Setting Up MBA in a Client Environment

Setting up a Multiple Book Agent (MBA) in a client environment involves the following:

- ❑ “Enabling the MBA Driver” on page 38
- ❑ “Configuring the MBA Driver” on page 38
- ❑ “Setting Up the BIOS” on page 39

Enabling the MBA Driver

To enable or disable the MBA driver, do the following:

1. Boot up your system in DOS mode.

Note

The `uxdiag.exe` file is included in when you download the driver software files from the Allied Telesis web site.

2. Type the following:

```
uxdiag -mba [ 0-disable | 1-enable ] -c devnum
```

where

devnum is the specific device(s) number (0,1,2, ...) to be programmed.

Configuring the MBA Driver

This procedure describes how to configure the MBA driver on the AT-2973SX and AT-2973T adapters.

To configure the MBA driver, do the following:

Note

You can use the MBA Configuration Menu to configure the MBA driver one adapter at a time as described below, or you can use the MS-DOS based application to simultaneously configure the MBA driver for multiple adapters. See Chapter 9, “User Diagnostics” on page 115.

1. Restart your system.
2. Press CTRL+S within 4 seconds after you are prompted to do so.

Note

The message prompting you to press CTRL+S is displayed once for each Broadcom NetXtreme II adapter you have in your system that has MBA enabled. The messages are displayed in the same order as the assigned adapter device number.

3. Use the UP ARROW and DOWN ARROW keys to move to the Boot Protocol menu item.

Note

If you have multiple adapters in your system and you are unsure which adapter you are configuring, press CTRL+F6, which causes the port LEDs on the adapter to start blinking.

4. Use the UP ARROW, DOWN ARROW, LEFT ARROW, and RIGHT ARROW keys to move to and change the values for other menu items, as desired.
5. Press F4 to save your settings.
6. Press ESC when you are finished.

Setting Up the BIOS

To boot from the network with the MBA, make the MBA enabled adapter the first bootable device under the BIOS. This procedure depends on the system BIOS implementation. Refer to the user manual for the system BIOS implementation for instructions.

Setting Up MBA in a Server Environment

Red Hat Linux PXE Server

The Red Hat Enterprise Linux distribution has PXE Server support. It allows users to remotely perform a complete Linux installation over the network. The distribution comes with the boot images boot *kernel* (vmlinuz) and *initial ram disk* (initrd), which are located on the Red Hat disk#1:

```
/images/pxeboot/vmlinuz  
/images/pxeboot/initrd.img
```

Refer to the Red Hat documentation for instructions on how to install PXE Server on Linux.

However, the Initrd.img file distributed with Red Hat Enterprise Linux, does not have a Linux network driver for the Broadcom NetXtreme II adapters. This version requires a driver disk for drivers that are not part of the standard distribution. You download the driver software files from the Allied Telesis web site.

MS-DOS UNDI/ Intel APITEST

To boot in MS-DOS mode and connect to a network for the MS-DOS environment, download the Intel PXE PDK from the Intel website. This PXE PDK comes with a TFTP/ProxyDHCP/Boot server. The PXE PDK can be downloaded from Intel at http://downloadcenter.intel.com/Product_Filter.aspx?ProductID=412&lang=eng.

Chapter 4

Installing the NDIS2 Driver Software

This chapter provides procedures to install the NDIS2 driver on the Microsoft Network Client and DOS NDIS platforms.

This chapter contains the following topics:

- ❑ “Overview” on page 42
- ❑ “Pre-installation Requirements” on page 43
- ❑ “Installing the NDIS2 Driver Software on MS-DOS Platforms” on page 44
- ❑ “Using Keywords for the Drivers” on page 49

Overview

The BXND20X Broadcom NetXtreme II Gigabit Ethernet driver is described in this chapter. This driver can be installed on AT-2973SX and AT-2973T adapters that are installed in systems running an MS-DOS platform. See the following sections:

- ❑ “Pre-installation Requirements” on page 43
- ❑ “Installing the NDIS2 Driver Software on MS-DOS Platforms” on page 44
- ❑ “Using Keywords for the Drivers” on page 49

Pre-installation Requirements

Before you can successfully install the NDIS2 driver software, you must do the following:

- ❑ Physically install the network adapter in the server.
- ❑ Install the networking software that is appropriate to the operating system (such as Microsoft LAN Manager 2.2 for MS-DOS). The networking software must be running on your server.

Installing the NDIS2 Driver Software on MS-DOS Platforms

The NDIS2 driver software can be run from an MS-DOS startup disk using Microsoft Network Client 3.0 or from the hard disk using Microsoft LAN Manager 2.2.

This section describes how to create a startup disk and modify it. See the following:

- ❑ “Creating a Startup Disk” on page 44
- ❑ “Modifying the Startup Disk” on page 45

Creating a Startup Disk

To create a startup disk to run a Microsoft Network client, you must have the following:

- ❑ Windows NT Server 4.0 CD-ROM
- ❑ A blank MS-DOS system disk (3.5" high-density floppy disk)
- ❑ Access to the Broadcom NDIS2 driver file (BXND20X.dos). This file is located on the driver source media.

After creating the startup disk, follow the instructions in “Modifying the Startup Disk” on page 45.

Note

Windows NT Server 4.0 users: When running Setup for Microsoft Network Client v3.0 for MS-DOS, click any network card from the list (NE2000 Compatible, for example) to create the startup disk.

To create a startup disk, do the following:

1. Create a folder called NCADMIN in the root of the C drive.
2. Copy the NCADMIN.CN_, NCADMIN.EX_, and NCADMIN.HL_ files from the I386 folder on the Windows NT Server 4.0 CD-ROM.
3. Open a command prompt window and change the directory to C:\NCADMIN.
4. Type the following and then press Enter.

```
expand -r ncadmin.*
```
5. Close the command prompt window by typing `exit` and then pressing Enter.
6. Start Windows Explorer.
7. Open the NCADMIN folder and double-click **ncadmin.exe**.

8. Follow the on-screen instructions to make the network startup disk (choose **NE2000 Compatible** from the list of adapters).

Modifying the Startup Disk

To modify the startup disk, do the following:

1. Edit A:\Net\Protocol.ini with Notepad or a similar text editor.
 - a. Change DriverName=\$ to DriverName=BXND20X\$.
 - b. Remove all other parameter entries under the [MS\$NE2CLONE] or equivalent section such as IOBASE=0x300 or INTERRUPT=3, and so on.

Example Protocol.ini file for IP

The following is an example of an protocol.ini file for IP:

```
[network.setup]
version=0x3110
netcard=ms$ne2clone,1,MS$NE2CLONE,1
transport=tcpip,TCPIP
lana0=ms$ne2clone,1,tcpip
[MS$NE2CLONE]
DriverName=BXND20X$
[protman]
DriverName=PROTMAN$
PRIORITY=MS$NDISHLP
[tcpip]
NBSessions=6
DefaultGateway=0
SubNetMask=255 0 0 0
IPAddress=192 168 0 1
DisableDHCP=0
DriverName=TCPIP$
BINDINGS=MS$NE2CLONE
LANABASE=0
```

Example Protocol.ini file for NetBEUI

The following is an example of an protocol.ini file for NetBEUI:

```
[network.setup]
version=0x3110
netcard=ms$ne2clone,1,MS$NE2CLONE,1
transport=ms$ndishlp,MS$NDISHLP
transport=ms$netbeui,MS$NETBEUI
lana0=ms$ne2clone,1,ms$ndishlp
lana1=ms$ne2clone,1,ms$netbeui
[MS$NE2CLONE]
DriverName=BXND20X$
[protman]
```

```
DriverName=PROTMAN$
PRIORITY=MS$NDISHLP
[MS$NDISHLP]
DriverName=ndishlp$
BINDINGS=MS$NE2CLONE
[MS$NETBEUI]
DriverName=netbeui$
SESSIONS=10
NCBS=12
BINDINGS=MS$NE2CLONE
LANABASE=0
```

2. Edit A:\Net\System.ini.
3. Change netcard= to netcard=BXND20X.dos.
4. Check for references to C:\NET and change C:\NET to A:\NET if necessary.

Example system.ini file

The following is an example of a system.ini file:

```
[network]
sizeworkbuf=1498
filesharing=no
printsharing=no
autologon=yes
computername=MYPC
lanroot=A:\NET
username=USER1
workgroup=WORKGROUP
reconnect=yes
dospophotkey=N
lmlogon=0
logondomain=
preferredredir=basic
autostart=basic
maxconnections=8
[network drivers]
netcard=BXND20X.dos
transport=ndishlp.sys,*netbeui
devdir=A:\NET
LoadRMDrivers=yes
```

5. Copy **BXND20X.dos** to A:\Net.

6. Create the appropriate Autoexec.bat file in drive A for the chosen protocol as shown:

TCP/IP

Here is an example of the TCP/IP autoexec.bat file:

```
path=a:\net
a:\net\net initialize
a:\net\netbind.com
a:\net\umb.com
a:\net\tcptsr.exe
a:\net\tinyrfc.exe
a:\net\nmtsr.exe
a:\net\emsbfr.exe
a:\net\net start basic
net use z: \\SERVERNAME\SHARENAME
```

NetBEUI

Here is an example of the NetBEUI autoexec.bat file:

```
SET PATH=A:\NET
A:\NET\NET START BASIC

net use z: \\SERVERNAME\SHARENAME
```

7. Create a Config.sys file on the startup disk in drive A as shown:

```
files=30
device=a:\net\ifshlp.sys
lastdrive=z
```

Installing the DOS NDIS2 Driver Software

To install the DOS NDIS2 Driver Software on the hard disk, do the following:

1. Verify that the system has Microsoft LAN Manager 2.2 installed, with a protocol such as NetBEUI configured.
2. Create a folder on your hard disk to store the NDIS 2.01 driver.

