Broadcom Advanced Control Suite: Broadcom Gigabit Ethernet Adapter U

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Broadcom Advanced Control Suite: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

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Overview

Broadcom Advanced Control Suite (BACS) is an integrated graphical user interface application that provides the following functions:

Vital Sign – at–a–glance status reports of all LAN adapters/controllers in your systems

Diagnostics – a comprehensive diagnostic for Broadcom NetXtreme™ Gigabit Ethernet controllers

Cable Analysis – an in depth analysis on CAT5 cable characterization performed by the Broadcom NetXtreme™ Gigabit Ethernet controller

Load Balance/Virtual LAN – an easy way to configure the load balance and failover by grouping multiple adapters/controller

Statistics – a detailed performance statistics on each selected adapter/controller

The Broadcom Advanced Control Suite is designed to run in one of the following 32–bit Windows operating systems:

- Microsoft® Windows® 2000
- Microsoft® Windows® NT 4.0 (Note: BACS Help files require Internet Explorer 5.0 or later to work properly.)
- Microsoft® Windows® .NET

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To configure the load balance, failover, and VLAN, use BACS or the Broadcom Advanced Server Program (BASP). Using BASP is the preferred method during installation, where BACS is more suitable for use after installation.

Installing the Broadcom Advanced Control Suite

The Broadcom Advanced Control Suite (BACS) can be installed from the Broadcom CD–ROM, or by using the silent install option.

Silent Installation

Broadcom recommends that you copy the installation files to your hard disk before running the silent install. This is because the *setup /s* command automatically generates a setup.log file in the directory it is run from. When the silent install is run from the CD, it cannot generate this log file, and the setup install fails.

1. Copy the the MgmtApps directory from the Broadcom CD–ROM to your hard disk.
2. From a DOS window, type `setup /s`. This installs the BACS software.

> *NOTE – If the silent install MUST be run from the CD, the command . . . setup /s /f2"c:\setup.log" . . . will target c:\ for an alternative log file location.*

CD–ROM Installation

> *NOTE – Before installing on Windows 2000 Advanced Server with Terminal Services, the command "change user /install" must be issued, otherwise an error will occur.*

1. Insert the Broadcom CD–ROM into your system's CD–ROM drive.
2. Open the Control Suite folder on the CD and double–click **setup.exe**. The Broadcom Management Programs Setup screen will appear.
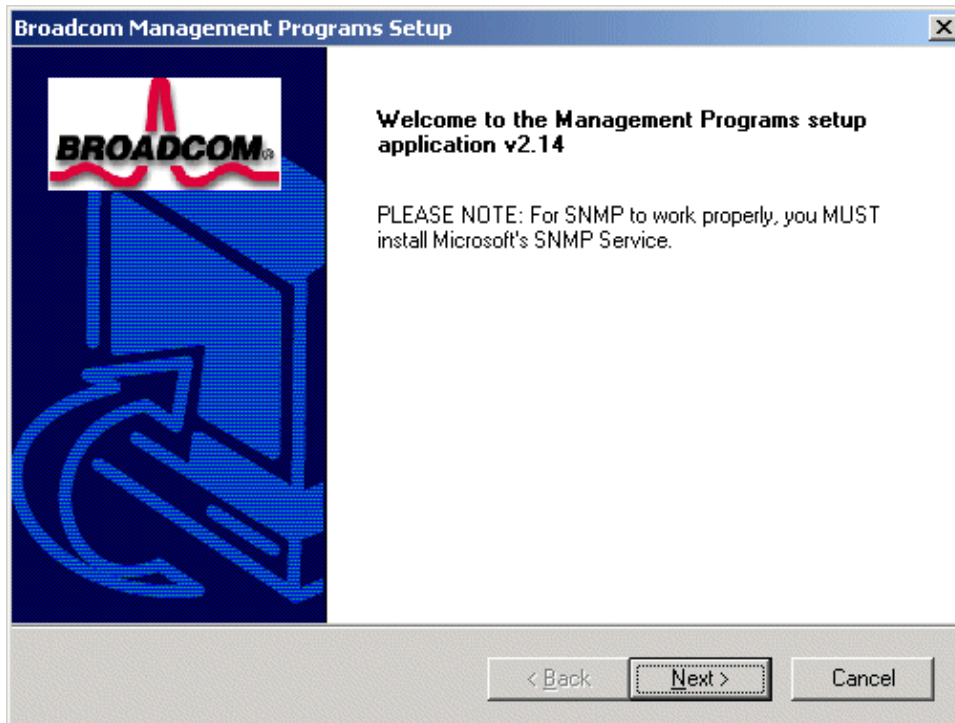
3. Click **Next**. The License Agreement will appear.
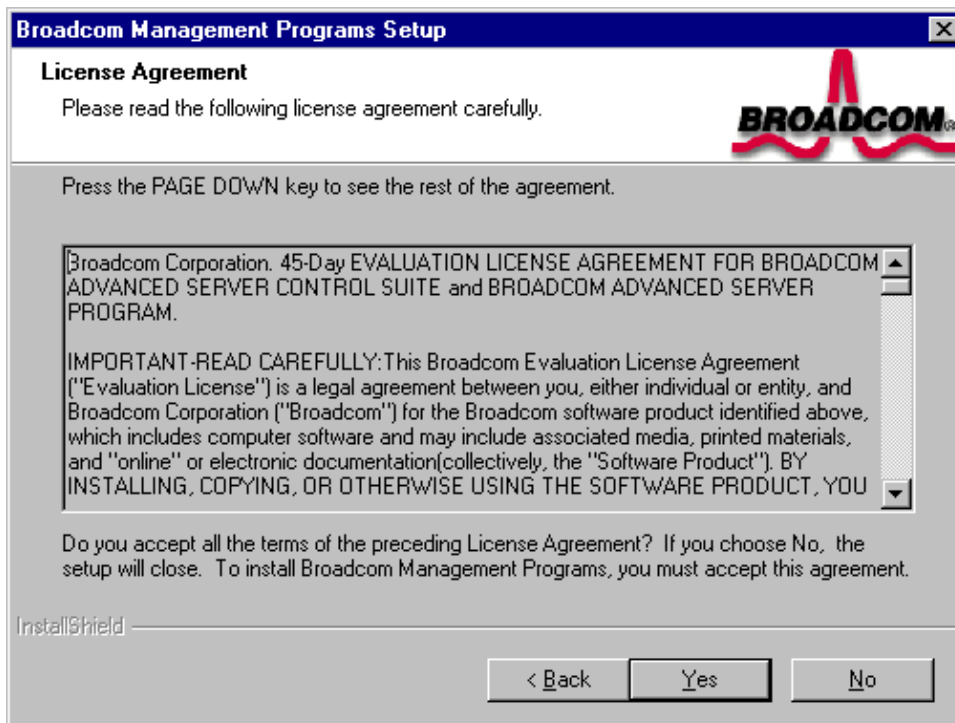
4. Read the agreement and click **Yes**. The Select Components screen will appear. Three installation selections are possible from this screen: Control Suite, SNMP Service, and CIM Provider.