Example: C:\LANMAN

3. Copy the **BXND20X.dos** file to this folder.
4. Edit the **Config.sys** file by adding the following lines:

```
DEVICE = C:\LANMAN\PROTMAN.DOS
DEVICE = C:\LANMAN\BXND20X.DOS
DEVICE = C:\LANMAN\NETBEUI.DOS
```

5. Edit the Autoexec.bat file by adding the following lines:

```
C:\ LANMAN\NETBIND.EXE
C:\LANMAN\NET START WORKSTATION
C:\LANMAN\NET USE drive letter: \\server
name\resource name
```

6. Edit the **Protocol.ini** file (located in C:\LANMAN) to configure the driver to bind with NetBEUI or any other protocols.

Here is an example:

```
[PROTOCOL MANAGER]
DriverName = PROTMAN$
[NETBEUI_XIF]
DriverName = netbeui$
BINDINGS = BXND20X
[BXND20X]
DriverName = "BXND20X$"
```

7. Restart the computer to complete the installation.

Note

The driver loads during system configuration and displays the Broadcom banner, controller name, MAC address, IRQ number, detected line speed, and the controller BusNum and DevNum. If the driver fails to load, an *initialization fail* message is displayed. For more information about the BusNum and DevNum keywords, see "Using Keywords for the Drivers" on page 49.

Using Keywords for the Drivers

The Protocol.ini file contains certain keywords that are used by the BXND20X.dos driver. These keywords are listed below:

- ❑ **BusNum.** Specifies the number of the PCI bus on which the network adapter is located. This keyword requires a value ranging from 0 to 255.
- ❑ **DevNum.** Specifies the device number assigned to the network adapter when it is configured by the PCI BIOS. This keyword requires a value ranging from 0 to 255.
- ❑ **FuncNum or PortNum.** Specifies the PCI function or port number assigned to the network controller. This keyword requires a value ranging from 0 to 7.

Note

The BusNum, DevNum, and FuncNum (or PortNum) keywords are needed when multiple adapters are installed in the server and when a specific controller must be loaded in a certain order. These keywords are used concurrently and are included for manufacturing purposes. Do not use them unless you are familiar with how to configure PCI devices. A PCI device scan utility is needed to find this information.

- ❑ **LineSpeed.** Specifies the speed of the network connection in Mbit/s. Values are 10, 100, or 1000 Mbit/s. Technically, a line speed of 1000 Mbit/s cannot be forced and is achievable only through auto-negotiation. For the sake of simplicity, the driver performs auto-negotiation when the line speed is set to a value of 1000.
- ❑ **Duplex.** Specifies the duplex mode of the network adapter. Requires a setting of either **Half** or **Full**. When this keyword is used, the **LineSpeed** keyword must also be used. If neither keyword is used, the network adapter defaults to auto-negotiation mode.
- ❑ **NodeAddress.** Specifies the network address used by the network adapter. If a multicast address or a broadcast address is specified, the adapter uses the default MAC address.
- ❑ **FixChecksumOff.** Turns off the driver's workaround for the TCP/IP stack to recognize the 1s complemented version of the checksum.
- ❑ **AcceptAllMC.** Informs the driver to deliver all multicast packets to the upper protocol.

Here is an example of the keywords:

```
[BXND20X]
DriverName = "BXND20X$"
BusNum = 3
DevNum = 14
PortNum = 2
LineSpeed = 1000
Duplex = Full
NodeAddress = 001020304050
```

Chapter 5

Installing the Linux Drivers

This chapter provides procedures to install the Linux drivers for the AT-2973SX and AT-2973T adapters.

This chapter contains the following topics:

- ❑ “Introduction” on page 52
- ❑ “Installing Linux Driver Software” on page 54

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 3.

Table 3. Broadcom NetXtreme II Linux Drivers

Linux Driver	Description
bnx2 cnic	Indicates the Linux drivers for the AT-2973SX and AT-2973T network adapters. 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-2973SX and AT-2973T network adapters.

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

- ❑ “bnx2 Driver” on page 52
- ❑ “bnx2i Driver” on page 53

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 4. The `netxtreme2` package contains the `bnx2` (1 Gb network adapter) and drivers for source RPM and compressed tar.

Table 4. 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 54
- ❑ “Building the Driver from the Source TAR File” on page 56

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 56
- ❑ “Building the bnx2i Driver” on page 57

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 54 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 54 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 58 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:

```
rmmod bnx2i  
kill -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 58
- ❑ “Unloading the Driver from a TAR Installation” on page 59

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 54 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 60
- ❑ “Setting Optional Properties for the bnx2i Driver” on page 61

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 offloaded 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 offloaded 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 offloaded; as QP size increases, the number of connections supported decreases. With the default values, the AT-2973SX and AT-2973T adapters 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 offloaded 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 64
- ❑ “Checking bnx2i Driver Messages” on page 65

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 68
- ❑ “Installing Open iSCSI User Applications” on page 69
- ❑ “Binding iSCSI Target to Broadcom NX2 iSCSI Transport Name” on page 70
- ❑ “Making Connections to iSCSI Targets” on page 70
- ❑ “Maximizing Offload iSCSI Connections” on page 71

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 54 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 53 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 60 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."

Chapter 6

Installing the Windows Drivers

This chapter provides procedures to install and remove the driver software for all of the Windows Operating Systems supported by the AT-2973SX and AT-2973T adapters. 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 74
- ❑ “Removing the Device Drivers” on page 82
- ❑ “Using the NetXtreme II Monolithic Driver” on page 83
- ❑ “Inserting the NetXtreme II Monolithic Driver in a WinPE 2.0 Image” on page 85
- ❑ “Displaying or Changing the Properties of the Adapter” on page 88
- ❑ “Setting Power Management Options” on page 89

Installing the Windows Driver Software

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

- ❑ Microsoft® Windows® (32-bit and 64-bit extended)
- ❑ Microsoft Windows Vista™ (32-bit and 64-bit extended)
- ❑ Microsoft Windows XP™ (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.

When Windows first starts after a hardware device such as an AT-2973SX or AT-2973T adapter 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.

There are two methods used to install the software drivers on all of the Windows Operating Systems supported by the AT-2973SX and AT-2973T adapters: 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 75
- ❑ “Using Silent Installation” on page 79

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.

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.

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.

Note

To use the TCP/IP Offload Engine (TOE), you must have Windows Server 2003 with Service Pack 2 (SP2) and a license key preprogrammed in the hardware. If supported, for iSCSI and RDMA, you only need a license key.

Using the Installer

The Installer is a graphical interactive installation mode. To install the AT-2973SX and AT-2973T drivers on a Windows Operating System, do the following:

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

See Figure 11.



Figure 11. 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 12 on page 76.

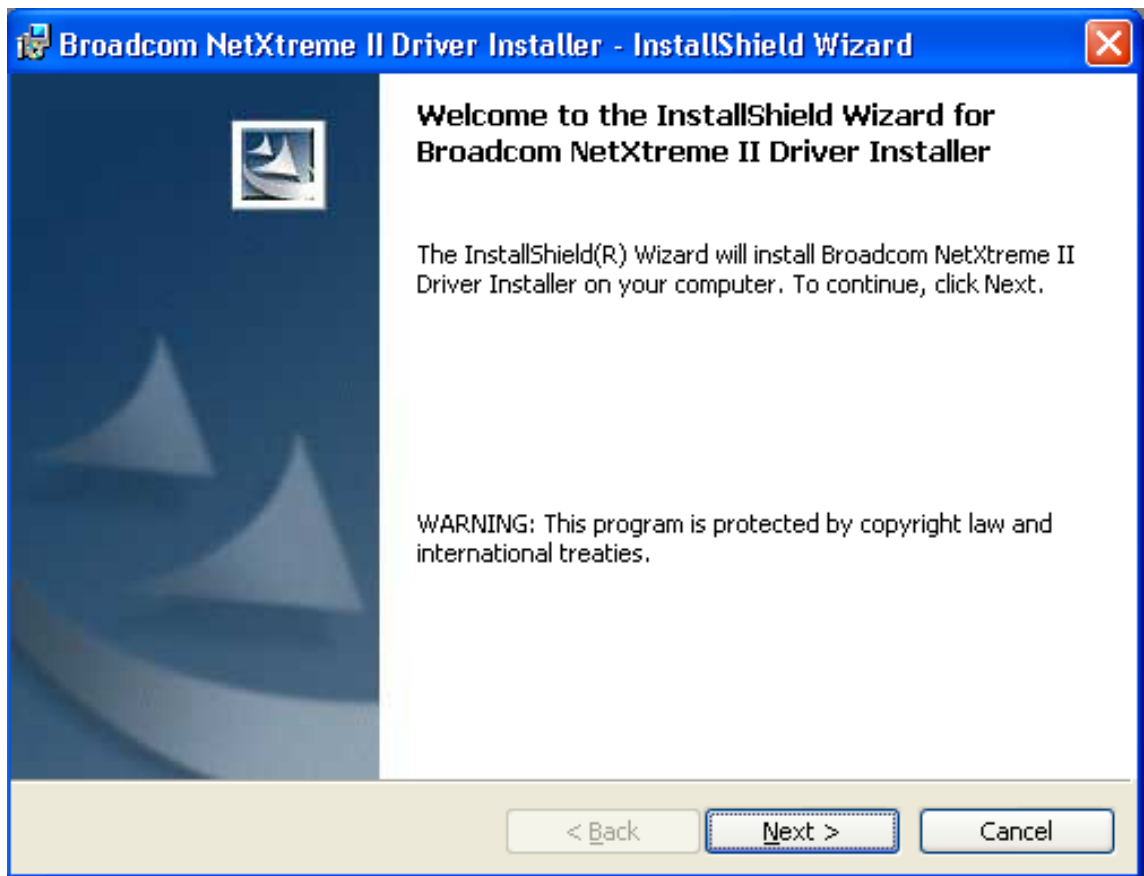


Figure 12. Broadcom NetXtreme II Driver Installer - InstallShield Wizard Page

3. Click **Next** to continue.

The License Agreement Page is displayed. See Figure 13 on page 77.

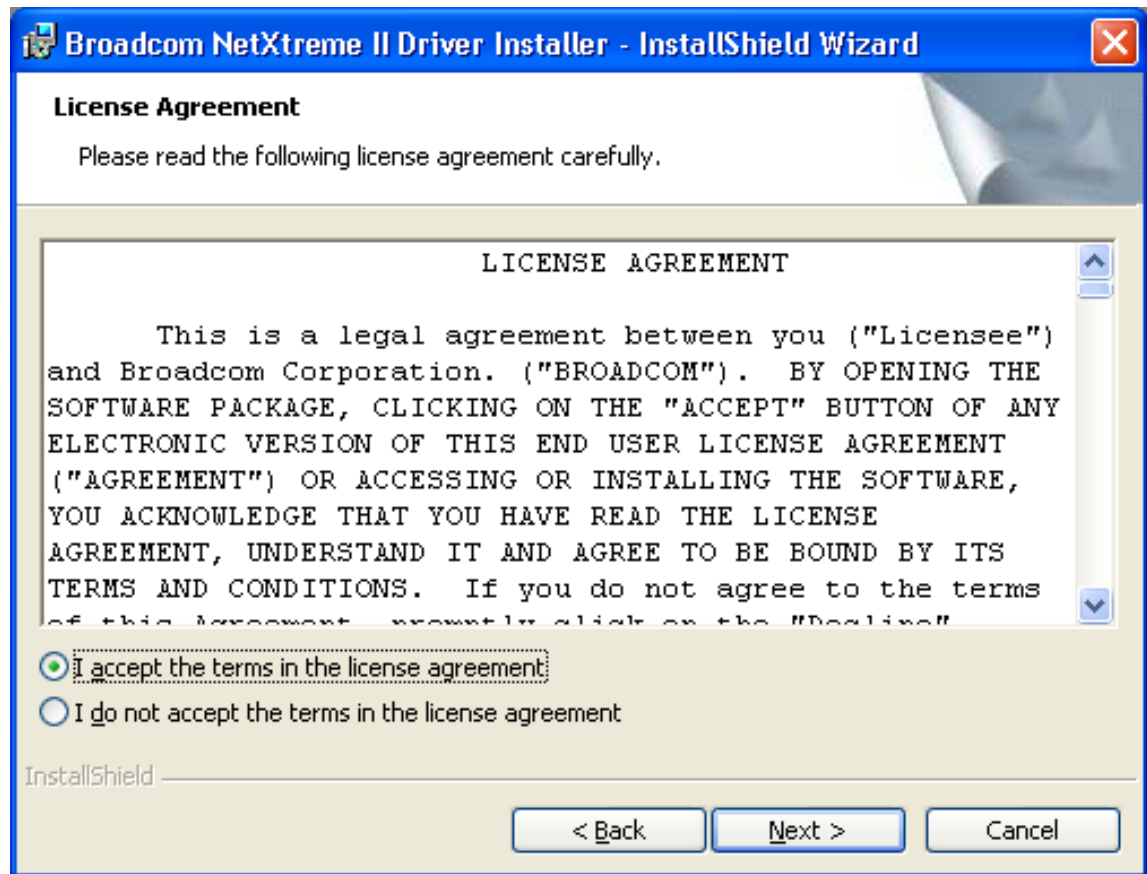


Figure 13. License Agreement Page

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 14 on page 78.

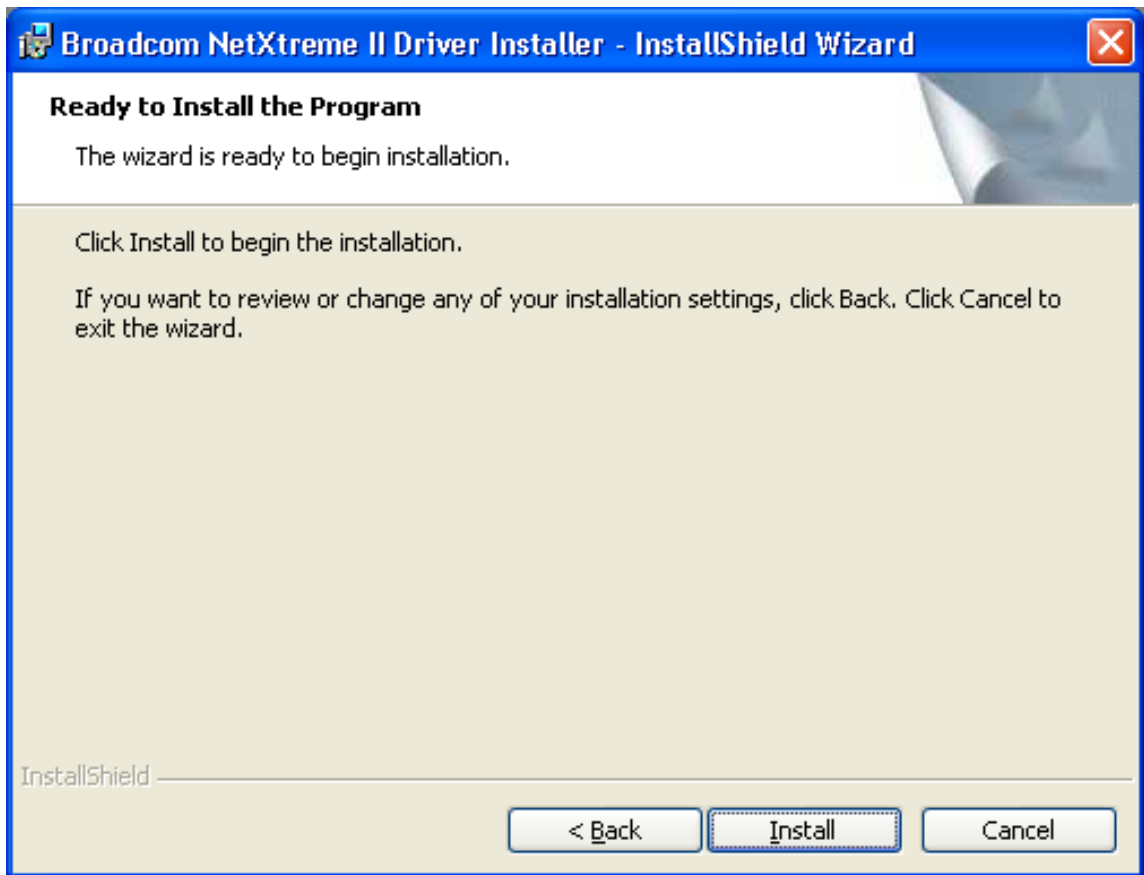


Figure 14. Ready to Install the Program Page

5. Click **Install**.

The InstallShield Wizard Completed Page is displayed. See Figure 15 on page 79.

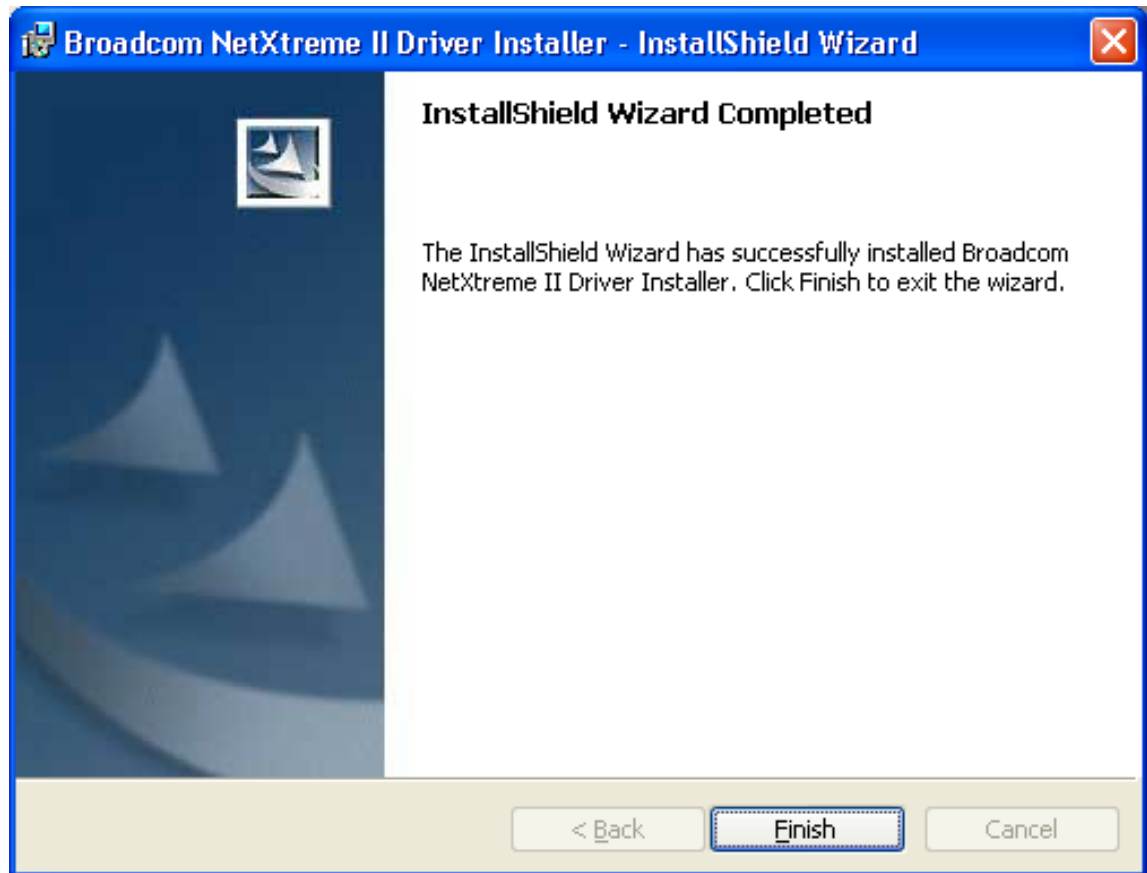


Figure 15. InstallShield Wizard Completed Page

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-2973SX and AT-2973T adapters. See the following:

- ❑ "Performing a Silent Install" on page 80
- ❑ "Performing a Silent Install and Creating a Log File" on page 80
- ❑ "Performing a Silent Upgrade" on page 80
- ❑ "Performing a Silent Uninstall" on page 80
- ❑ "Performing a Silent Reinstall" on page 81

Note

All commands are case sensitive.

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.

Note

Windows Server 2003 and Windows Server 2008 provide the Device Driver Rollback feature to replace a device driver with one that was previously installed. However, the complex software architecture of the NetXtreme II device may present problems if the rollback feature is used on one of the individual components. Therefore, Allied Telesis recommends that changes to driver versions be made only through the use of a driver installer.

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.

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 cotype.cmd script. The script requires two arguments: hardware architecture and destination location.