    Control Suite – Check this box to install the Advanced Server Control Suite.
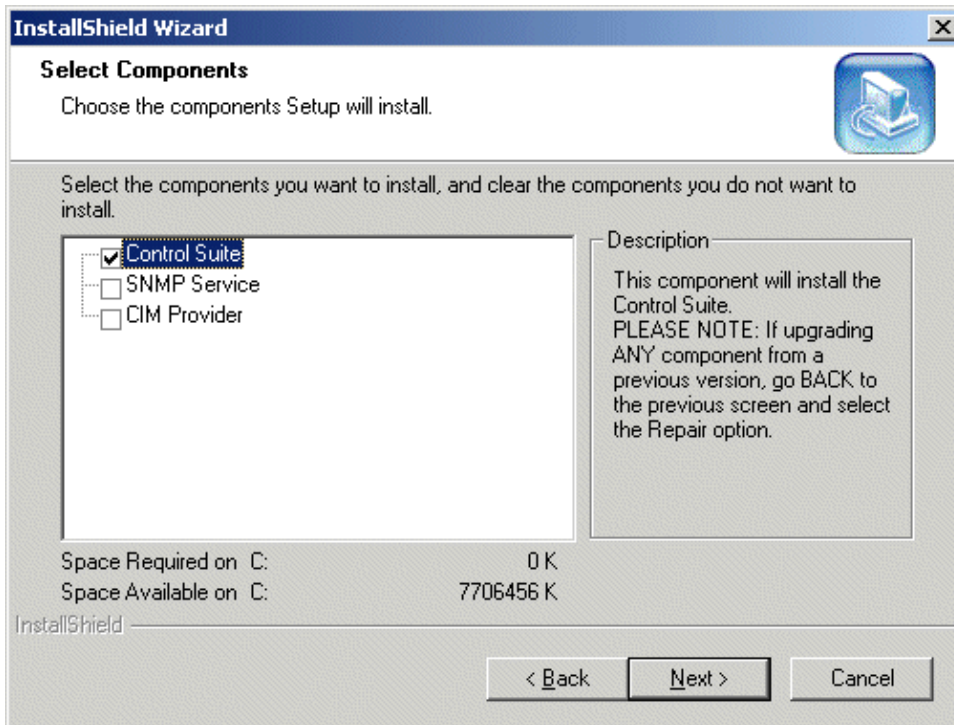
SNMP Service – Check this box to install the Advanced Server SNMP sub–agent.

NOTE – The Microsoft SNMP Service must be running for this component to function properly.
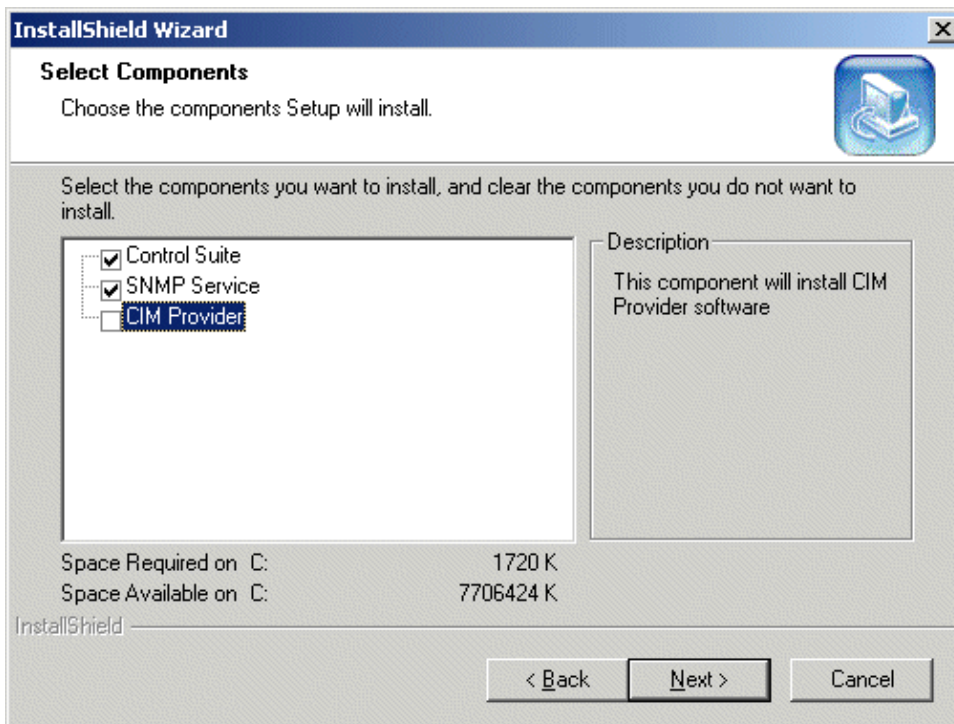
CIM Provider – Check this box to install the CIM Provider.
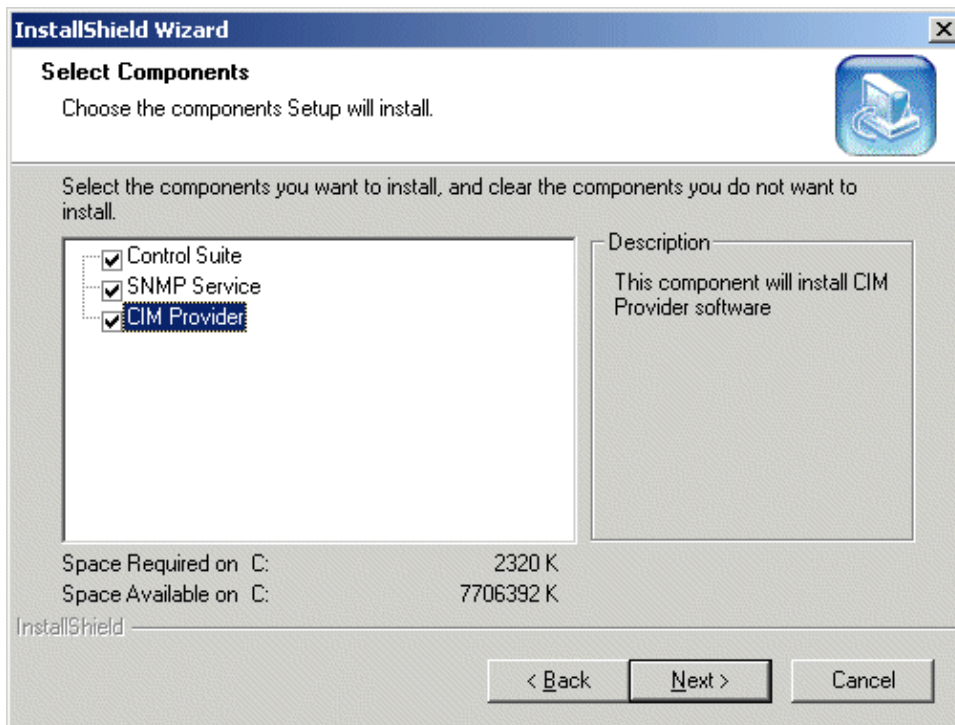
5. Click **Next**. The selected program(s) will be installed.
6. Click **Yes** to install the Broadcom Advanced Server Program (BASP) driver.
7. Click **No** if BASP teaming software is not required.
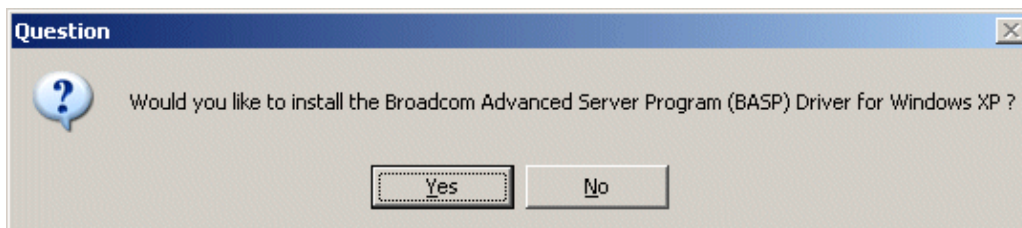
8. When complete, an information screen as shown below will notify you that the files were successfully installed.
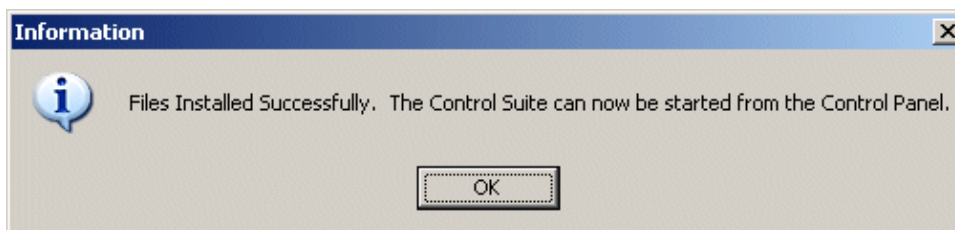
9. Click **OK** and reboot to complete the installation.