```
cotype.cmd <arch> <destination>
```

For example: cotype 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).

3. 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.

Setting Power Management Options

You can set power management options to allow the operating system to turn off the controller to save power or to allow the controller to wake up the computer. If the device is busy doing something such as servicing a call, the operating system does not shut down the device. The operating system attempts to shut down every possible device only when the computer attempts to go into hibernation. To have the controller stay on at all times, do not click the **Allow the computer to turn off the device to save power** check box.

Note

Power management options are not available on blade servers.

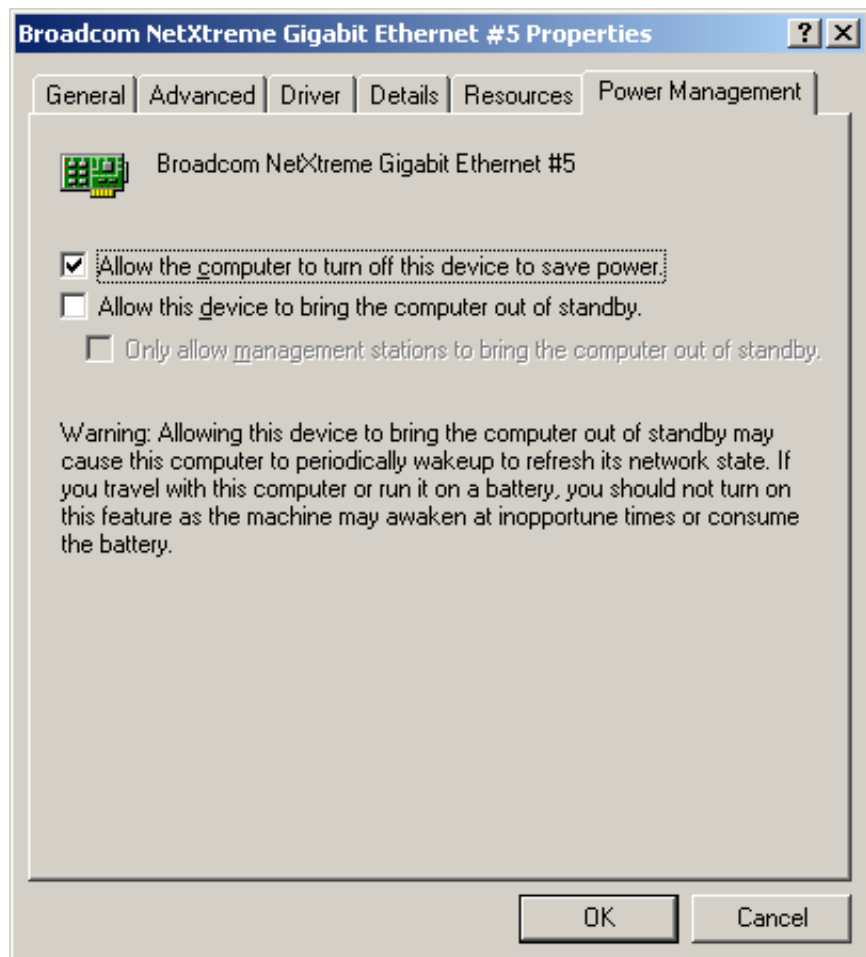


Figure 16. Power Management Tab

Note

The Power Management tab is available only for servers that support power management.

Note

To enable Wake on LAN (WOL) when the computer is on standby, click **Allow the device to bring the computer out of standby** box.

Note

If you select **Only allow management stations to bring the computer out of standby**, the computer can be brought out of standby only by Magic Packet.



Caution

Do not select Allow the computer to turn off the device to save power for any adapter that is a member of a team.

Chapter 7

Installing Management Applications

This chapter provides information about prerequisites for installing management applications as well as procedures instructions. It contains the following topics:

- ❑ “Installing Broadcom Advanced Control Suite 3 and Related Management Applications” on page 92
- ❑ “Modifying Management Applications” on page 97
- ❑ “Repairing Management Applications” on page 98
- ❑ “Removing Management Applications” on page 99

Installing Broadcom Advanced Control Suite 3 and Related Management Applications

The Broadcom Advanced Control Suite 3 (BACS 3) software and related management applications can be installed from the source-file directory or by using the silent install option. See the following:

- ❑ “Checking .NET Framework Requirements” on page 93
- ❑ “Using the Installer” on page 94
- ❑ “Using the Silent Install Option” on page 94

After you use the source-file directory or the silent install option, the following features are installed on your system:

- ❑ **Control Suite.** Broadcom Advanced Control Suite 3 (BACS 3).
- ❑ **BASP.** Installs Broadcom Advanced Server Program.
- ❑ **SNMP.** Installs the Simple Network Management Protocol subagent.
- ❑ **CIM Provider.** Installs the Common Information Model provider.

Note

Ensure that the Broadcom network adapter(s) is physically installed in the system before installing BACS 3.

Note

Before installing Broadcom Advance Control Suite 3, verify that .NET Framework 2.0, or above, is installed.

Note

Before you begin the installation, close all applications, windows, or dialog boxes.

Note

To use the TCP/IP Offload Engine (TOE), you must have Windows Server 2003 with Service Pack 2 (SP2) and a license key preprogrammed in the hardware. If supported, for iSCSI and RDMA, you only need a license key.

Checking .NET Framework Requirements

Before you use either the source-file directory or the silent install option, you must make sure that your system meets the minimum installation requirements.

Microsoft .NET Framework 2.0 includes the runtime and associated files needed to run BACS 3, and must be installed on your system in order for BACS 3 to operate. For information on the minimum and recommended .NET Framework versions for your operating system, see Table 5 on page 93.

Note

For optimal performance of BACS 3, Broadcom recommends .NET Framework 2.0 SP1, .NET Framework 3.0 SP1, or .NET Framework 3.5, depending on your operating system.

Table 5. Minimum and Recommended .NET Framework Versions for BACS 3

Operating System	Minimum Required		Recommended	
	Version	How to Obtain	Version	How to Obtain
Windows 2000 Server	.NET 2.0	Download from Microsoft	.NET 2.0 SP1	Download from Microsoft
Windows Server 2003	.NET 2.0	Download from Microsoft	.NET 2.0 SP1	Download from Microsoft
Windows Server 2003 R2	.NET 2.0	Included in OS package, but by default, not included during installation	.NET 2.0 SP1	Download from Microsoft
Windows Server 2008	.NET 2.0	Included in .NET 2.0 SP1, which is included during OS installation	.NET 2.0 SP1	Included in OS package

Note

Starting BACS 3 without .NET Framework (version 2.0 or above) installed on your system results in an error.

Note

Long startup times for BACS 3 may be caused by a limitation of .NET Framework 2.0, as described in Microsoft knowledge base article KB936707. To improve the startup time of BACS 3, apply .NET Framework 2.0 SP1 (or appropriate version for your OS as shown in the Recommended column of Table 5), and reboot your system.

Using the Installer

The driver software is available for download from the Allied Telesis web site.

To install the management applications, do the following:

Note

Before starting the installation, verify that .NET Framework 2.0 or above is installed. This ensures optimal performance of BACS 3.

1. Open the MgmtApps folder, select IA32 or x64, and then double-click **Setup.exe** to open the InstallShield Wizard.
2. Click **Next** to continue.
3. After you review the license agreement, click **I accept the terms in the license agreement** and then click Next to continue.
4. Select the features you want installed. If you receive a warning regarding .NET Framework 2.0, then press OK to continue installing BACS 3 and manually install .NET Framework 2.0 when installation completes, or Cancel to quit.
5. Click **Next**.
6. Click **Install**.
7. Click **Finish** to close the wizard.

Using the Silent Install Option

You can use the silent install option to install from a source folder or any folder. You can create a log file during the installation procedure. In addition, you can specify which features you will install on your system. See the following sections:

- ☐ “Performing a Silent Install from the Installer Source Folder” on page 95
- ☐ “Performing a Silent Install and Creating a Log File” on page 95
- ☐ “Performing a Silent Install from any Folder” on page 95
- ☐ “Performing a Silent Install by Feature on IA32 Platforms” on page 96
- ☐ “Performing a Silent Install by Feature on AMD64/EM64T Platforms” on page 96
- ☐ “Performing a Silent Install from Within a Batch File” on page 96

Performing a Silent Install from the Installer Source Folder

To perform a silent install (or upgrade) from within the installer source folder, do the following:

Note

All commands are case sensitive.

Note

User must "Run as Administrator" for Vista when using "msiexec" for "silent" install/uninstall(s).

Note

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

Type the following:

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

If performing a silent upgrade, your system may reboot automatically. To suppress the reboot, type the following:

```
setup /s /v"/qn REBOOT=ReallySuppress"
```

Performing a Silent Install and Creating a Log File

To perform a silent install and create a log file, type the following:

```
setup /s /v"/qn /L f:\ia32\1testlog.txt"
```

The 1testlog.txt log file is created at f:\ia32.

Performing a Silent Install from any Folder

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

```
msiexec /x "{26E1BFB0-E87E-4696-9F89-B467F01F81E5}" /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.

Note

After performing a silent uninstall, it is necessary to reboot the system before reinstalling this installer. If a reboot is not performed, BASP will not install correctly.

Performing a Silent Install by Feature on IA32 Platforms

To perform a silent install by feature on IA32 platforms, do the following:

Note

CHM32 or CHM64 installs the BACS help file and must be included when installing the BACS feature.

Use ADDSOURCE to include any of the features listed below.

```
setup /s /v"/qn  
ADDSOURCE=BACSi32,CHM32,BASPi32,SNMPi32,CIMi32"
```

Performing a Silent Install by Feature on AMD64/EM64T Platforms

To perform a silent install by feature on AMD64/EM64T platforms, type the following:

```
setup /s /v"/qn  
ADDSOURCE=BACSa64,CHMa64,BASPa64,SNMPa64"
```

Performing a Silent Install from Within a Batch File

To perform a silent install from within a batch file and wait for the install to complete before continuing with the next command line, type the following:

```
start /wait setup /s /w /v/qn
```


Modifying Management Applications

To modify the management applications, do the following:

1. In Control Panel, double-click **Add or Remove Programs**.
2. Click **Broadcom Management Programs** and then click **Change**.
3. Click **Next** to continue.
4. Click **Modify** to change program features.
5. Click **Next** to continue.
6. Click on an icon to change how a feature is installed.
7. Click **Next**.
8. Click **Install**.
9. Click **Finish** to close the wizard.
10. Reboot your system to complete the modification of the management applications.

Repairing Management Applications

To repair or reinstall the management applications, do the following:

1. In Control Panel, double-click **Add or Remove Programs**.
2. Click **Broadcom Management Programs**, and then click **Change**.
3. Click **Next** to continue.
4. Click **Repair** to repair errors in installed applications.
5. Click **Next** to continue.
6. Click **Install**.
7. Click **Finish** to close the wizard.

Removing Management Applications

To remove all management applications, do the following:

1. In Control panel, double-click Add or Remove Programs.
2. Click **Broadcom Management Programs**, and then click **Remove**.
3. Reboot your system to complete the removal of management applications.

Chapter 8

Troubleshooting

This chapter provides troubleshooting information. It contains the following topics:

- ❑ “Hardware Diagnostics” on page 102
- ❑ “Checking Port LEDs” on page 103
- ❑ “Troubleshooting Checklist” on page 104
- ❑ “Solving Broadcom Boot Agent and Broadcom Advanced Server Program (BASP) Issues” on page 110
- ❑ “Solving Miscellaneous Issues” on page 112

Hardware Diagnostics

Loopback diagnostic tests are available for testing the adapter hardware. These tests provide access to the adapter internal/external diagnostics, where packet information is transmitted across the physical link. For instructions and information on running tests in an MS-DOS environment, see Chapter 9, “User Diagnostics” on page 115; for Windows environments, see “Running Diagnostic Tests” in the *Broadcom Advanced Control Suite 3 User Guide*.

Checking Port LEDs

See “Physical Descriptions” on page 21 to check the state of the network link and activity.

Troubleshooting Checklist



Caution

Before you open the cabinet of your server to add or remove the adapter, see “Reviewing Safety Precautions” on page 24.

The following checklist provides recommended actions to resolve problems installing or running either the AT-2973SX or AT-2973T adapter in your system.

- ☐ Inspect all cables and connections. Verify that the cable connections at the network adapter and the switch are attached properly. Verify that the cable length and rating comply with the requirements listed in “Connecting the Network Cables” on page 33.
- ☐ Check the adapter installation by reviewing “Installing a Network Adapter Card” on page 29. Verify that the adapter is properly seated in the slot. Check for specific hardware problems, such as obvious damage to board components or the PCI edge connector.
- ☐ Check the configuration settings and change them if they are in conflict with another device.
- ☐ Verify that your server is using the latest BIOS.
- ☐ Try inserting the adapter in another slot. If the new position works, the original slot in your system may be defective.
- ☐ Replace the failed adapter with one that is known to work properly. If the second adapter works in the slot where the first one failed, the original adapter is probably defective.
- ☐ Install the adapter in another functioning system and run the tests again. If the adapter passed the tests in the new system, the original system may be defective.
- ☐ Remove all other adapters from the system and run the tests again. If the adapter passes the tests, the other adapters may be causing contention.

Checking Current Drivers

This section describes how to check that the current drivers are loaded properly for the Windows and Linux platforms.

Windows

See “Viewing Vital Signs” in the *Broadcom Advanced Control Suite 3 User Guide* to view vital information about the adapter, link status, and network connectivity.

Linux

To verify that the bnx2.o driver is loaded properly, enter the following command:

```
lsmod
```

If the driver is loaded, a line similar to one Table 6 is displayed, where size is the *size* of the driver in bytes, and *n* is the number of adapters configured.

Table 6. Linux Module Size

Module	Size	Used by
BCM5709	size	n

Running a Cable Length Test

For a Windows operating systems, see “Analyzing Cables” in the *Broadcom Advanced Control Suite 3 User Guide* for information on running a cable length test.

Testing Network Connectivity

This section describes how to test network connectivity for the Windows and Linux platforms.

Note

When using forced link speeds, verify that both the adapter and the switch are forced to the same speed, or that at least one link partner is configured for auto-negotiation.

Windows

In the Windows platforms, use the ping command to test network connectivity.

Note

Network connectivity can also be tested using the “Testing the Network” feature in the *Broadcom Advanced Control Suite 3 User Guide*.

To determine if the network connection is working, do the following:

1. Click **Start**, and then click **Run**.
2. Type *cmd* in the **Open** box, and then click **OK**.
3. Type *ipconfig /all* to view the network connection to be tested.
4. Type ping IP address, and then press **Enter**.

The ping statistics that are displayed indicate whether the network connection is working or not.

Linux

To verify that the Ethernet interface is up and running on a Linux platform, run `ifconfig` to check the status of the Ethernet interface. In addition, it is possible to use the `netstat -i` command to check the statistics on the Ethernet interface. See “Installing Linux Driver Software” on page 54 for information on `ifconfig` and `netstat`.

Ping an IP host on the network to verify connection has been established. From the command line, type `ping IP address`, and then press **Enter**.

The ping statistics that are displayed indicate whether or not the network connection is working.

Microsoft Windows Server 2008 Hyper-V

Microsoft Windows Server 2008 Hyper-V™ is a hypervisor virtualization system. For information on Hyper-V, see <http://www.microsoft.com/windowsserver2008/en/us/hyperv.aspx>.

This section addresses issues that affect the configuration of NetXtreme II network adapters and teamed adapters when Hyper-V is used.

Note

Ensure that Integrated Services, which is a component of Hyper-V, is installed in the guest operating system (child partition) for full functionality.

Single Network Adapter

When configuring a NetXtreme II network adapter for Hyper-V, be aware of the following:

- ❑ An adapter that is bound to a virtual network should not be configured for VLAN tagging through the driver's advanced properties. Instead, Hyper-V should manage VLAN tagging exclusively.
- ❑ Since Hyper-V does not support Jumbo Frames, it is recommended that this feature not be used or connectivity issues may occur with the child partition.
- ❑ The Locally Administered Address (LAA) set by Hyper-V takes precedence over an address set in the adapter's advanced properties.
- ❑ A TOE-enabled network adapter that is bound to a Hyper-V virtual network reports TOE as an offload capability in BACS; however, TOE does not work. This is a limitation of Hyper-V because this system does not support TOE.
- ❑ In an IPv6 network, a team that supports Checksum Offload (CO) and Large Send Offload (LSO) and is bound to a Hyper-V virtual network reports CO and LSO as an offload capability in BACS. Also, in an IPv6

network, a team that supports CO or LSO and is bound to a Hyper-V virtual network reports CO or LSO as an offload capability in BACS. However, in both instances CO and LSO do not work. This is a limitation of Hyper-V because this system does not support CO and LSO in an IPv6 network.