The Control Suite can be started from the Control Panel by double−clicking the **Broadcom NetXtreme™ Gigabit Ethernet** icon.
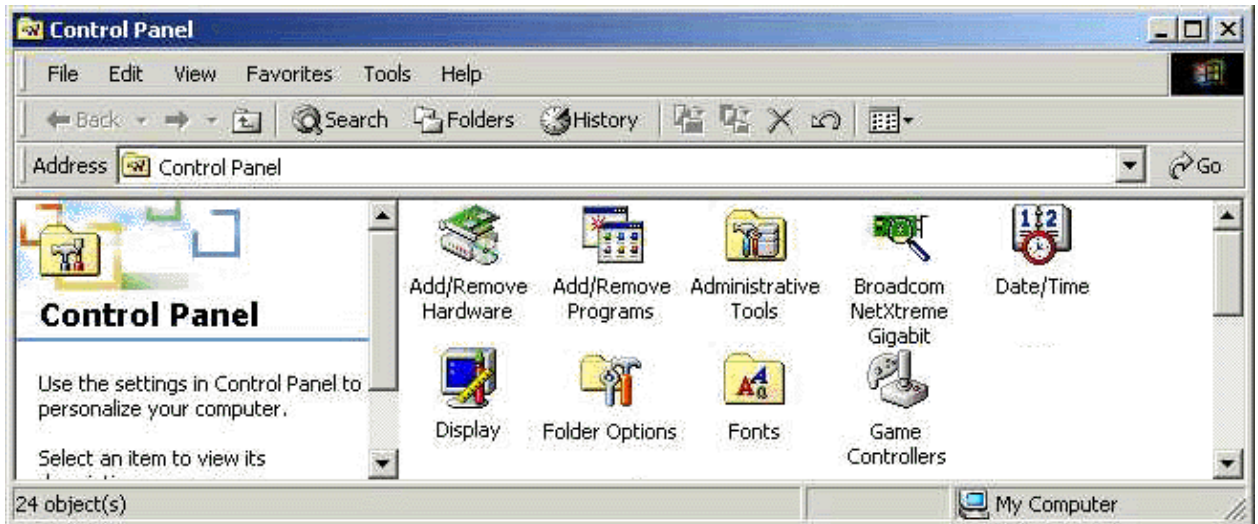
Removing the Broadcom Advanced Control Suite

To remove the Broadcom Advanced Control Suite (BACS) software, perform the following:

1. From the Windows Control Panel, double−click **Add/Remove Programs**.
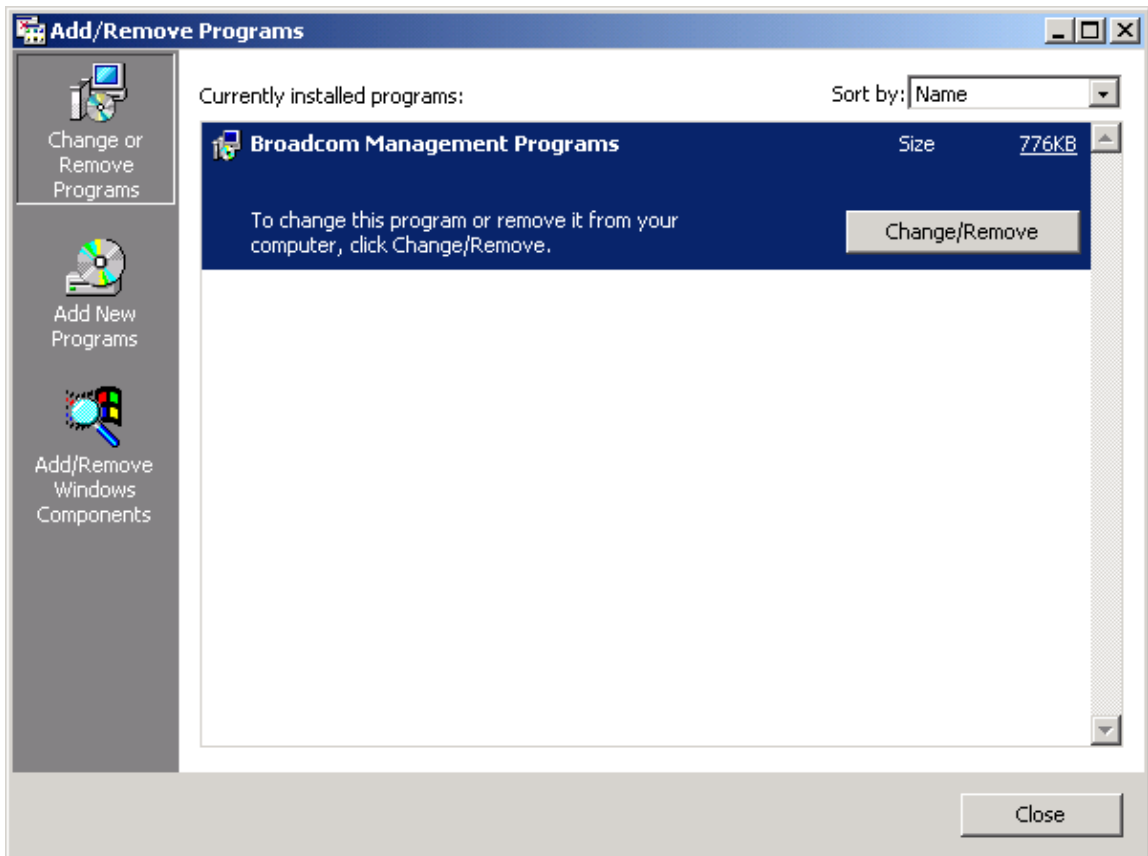
2. At the Add/Remove window, select "Broadcom Management Programs" and click
   Add/Remove. The InstallShield Wizard screen will appear.
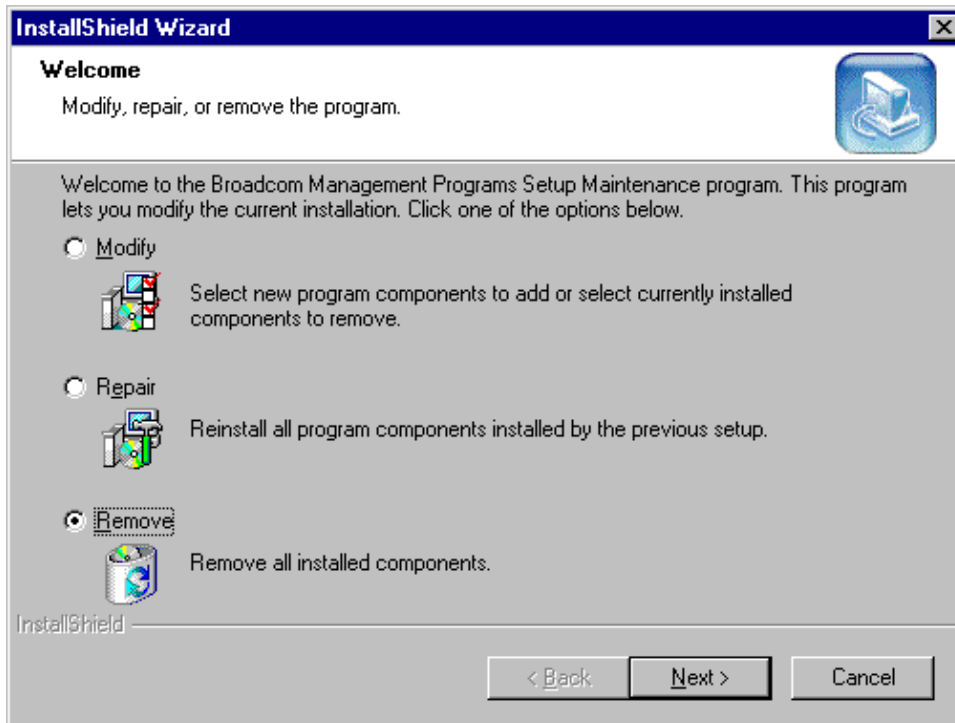
3. Click the **Remove** radio button and click **Next**. The Confirm File Deletion screen will appear.
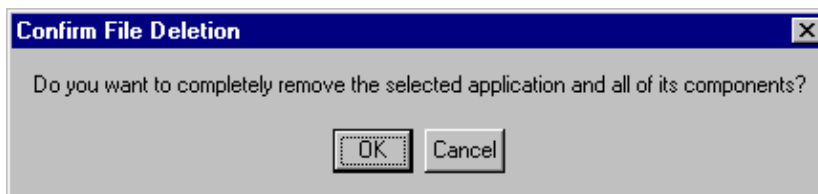
4. Click **OK**. An information screen will appear confirming the update.
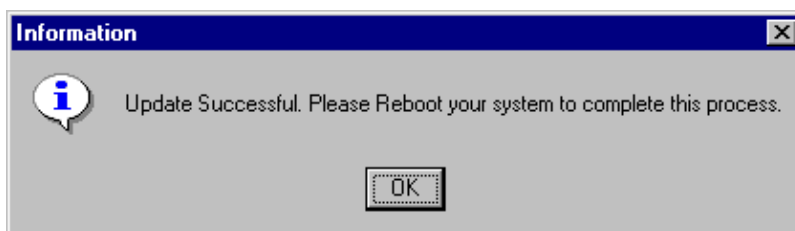
5. Reboot your system to complete the BASC removal.