Teamed Network Adapters

The following Broadcom team types are supported with Hyper-V:

- ❑ Smart Load Balancing and Failover (configured only for one primary and one standby)
- ❑ Link Aggregation (IEEE 802.3ad LACP)
- ❑ Generic Trunking (FEC/GEC) 802.3ad Draft Static

When configuring a team of NetXtreme II network adapters on a Hyper-V system, be aware of the following:

- ❑ Create the team prior to binding the team to the Hyper-V virtual network
- ❑ Create a team only with an adapter that is not already assigned to a Hyper-V virtual network.
- ❑ A TOE-enabled team that is bound to a Hyper-V virtual network reports TOE as an offload capability in BACS; however, TOE does not work. This is a limitation of Hyper-V because this system does not support TOE.
- ❑ In an IPv6 network, a team that supports Checksum Offload (CO) and Large Send Offload (LSO) and is bound to a Hyper-V virtual network reports CO and LSO as an offload capability in BACS. Also, in an IPv6 network, a team that supports CO or LSO and is bound to a Hyper-V virtual network reports CO or LSO as an offload capability in BACS. However, in both instances CO and LSO do not work. This is a limitation of Hyper-V because this system does not support CO and LSO in an IPv6 network.
- ❑ To successfully perform VLAN tagging for both the host (parent partition) and the guest (child partition) with the BASP teaming software, you must configure the team for tagging. Unlike VLAN tagging with a single adapter, tagging cannot be managed by Hyper-V when using BASP software.

Removing the Device Drivers

Uninstall the Broadcom NetXtreme II device drivers from your system only through the InstallShield wizard. Uninstalling the device drivers with Device Manager or any other means may not provide a clean uninstall which, in turn, may cause the system to become unstable. For information on uninstalling Broadcom NetXtreme II device drivers, see “Removing the Device Drivers” on page 82.

Upgrading from Windows 2000 Server to Windows Server 2003

When a Broadcom NetXtreme II adapter is installed in your system, Broadcom recommends that you uninstall the adapter's driver before performing an OS upgrade from Windows 2000 Server to Windows Server 2003. This ensures that no errors are encountered in the installation of the Windows Server 2003 drivers for the NetXtreme II adapters. The device drivers for Windows 2000 and Windows Server 2003 are not the same and require the installation of the Windows 2003 drivers to be performed after the OS upgrade is completed.

Preparing an Answer File

When creating an answer file for an unattended installation or for the System Preparation Tool (Sysprep) utility, the following lines must be included under the [Unattend] section:

```
OemPreinstall=Yes
OemPnpDriversPath=Drivers\NIC
```

Note

This does not include an unattended installation when performed from a CD-ROM.

Note

The path shown in OemPnpDriversPath can be appended with the path to other applicable drivers.

For an unattended installation, place the Broadcom NetXtreme II driver files in the \$OEM\$\\$1\Drivers\NIC directory. For Sysprep, the drivers are located in Drivers\NIC at the root of the system drive. The Broadcom NetXtreme II driver files are listed below according to the operating system to be installed:

- ❑ **Windows 2000:** bxvbd.inf, bxvbdx.sys, bxvbd.cat, bxnd.inf, bxnd.cat, bxnd50x.sys, bxndcox.dll, bxdiag.cat, bxdiag.inf, bxdiagx.sys, wdfcoinstaller01005.dll, and wUDFUpdate_01005.dll
- ❑ **Windows Server 2003 (ia32):** bxvbd.inf, bxvbdx.sys, bxvbd.cat, bxnd.inf, bxnd.cat, bxnd52x.sys, bxndcox.dll, bxdiag.cat, bxdiag.inf, bxdiagx.sys, wdfcoinstaller01005.dll, and wUDFUpdate_01005.dll
- ❑ **Windows Server 2003 (x64):** bxvbd.inf, bxvbda.sys, bxvbd.cat, bxnd.inf, bxnd.cat, bxnd52a.sys, bxndcoa.dll, bxdiag.cat, bxdiag.inf, bxdiaga.sys, wdfcoinstaller01005.dll, and wUDFUpdate_01005.dll

When applying network properties through an answer file for a NetXtreme II device where the PnP iD is the identifier, as follows:

For a BCM5709C NetXtreme II GigE - Infd =
"b06bdrv\l2nd&pci_163914e4"

For a BCM5709S Netxtreme II GigE - Infd =
"b06bdrv\l2nd&pci_163a14e4"

Currently, the PCI location (PCI bus, device, and function numbers) method is not supported for the NetXtreme II device as an identifier or the adapter in the answer file due to a limitation with the Windows operating system.

Solving Broadcom Boot Agent and Broadcom Advanced Server Program (BASP) Issues

This section discusses issues with the Broadcom Boot Agent and Broadcom Advanced Server (BASP) as well as provides solutions.

Problem: Unable to obtain network settings through DHCP using PXE.

Solution: For proper operation make sure that the Spanning Tree Protocol (STP) is disabled or that portfast mode (for Cisco) is enabled on the port to which the PXE client is connected. For instance, set spantree portfast 4/12 enable.

Problem: A BASP team in Windows 2003 may not function properly if a team member driver property is modified.

Solution: Due to a limitation in Windows 2003, the features of team members should remain static during the entire life of the team. To change the characteristics of a team member, remove the team member from the team, modify the team member, and then the adapter to the team again. This limitation does not exist in Windows 2008.

Problem: A system containing an 802.3ad team causes a Netlogon service failure in the system event log and prevents it from communicating with the domain controller during boot up.

Solution: Microsoft Knowledge Base Article 326152 (<http://support.microsoft.com/kb/326152/en-us>) indicates that Gigabit Ethernet adapters may experience problems with connectivity to a domain controller due to link fluctuation while the driver initializes and negotiates link with the network infrastructure. The link negotiation is further affected when the Gigabit adapters are participating in an 802.3ad team due to the additional negotiation with a switch required for this team type. As suggested in the Knowledge Base Article above, disabling media sense as described in a separate Knowledge Base Article 239924 (<http://support.microsoft.com/kb/239924/>) has shown to be a valid workaround when this problem occurs.

Problem: The 802.3ad team member links disconnect and reconnect continuously (applies to all operating systems).

Solution: This is a third-party issue. It is seen only when configuring an 802.3ad team with more than two members on the server and connecting an HP2524 switch, with LACP enabled as passive or active. The HP switch shows an LACP channel being brought up successfully with only two team members. All other team member links disconnect and reconnect. This does not occur with a Cisco Catalyst 6500.

Problem: A Generic Trunking (GEC/FEC) 802.3ad-Draft Static type of team may lose some network connectivity if the driver to a team member is disabled.

Solution: If a team member supports underlying management software (ASF/IPMI/UMP) or Wake-On-LAN, the link may be maintained on the switch for the adapter despite its driver being disabled. This may result in the switch continuing to pass traffic to the attached port rather than route the traffic to an active team member port. Disconnecting the disabled adapter from the switch allows traffic to resume to the other active team members.

Problem: Large Send Offload (LSO) and Checksum Offload are not working on my team.

Solution: If one of the adapters on a team does not support LSO, LSO does not function for the team. Remove the adapter that does not support LSO from the team or replace it with one that does. This same solution applies to Checksum Offload.

Problem: The advanced properties of a team do not change after changing the advanced properties of an adapter that is a member of the team.

Solution: If an adapter is included as a member of a team and you change any advanced property, then you must rebuild the team to ensure that the team's advanced properties are properly set.

Problem: Errors occur when an RSS-enabled adapter is included as a member of a team on Windows Server 2003 and Windows Server 2008 systems.

Solution: Disable RSS from all members of the team and rebuild the team.

Solving Miscellaneous Issues

This section presents issues and provides solutions for a variety of driver software issues.

Problem: Although installed, the Broadcom Advanced Control Suite 3 (BACS) application does not start and an error message appears.

Solution: .NET Framework 2.0 is required for BACS 3 to operate. Install .NET Framework 2.0.

Problem: Broadcom Advanced Control Suite 3 takes a long time to start up.

Solution: This is a limitation of .NET Framework 2.0. Apply .NET Framework 2.0 SP1 and reboot your system.

Problem: The Broadcom NetXtreme II adapter may not perform at optimal levels on some systems if it is added after the system has booted.

Solution: The system BIOS in some systems does not set the cache line size and the latency timer if the adapter is added after the system has booted. Reboot the system after the adapter has been added.

Problem: Intelligent Platform Management Interface (IPMI) is not functioning properly.

Solution: IPMI works only when LiveLink™ is disabled. See “Configuring LiveLink for a Smart Load Balancing and Failover and SLB (Auto-Fallback Disable) Team” in the *Broadcom Advanced Control Suite 3 User Guide*.

Problem: Cannot configure Resource Reservations in BACS 3 after SNP is uninstalled.

Solution: Reinstall SNP. Prior to uninstalling SNP from the system, ensure that NDIS is enabled via the checkbox on the Resource Configuration screen, available from the Resource Reservations section of the Configurations tab (see Viewing Resource Reservations in the *Broadcom Advanced Control Suite 3 User Guide*). If NDIS is disabled and SNP is removed, there is no access to re-enable the device.

Problem: TOE performance is more susceptible to packet loss when flow control is disabled.

Solution: Enable flow control to reduce the number of packets lost.

Problem: A DCOM error message (event ID 10016) appears in the System Event Log during the installation of the Broadcom adapter drivers.

Solution: This is a Microsoft issue. For more information, see Microsoft knowledge base KB913119 at <http://support.microsoft.com/kb/913119>.

Problem: Performance is degraded when multiple BCM57710 network adapters are used in a system.

Solution: Ensure that the system has at least 2 GB of main memory when using up to four network adapters and 4 GB of main memory when using four or more network adapters.

Chapter 9

User Diagnostics

This chapter provides user diagnostic information for the following platforms.

- ❑ “Introduction” on page 116
- ❑ “System Requirements” on page 117
- ❑ “Performing Diagnostics” on page 118
- ❑ “Diagnostic Test Descriptions” on page 121

Introduction

Broadcom NetXtreme II User Diagnostics is an MS-DOS based application that runs a series of diagnostic tests. These tests allow you to update device firmware as well as to view and change settings for available adapter properties.

To run Broadcom NetXtreme II User Diagnostics, you must create an MS-DOS 6.22 bootable disk containing the uxdiag.exe file. Next, start the system with the boot disk in drive A. See the following sections:

- ❑ For a list of system requirements to run the diagnostic tests, see “System Requirements” on page 117.
- ❑ For instructions how to run diagnostic tests on the AT-2973SX and the AT-2973T adapters, see “Performing Diagnostics” on page 118.
- ❑ For descriptions of the available diagnostic tests, see “Diagnostic Test Descriptions” on page 121.

System Requirements

The following system requirements are needed to run user diagnostics:

- ☐ MS-DOS 6.22 Operating System
- ☐ uxdiag.exe file

Performing Diagnostics

At the MS-DOS prompt, type `uxdiag` followed by the command options.

The `uxdiag` command options are shown in Table 7. For example, to run all diagnostic tests except Group B tests on adapter #1, enter the following command:

```
C:\>uxdiag -c 1 -t b
```

Note

You must include **uxdiag** at the beginning of the command string each time you type a command.

Table 7. `uxdiag` Command Options

Command Options	Description
<code>uxdiag</code>	Performs all tests on all Broadcom NetXtreme II adapters in your system.
<code>uxdiag -c <devnum></code>	Specifies the adapter (devnum) to test. Use all in place of a specific device number to test all adapters.
<code>uxdiag -cof</code>	Allows tests to continue after detecting a failure.
<code>uxdiag -F</code>	Forces an upgrade of the image without checking the version.
<code>uxdiag -fbc <bc_image></code>	Specifies the bin file to update the bootcode.
<code>uxdiag -fib <ib_image></code>	Specifies the bin file for iSCSI boot.
<code>uxdiag -fibc</code>	Programs the iSCSI configuration block. Used only with <code>-fib <ib_image></code> .
<code>uxdiag -fibp</code>	Programs the iSCSI configuration software. Used only with <code>-fib <ib_image></code> .
<code>uxdiag -fipmi <ipmi_image></code>	Specifies the bin file to update IPMI firmware.
<code>uxdiag -fmba <mba_image></code>	Specifies the bin file to update the MBA.
<code>uxdiag -fncsi <ncsi_image></code>	Specifies the bin file to update the NCSI firmware.

Table 7. uxdiag Command Options (Continued)

Command Options	Description
uxdiag -fnvm <raw_image>	Programs the raw image into NVM.
uxdiag -fump <ump_image>	Specifies the bin file to update UMP firmware.
uxdiag -help	Displays the Broadcom NetXtreme II User Diagnostics (uxdiag) command options.
uxdiag -l <iteration num>	Specifies the number of iterations to run on the selected tests.
uxdiag -idmatch	Enables matching of VID, DID, SVID, and SSID from the image file with device IDs. Used only with -fnvm <raw_image>.
uxdiag -log <file>	Logs the test results to a specified log file.
uxdiag -mba <1/0>	Enables/disables Multiple Boot Agent (MBA) protocol where: 1 = Enable 0 = Disable
uxdiag -mbap <n>	Sets the MBA boot protocol where: 0 = PXE 1 = RPL 2 = BOOTP 3 = iSCSI_Boot
uxdiag -mbas <n>	Sets the MBA/PXE speed where: 0 = Auto 1 = 10H 2 = 10F 3 = 100H 4 = 100F 6 = 1000F
uxdiag -mbav <1 0>	Enables/disables MBA VLAN. 1 = Enable 0 = Disable
uxdiag -mbavval <n>	Sets MBA VLAN (<65536>).
uxdiag -mfw <1/0>	Enables/disables management firmware where: 1 = Enable 0 = Disable

Table 7. uxdia Command Options (Continued)

Command Options	Description
uxdiag -t <groups/tests>	Disables certain groups or tests.
uxdiag -T <groups/tests>	Enables certain groups or tests.
uxdiag -ver	Displays the version of Broadcom NetXtreme II User Diagnostics (uxdiag) and all installed adapters.
uxdiag -wol <1/0>	Enables/disables Magic Packet WOL where: 1 = Enable 0 = Disable

Diagnostic Test Descriptions

The diagnostic tests are divided into four groups:

- ☐ Basic Functional Tests (Group A)
- ☐ Memory Tests (Group B)
- ☐ Block Tests (Group C)
- ☐ Ethernet Traffic Tests (Group D).

The diagnostic tests are listed and described in Table 8

Table 8. Diagnostic Tests

Test		Description
Number	Name	
Group A: Basic Functional Tests		
A1	Register	Verifies that registers accessible through the PCI/PCI-E interface implement the expected read-only or read/write attributes by attempting to modify those registers.
A2	PCI Configuration	Checks the functionality of the PCI Base Address Register (BAR) by varying the amount of memory requested by the BAR and verifying that the BAR actually requests the correct amount of memory (without actually mapping the BAR into system memory). Refer to PCI or PCI-E specifications for details on the BAR and its addressing space.
A3	Interrupt	Generates a PCI interrupt and verifies that the system receives the interrupt and invokes the correct ISR. A negative test is also performed to verify that a masked interrupt does not invoke the ISR.
A5	MSI	Verifies that a Message Signaled Interrupt (MSI) causes an MSI message to be DMA'd to host memory. A negative test is also performed to verify that when an MSI is masked, it does not write an MSI message to host memory.
A6	Memory BIST	Invokes the internal chip Built-In Self Test (BIST) command to test internal memory.

Table 8. Diagnostic Tests (Continued)

Test		Description
Number	Name	
Group B: Memory Tests		
B1	TXP Scratchpad	The Group B tests verify all memory blocks of the Broadcom NetXtreme II adapter by writing various data patterns (0x55aa55aa, 0xaa55aa55, walking zeroes, walking ones, address, etc.) to each memory location, reading back the data, and then comparing it to the value written. The fixed data patterns are used to ensure that no memory bit is stuck high or low, while the walking zeroes/ones and address tests are used to ensure that memory writes do not corrupt adjacent memory locations.
B2	TPAT Scratchpad	
B3	RXP Scratchpad	
B4	COM Scratchpad	
B5	CP Scratchpad	
B6	MCP Scratchpad	
B7	TAS Header Buffer	
B8	TAS Payload Buffer	
B9	RBUF via GRC	
B10	RBUF via Indirect Access	
B11	RBUF Cluster List	
B12	TSCH List	
B13	CSCH List	
B14	RV2P Scratchpads	
B15	TBDC Memory	
B16	RBDC Memory	
B17	CTX Page Table	
B18	CTX Memory	
Group C: Block Tests		
C1	CPU Logic and DMA Interface	Verifies the basic logic functionality of all the on-chip CPUs. It also exercises the DMA interface exposed to those CPUs. The internal CPU tries to initiate DMA activities (both read and write) to system memory and then compares the values to confirm that the DMA operation completed successfully.

Table 8. Diagnostic Tests (Continued)

Test		Description
Number	Name	
C2	RBUF Allocation	Verifies the RX buffer (RBUF) allocation interface by allocating and releasing buffers and checking that the RBUF block maintains an accurate count of the allocated and free buffers.
C3	CAM Access	Verifies the content-addressable memory (CAM) block by performing read, write, add, modify, and cache hit tests on the CAM associative memory.
C4	TPAT Cracker	Verifies the packet cracking logic block (that is, the ability to parse TCP, IP, and UDP headers within an Ethernet frame) as well as the checksum/CRC offload logic. In this test, packets are submitted to the chip as if they were received over Ethernet and the TPAT block cracks the frame (identifying the TCP, IP, and UDP header data structures) and calculates the checksum/CRC. The TPAT block results are compared with the values expected by Broadcom NetXtreme II User Diagnostics and any errors are displayed.
C5	FIO Register	The Fast IO (FIO) verifies the register interface that is exposed to the internal CPUs.
C6	NVM Access and Reset-Corruption	Verifies non-volatile memory (NVM) accesses (both read and write) initiated by one of the internal CPUs. It tests for appropriate access arbitration among multiple entities (CPUs). It also checks for possible NVM corruption by issuing a chip reset while the NVM block is servicing data.
C7	Core-Reset Integrity	Verifies that the chip performs its reset operation correctly by resetting the chip multiple times, checking that the bootcode and the internal uxdiag driver loads/unloads correctly.