Initializing the Broadcom Advanced Control Suite

To initialize the Broadcom Advanced Control Suite (BACS) software, do the following:

NOTE – The Broadcom NetXtreme™ Gigabit Ethernet Adapter must be enabled before initializing the BACS. Refer to "Installing the Driver Software" for the operating system that you are using.

1. Click **Start** button, click **Settings**, then click **Control Panel**.
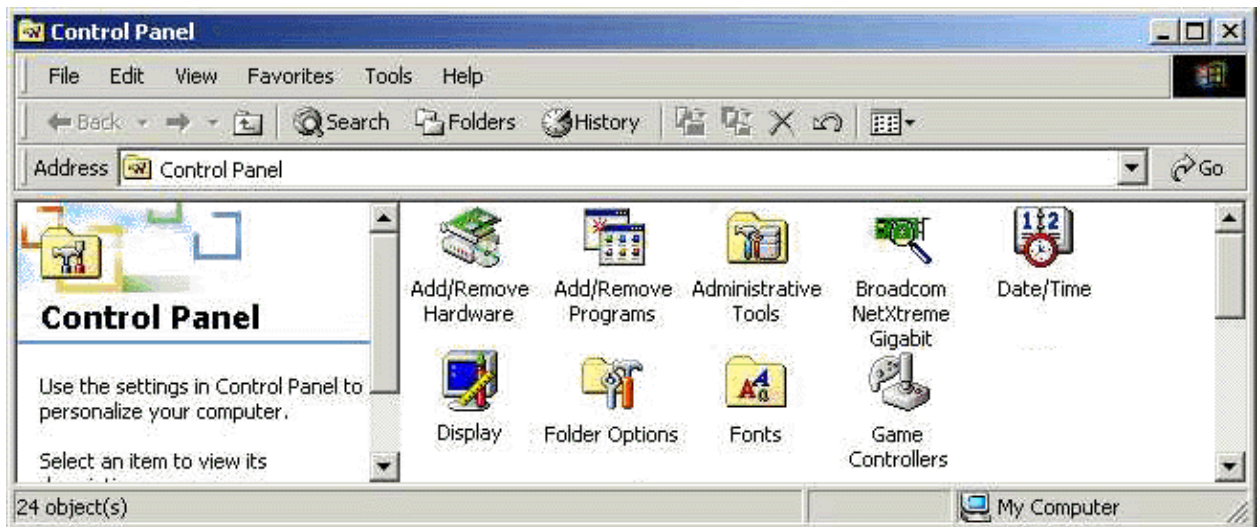
2. Double click the **Broadcom NetXtreme™ Gigabit Ethernet** icon.

Vital Sign

The Vital Sign screen allows you to view vital adapter information, network status, and network connectivity. Active adapters are listed in the Installed Adapters window. When selected, vital sign information for that adapter is displayed.

NOTE – Information for Non–Broadcom adapters is less comprehensive than information listed for Broadcom adapters.
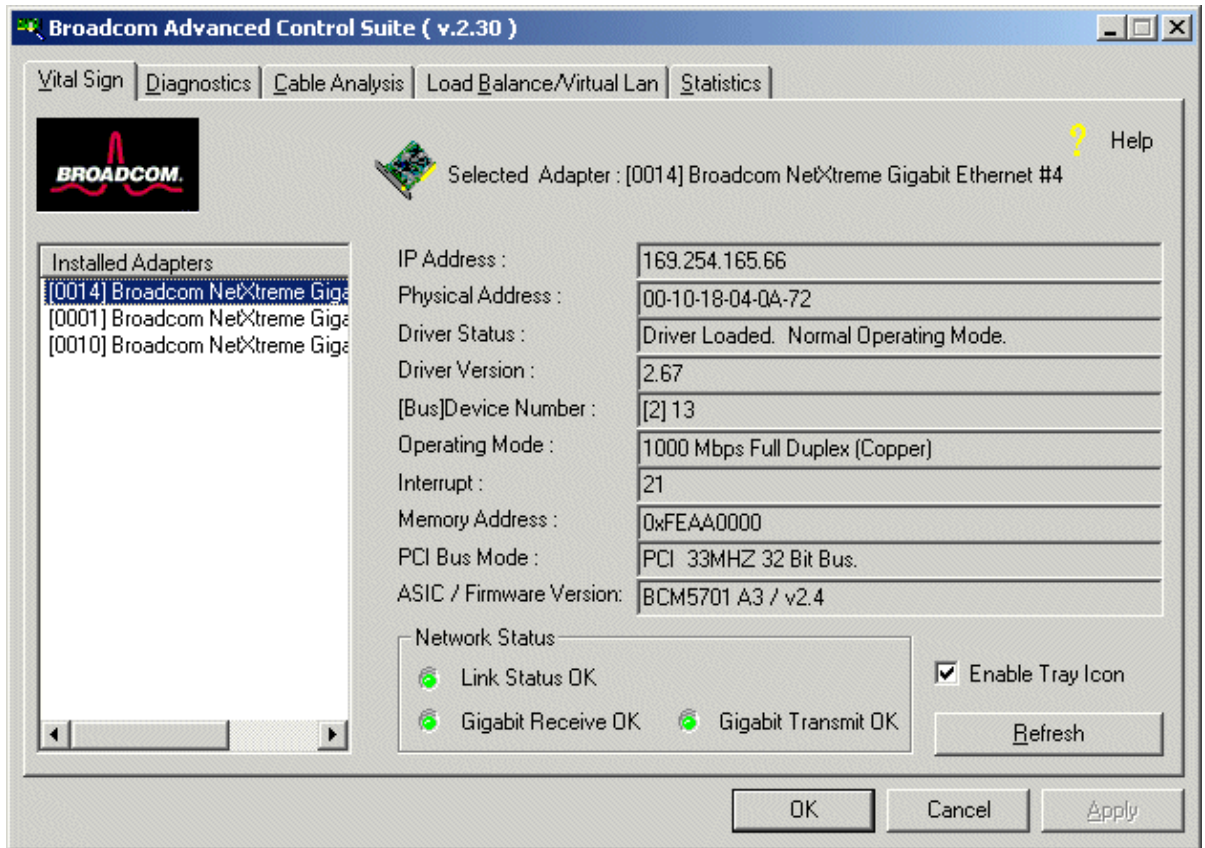
Interface components of the BACS Vital Sign window are described below:

- IP Address: This is a network address that is associated with the selected adapter. The all zeroed value of this parameter indicates the associated driver has not been bounded with Internet Protocol (IP).

- Physical Address: This is a physical MAC (Media Access Control) that is assigned to the selected adapter by the adapter's vendor. This parameter will never be zeroed.

- Driver Status: This parameter indicates the status of the driver that is associated with the selected adapter. The possible values for this parameter are:
  - ♦ Driver Loaded. Normal operating mode – The associated driver with the selected adapter was loaded by the windows operating system and is functioning.
  - ♦ Driver Not Loaded – The associated driver with the selected adapter has not been loaded by the windows operating system.
  - ♦ Information Not Available – This indicates the value is not obtainable from the driver that is associated with the selected adapter.

- Driver Version: This parameter indicates the current version of the software driver that is associated with the selected adapter.

- [Bus] Device Number: This parameter indicates the PCI bus number and the device number for the selected adapter.

  Example: [0] 14 indicates Broadcom adapter resides in PCI bus 0, device 14.

- Operating Mode: This parameter indicates the current operating mode of the adapter. The possible values are:
  - 10 Mbps Half Duplex
  - 10 Mbps Full Duplex
  - 100 Mbps Half Duplex
  - 100 Mbps Full Duplex
  - 1000 Mbps Full Duplex
- Interrupt: This parameter indicates the interrupt line number that is associated with the selected adapter. The valid number is ranged from (2 – 25).
- Memory Address: This parameter indicates the memory mapped address that is assigned to the selected adapter. This value can never be zero.
- PCI Bus Mode: This parameter indicates the type and mode of PCI bus slot that is occupied by the selected adapter. The possible values of this parameter are:
  - PCI 33 MHz 32 Bit Bus
  - PCI 33 MHz 64 Bit Bus
  - PCI 66 MHz 64 Bit Bus
  - PCI–X 100 MHz 64 Bit Bus
  - Unknown Clock Speed

- ASIC/Firmware Version: This field displays the Chip and Firmware versions of the selected Broadcom adapter.
- Network Status: This parameter provides overall status of the followings:
  - Link Status OK: is GREEN when there is a link established at 10, 100 or 1000 Mbps. RED indicates that a link is not established.
  - Gigabit Receive OK: indicates the selected adapter is able to receive data (gigabit only).
  - Gigabit Transmit OK: indicates the selected adapter is able to transmit data (gigabit only).

> *NOTE* – Only adapters with a 1000 Mbps link will light the Gigabit Receive OK and Gigabit Transmit OK LEDs.

> *NOTE* – Parameters (3 through 10) are not applicable on other vendor's adapters and these values are displayed as: Information Not Available.

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Diagnostics

The Diagnostics screen allows you to view information for Broadcom–only adapters. This function is used to test the physical adapter components.
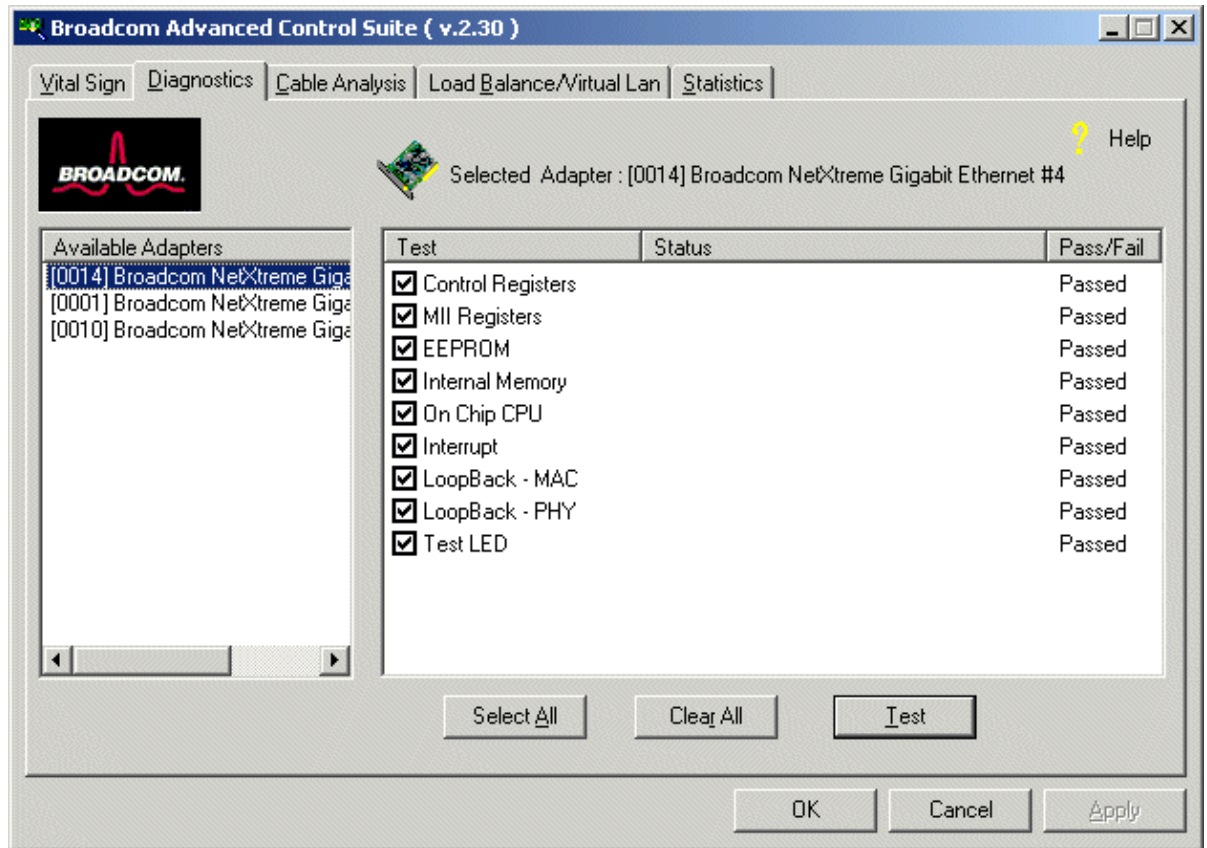
NOTE – Network connection will be lost when running these tests.