Table 8. Diagnostic Tests (Continued)

Test		Description
Number	Name	
C8	DMA Engine	Verifies the functionality of the DMA engine block by performing numerous DMA read and write operations to various system and internal memory locations (and byte boundaries) with varying lengths (from 1 byte to over 4 KB, crossing the physical page boundary) and different data patterns (incremental, fixed, and random). CRC checks are performed to ensure data integrity. The DMA write test also verifies that DMA writes do not corrupt the neighboring host memory.
C9	VPD	Exercises the Vital Product Data (VPD) interface using PCI configuration cycles. You must program a proper bootcode is programmed into the non-volatile memory. If no VPD data is present (that is, the VPD NVM area is all 0s), the test first initializes the VPD data area with non-zero data before starting the test and restores the original data after the test completes.
C11	FIO Events	Verifies that the event bits in the CPU's Fast IO (FIO) interface are triggering correctly when a particular chip events occur, such as a VPD request initiated by the host, an expansion ROM request initiated by the host, a timer event generated internally, toggling any GPIO bits, or accessing NVM.
Group D: Ethernet Traffic Tests		
D1	MAC Loopback	Enables MAC loopback mode in the adapter and transmits 5000 Layer 2 packets of various sizes. As the packets are received by Broadcom NetXtreme II User Diagnostics, they are checked for errors. Packets are returned through the MAC receive path and never reach the PHY. The adapter should not be connected to a network.

Table 8. Diagnostic Tests (Continued)

Test		Description
Number	Name	
D2	PHY Loopback	Enables PHY loopback mode in the adapter and transmits 5000 Layer 2 packets of various sizes. As the packets are received by Broadcom NetXtreme II User Diagnostics, they are checked for errors. Packets are returned through the PHY receive path and never reach the wire. The adapter should not be connected to a network.
D4	LSO	Verifies the functionality of the adapter's Large Send Offload (LSO) support by enabling MAC loopback mode and transmitting large TCP packets. As the packets are received by Broadcom NetXtreme II User Diagnostics, they are checked for proper segmentation (according to the selected MSS size) and any other errors. The adapter should not be connected to a network.
D5	EMAC Statistics	Verifies that the basic statistics information maintained by the chip is correct by enabling MAC loopback mode and sending Layer 2 packets of various sizes. The adapter should not be connected to a network.
D6	RPC	Verifies the Receive Path Catch-up (RPC) block by sending packets to different transmit chains. The packets traverse the RPC logic (though not the entire MAC block) and return to the receive buffers as received packets. This is another loopback path that is used by Layer 4 and Layer 5 traffic within the MAC block. As packets are received by Broadcom NetXtreme II User Diagnostics, they are checked for errors. The adapter should not be connected to a network.

Appendix A

Specifications

Physical Specifications

This section provides the dimensions and weight of the adapters.

Dimensions: AT-2973SX: 14.47 cm x 5.61 cm (5.7 in. x 2.2 in.)
 AT-2973T: 14.47 cm x 5.61 cm (5.7 in. x 2.2 in.)

Weight: AT-2973SX: 68.0 g (.15 lbs.)
 AT-2973T: 68.0 g (.15 lbs.)

Environmental Specifications

The following environmental specifications apply to both the AT-2973SX and AT-2973T adapters:

Operating Temperature: 0°C to 50°C (+32°F to +122°F)
Storage Temperature: -20°C to +70°C (-4°F to +158°F)
Operating Humidity: 30% to 80% (noncondensing)
Storage Humidity: 10% to 95% (noncondensing)
Maximum Operating Altitude: 10,000
Maximum Storage Altitude 35,000 ft.

Power Specifications

The following power specifications apply to both the AT-2973SX and AT-2973T adapters:

Operating Voltage: 3.3V
Power Consumption: AT-2973SX: 5.28 Watts, @ +3.3V
 AT-2973T: 4.1 Watts, @ +3.3V

Performance Specifications

The following performance specifications apply to both the AT-2973SX and AT-2973T adapters:

x4 PCIe v2.0 and v1.1 compliant

Operating Specifications

The following operating specifications apply to the AT-2973SX adapter:

Output Optical Power: -9.5 dBm minimum to -1.5 dBm maximum

Input Optical Power: -17 dBm

Receive Sensitivity: -12.5 dBm with 62.5 um fiber or
-13.5 dBm with 50 um fiber

10/100/1000Base-T Twisted-Pair Port Connectors

This section lists the pin signals for the 10/100/1000Base-T twisted-pair ports for the AT-2973T adapter. Figure 17 illustrates the pin layout to an RJ-45 connector and port.

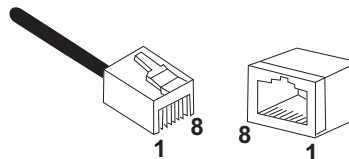


Figure 17. RJ-45 Connector and Port Pin Layout

Table 9 lists the RJ-45 pin signals when a twisted-pair port is operating in the MDI configuration.

Table 9. MDI Pin Signals (10Base-T or 100Base-TX)

Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-

Table 10 lists the RJ-45 port pin signals when a twisted-pair port is operating in the MDI-X configuration.

Table 10. MDI-X Pin Signals (10Base-T or 100Base-TX)

Pin	Signal
1	RX+
2	RX-
3	TX+
6	TX-

Table 11 lists the RJ-45 connector pins and their signals when a 1000Base-T port is operating at 1000 Mbps.

Table 11. RJ-45 1000Base-T Connector Pinouts^a

Pin	Pair	Signal
1	1	TX and RX+
2	1	TX and RX-
3	2	TX and RX+
4	3	TX and RX+
5	3	TX and RX-
6	2	TX and RX-
7	4	TX and RX+
8	4	TX and RX-

a. Bi-directional data on each pair.

Console Port Pinouts

Table 12 lists the pin signals on the RJ-45 style serial terminal port for the AT-2973T adapter.

Table 12. Console Port Pinouts

Pin	Signal
4	Ground
3	Transmit Data
6	Receive Data
7	No Connection
5	Ground
2	No Connection
8	No Connection
1	No Connection

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 18 shows the ferrule in an SC connector.

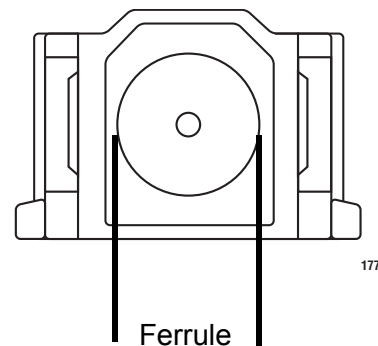


Figure 18. Ferrule in an SC Connector Plug

Figure 19 shows part of the end face of an unclean and clean ferrule.

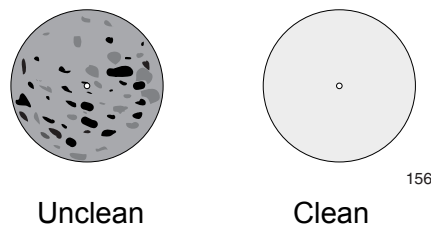


Figure 19. Unclean and Clean Ferrule

This appendix provides the following procedures

- ❑ “Using a Cartridge-Type Cleaner” on page 132
- ❑ “Using a Swab” on page 134

Using a Cartridge-Type Cleaner

Fiber optic cartridge cleaners are available from many vendors and are typically called “cartridge cleaners,” as shown in Figure 20.



Figure 20. 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, perform the following procedure.

5. 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 21.
6. Place the ferrule tip on the exposed cleaning surface and rub the ferrule in a downward direction, as shown in Figure 21.

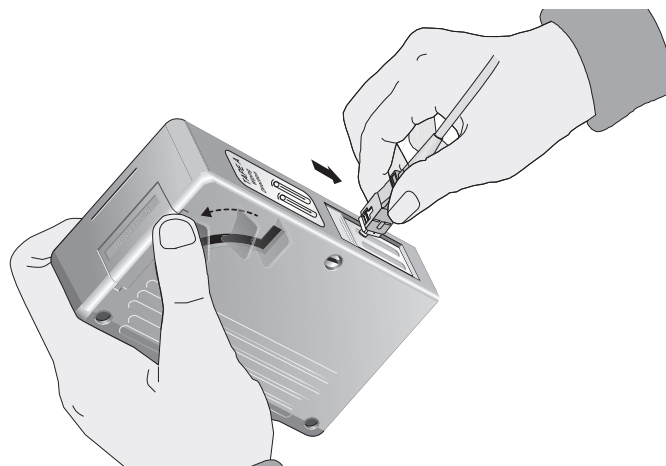


Figure 21. Rubbing the Ferrule Tip on the Cleaning Surface

Note

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

7. 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.

8. If desired, repeat steps 3 and 4.
9. If a fiber inspection scope is available, use the scope to inspect the ferrule end face to make sure that it is clean.
10. 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.



Warning

Do not stare into the laser beam. ⚠ 2



Warning

Do not look directly at the cable ends or inspect the cable ends with an optical lens. ⚠ 31

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 22. 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.

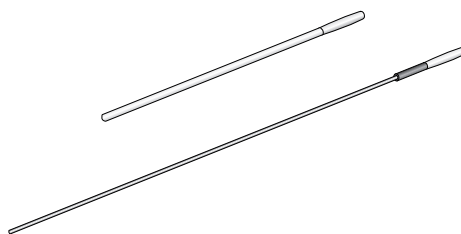


Figure 22. Lint-Free and Alcohol-Free Swabs

Note

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

To clean a recessed ferrule using a swab, perform the following procedure.

1. Insert the swab into the adapter as shown in Figure 21 and rub the ferrule tip with the swab.

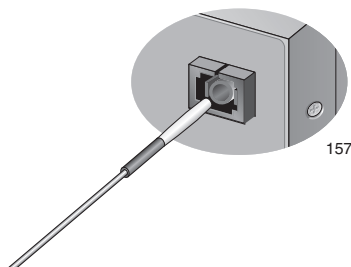


Figure 23. Cleaning a Recessed Ferrule

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.



Warning

Do not stare into the laser beam. ⚠ 2



Warning

Do not look directly at the cable ends or inspect the cable ends with an optical lens. ⚠ 31