Interface components of the BACS Diagnostics window are described below:

- Control Register Test – This test verifies the read and write capabilities of the network controller registers by writing various values to the registers and verifying the result. The device driver uses these registers to perform network functions such as sending and receive information. If the test fails, the network adapter may not work properly.
- MII Register Test – This test verifies the read and write capabilities of the physical layer chip registers. The physical layer chip is used to control the electrical signals on the wire and for configuring network speed such 1000 Mbps
- EEPROM Test – This test verifies the content of the EEPROM by reading a portion of the EEPROM and computing the checksum. The test fails if the computed checksum is different than the checksum stored in the EEPROM. An EEPROM image upgrade will not require a code change for this test.
- Internal Memory Test – This tests verifies that the network controller internal memory is functioning properly. The test writes patterned values to the memory and reading back the results. The test fails if an erroneous value is read back. The network controller will not function without its internal memory.
- On Chip CPU Test – This test verifies the operation of the two internal CPUs in the network controller.

- Interrupt Test – This test verifies that the NDIS driver is able to receive interrupts from the network controller.
- MAC and PHY Loopback Test – This test verifies that the NDIS driver is able send packets and receive packets from the network controller.
- Test LED – This test blinks all LEDs five times to identify the adapter.

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Cable Analysis

From the Cable Analysis screen, the user can monitor conditions of an Ethernet CAT5 cable connection within a cable plant in an Ethernet network. The software measures the cable quality and compares it against the IEEE 802.3ab for compliance. Given a graphical environment, it can display the frequency–response characteristics of each cable pair.

The Cable Analysis screen allows you to display the "Gain vs. Frequency Characterization" feature.

NOTE – Network connection will be lost when running this test.

Length

The Length sub tab allows you to verify cable length and determine whether your configuration has the appropriate cable, which are calculated by a Return Loss algorithm. This utility allows you to determine whether the problem is with the adapter or in the cable plant.

1. From the Cable Analysis/Length screen, select the Broadcom adapter to be tested.
   The name and status of the selected adapter is displayed below. The status messages are as follows:
   - c0: Local Rx OK, remote Rx OK, Link up.
   - c1: Local Rx OK, remote Rx OK, Link up.
   - c2: Local Rx OK, remote Rx not OK.
   - c3: Remote Tx not transmitting or 1 pair broken.
   - c4: DFE/timing recovery not converging.
   - c5: PCS can not align.
   - c6: Intermittent link – marginal SNR or high BER.
   - c7: Intermittent link – marginal SNR or high BER.

2. Click **Initialize**, then click **Test** to display the status of the selected adapter.
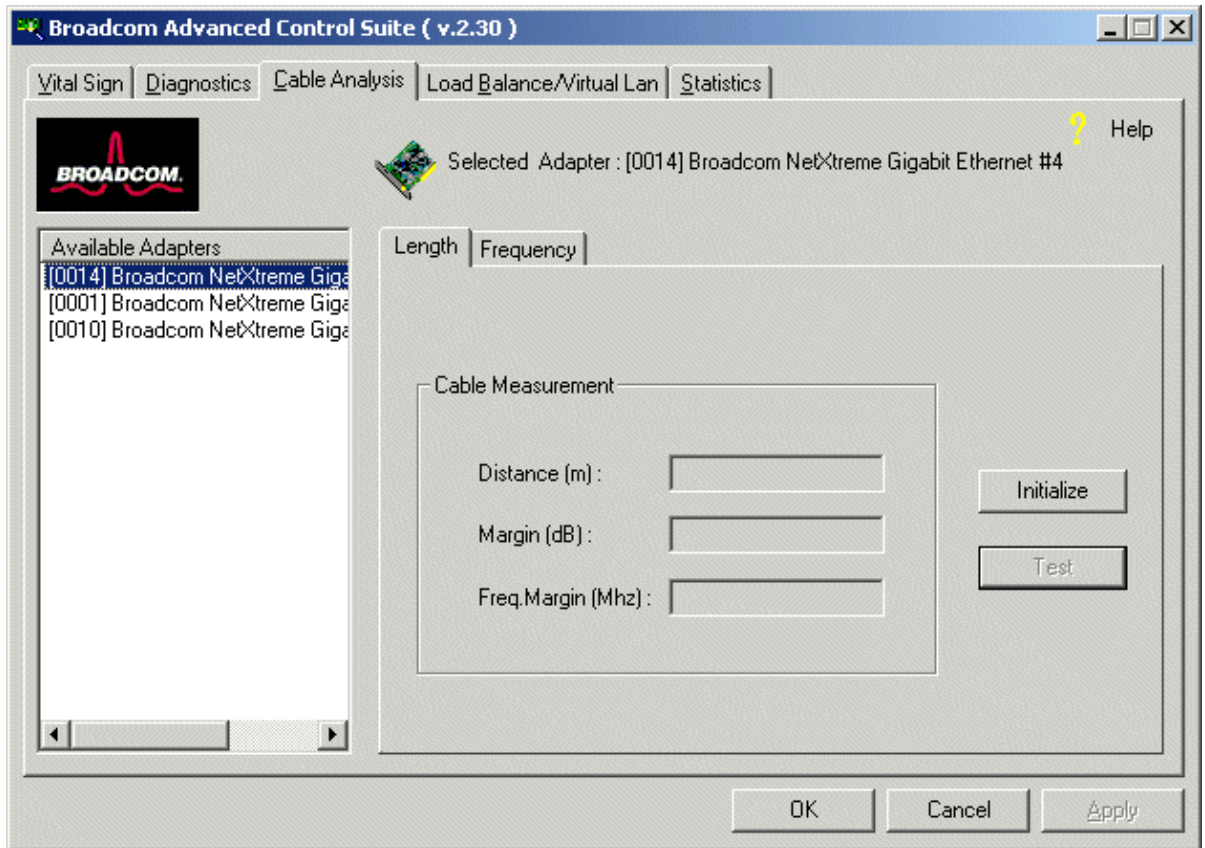
Interface components for the BACS Cable Analysis/Channel Pairs window are described below:

- **Distance**: This field presents the estimated cable length in meters by averaging all four channels using Return Loss algorithms.
- **Margin**: Margin yields the minimum distance between the measured cable pair and the maximum IEEE 802.3ab limits. The unit is in dB.
- **Frequency Margin**: This measures the minimum distance between the measured cable pair and the maximum IEEE 802.3ab limits in the frequency domain. The unit is in MHz.

Frequency

Each channel's frequency response is displayed based on the computation by the cable algorithms. The two graphs represent the values calculated by the Cable Loss and Return Loss algorithms. The vertical axis represents the gain in dB and the horizontal axis represents the operating frequency. The blue graph is the IEEE 802.3ab limit and the red graph is the actual computed values for a particular twisted pair. The two methods of measurement present the typical measurement standards to characterize the cable quality. It is important to take both measurements into consideration, as one result alone is not indicative of the characterization of the cable being tested.

1. From the Cable Analysis/Frequency screen, select the Broadcom adapter and channel to be tested.
2. Click **Initialize**, then click **Test** to display the status of the selected adapter.
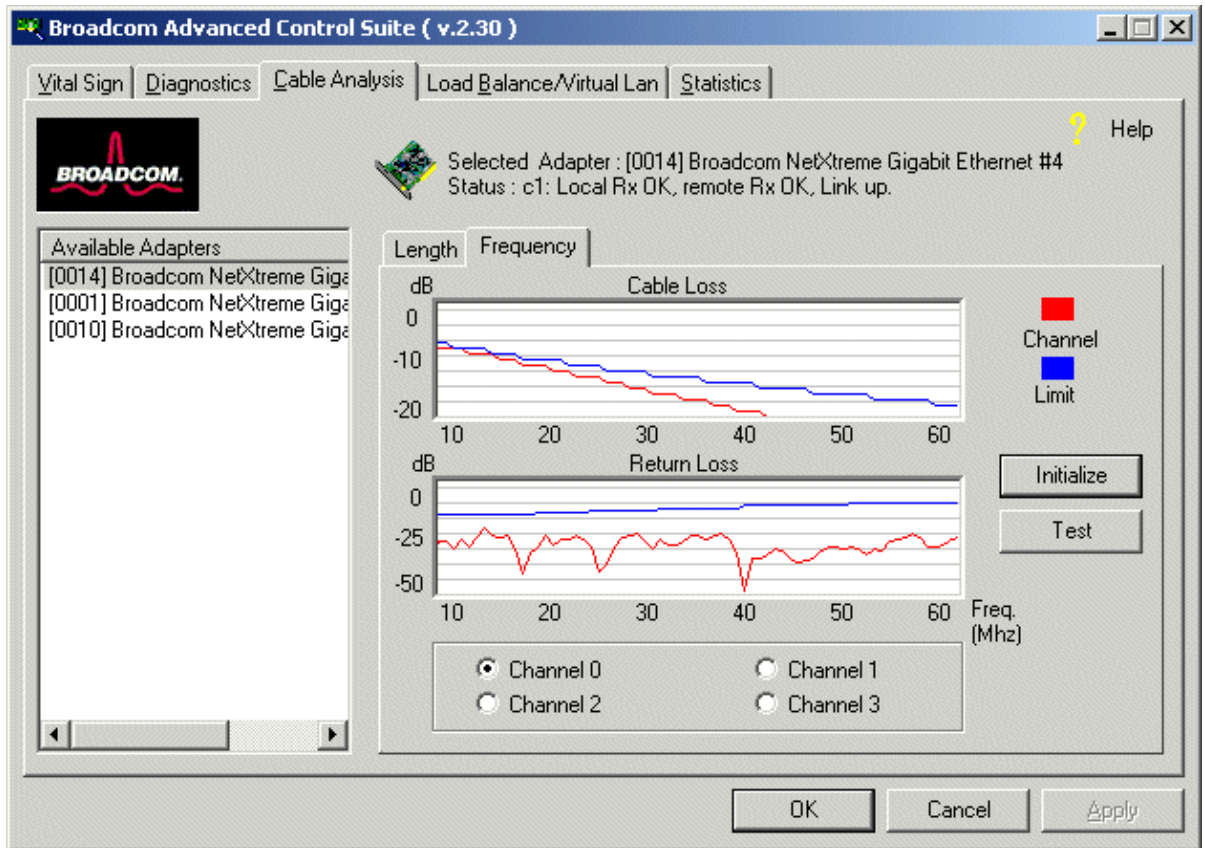
Cable Loss Measurement

The cable loss (red) curve represents the insertion loss of the cable under test as a function of frequency in the frequency range [0 – 62.5 MHz]. The cable loss limit (blue) curve represents the cable loss limit as specified in Section 40.7.2.1 of the IEEE Standard 802.3ab–1999. The cable loss curve (red) on top of the cable loss limit (blue) curve indicates the cable is within the operating limit. If the cable loss (red) curve superimposes the cable loss limit (blue) curve, the cable is marginal to the operating limit. If the cable loss (red) curve is below the cable loss limit (blue) curve, the cable is outside the operating limit of the IEEE 802.3ab–1999 standards. This condition would signify that the cable length is too long and not operational.

Return Loss Measurement

The return loss (red) curve represents the return loss of the cable under test as a function of frequency in the frequency range [0,62.5 MHz]. The return limit (blue) curve represents the return loss limit as specified in Section 40.7.2.3 of the IEEE Standard 802.3ab–1999. The return loss (red) curve below of the return limit (blue) curve indicates the cable is within the operating limit. If the return loss (red) curve superimposes the return limit (blue) curve, the cable is marginal to the operating limit. If the return loss (red) curve is above the return limit (blue) curve, the cable is outside the operating limit of the IEEE 802.3ab–1999 standards. This condition would signify that the cable length is too long and not operational.

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Load Balance/Virtual LANs

The Load Balance/Virtual LANs screen allows you to configure advanced features. Any available adapter can be configured as part of a team. Teaming is a method of grouping multiple adapters into a virtual adapter (bundling multiple adapters to look like a single adapter). The benefit of this approach is load balancing.

An example of this usage using the graphic provided below shows three available adapters on the primary side. By selecting each of the available adapters, and moving each of them over to the Load Balance Members column, they then appear to the outside world as one adapter. Each member in the Load Balance Member list shares the traffic burden of all three members.

The Standby Member field is used to permit the selection of one of the team members to handle traffic, should all members in the Load Balance Member list fail (failover). The selected Standby Member will not handle any traffic unless all Load Balance Members fail. When one Load Balance Member (or more) is restored (fail–back), traffic will then be handled by the restored team member(s).
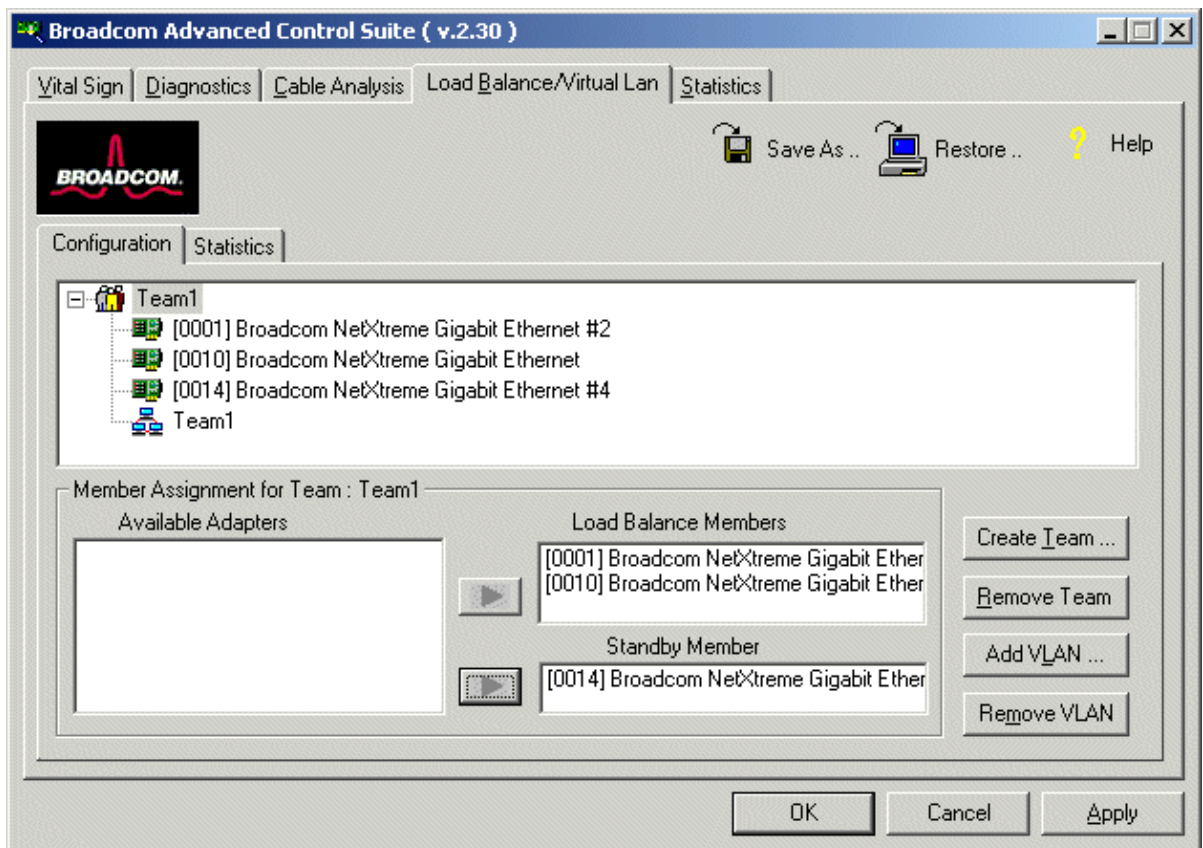
1. Right–click on the node of Load Balance tree to display a drop–down menu that is associated with the selected node type.
2. For the team node, the menu items are 'Delete' and 'Properties'. The user can either select 'Delete' to remove the highlighted team or 'Properties' to display the Team Properties dialog box.
3. From Team Properties dialog, the user can change team name and/or change > team type.
4. For the adapter node, the menu items are 'Unassign' and 'Properties'. The user can select

'Unassign' to remove the selected adapter from the team or 'Properties' to display the adapter Properties. All display in adapter Properties are read–only.

5. For the VLAN node, the menu items are 'Delete' and 'Properties'. The user can either select Delete to remove the highlighted VLAN or 'Properties' to display the VLAN Properties. The only writable item on this dialog box is VLAN name.

Creating a New Team

1. From the Load Balance/Virtual LAN window, click the **Create Team** button. This displays the Add New Team window.
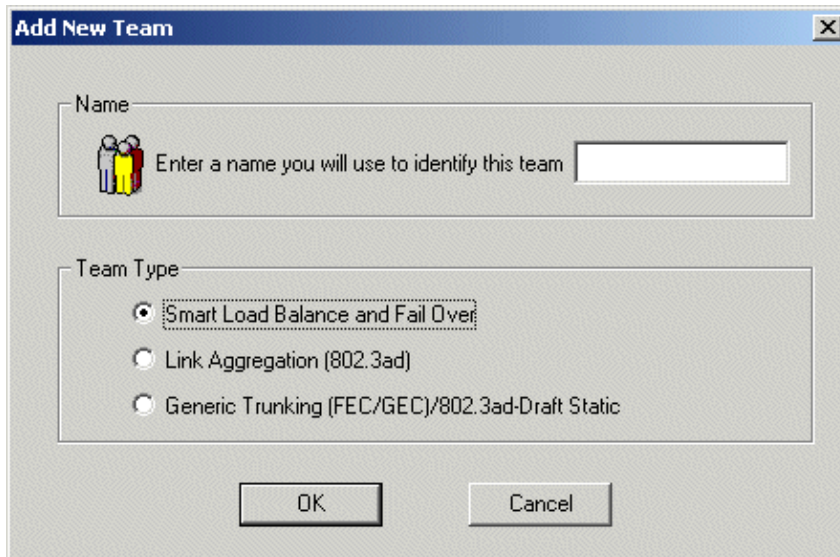
2. Enter a team name in the "Name" entry field, then select the Team Type and click **OK**.
3. Place an available adapter into the team.

- In the Available Adapters list, select the adapter(s) that you want to add to the team created in the previous step. Move the selected adapters to the Load Balance list box using the double arrows.
- When you are finished configuring failover teams, click the **OK** or **Apply** button to accept the changes.
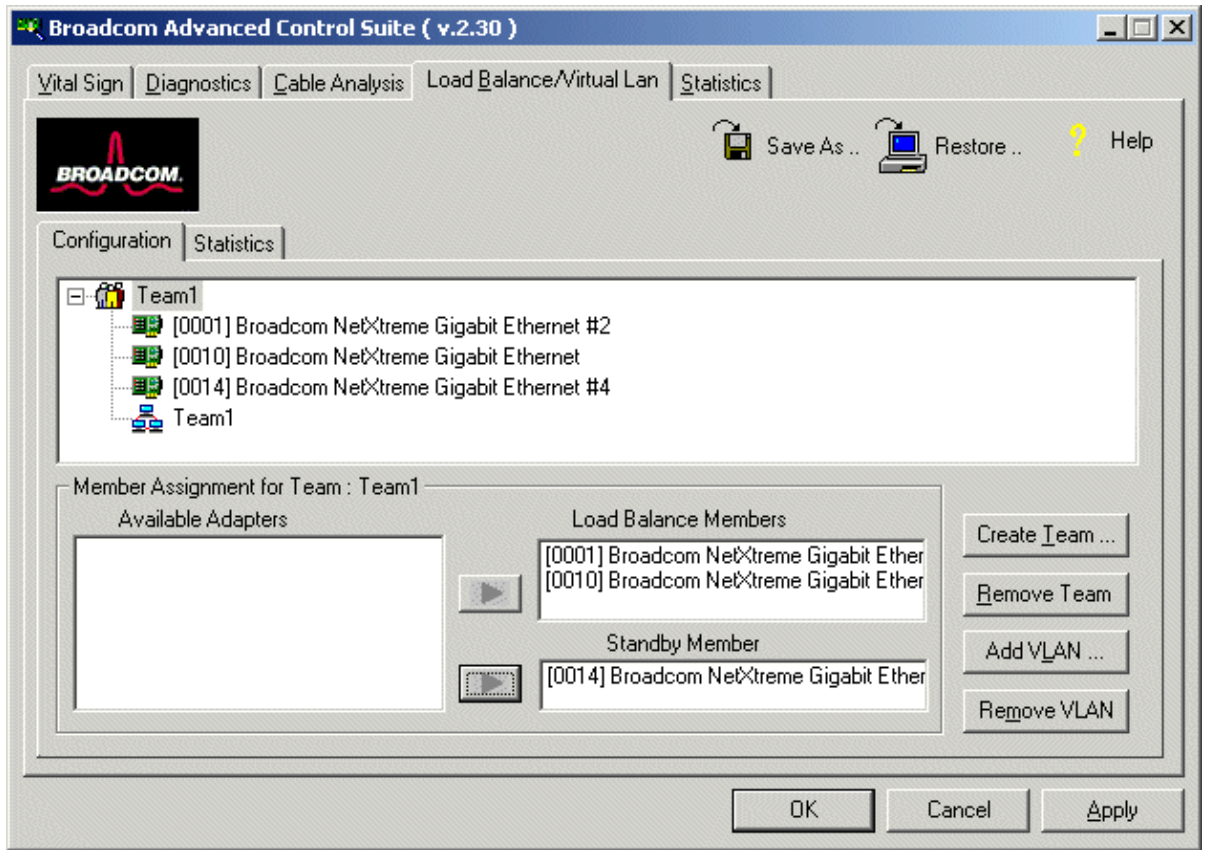
 NOTE – At least one adapter must be displayed in the Load Balance list box.

The minimum number of characters that can be used in a team name is one. The maximum number of characters that can be used in a team name is 39. A Team Name cannot begin with spaces nor contain the character "&". If you attempt to use an identical team name, an error message displays indicating that the entered name already exists. The maximum number of members in a team is eight.
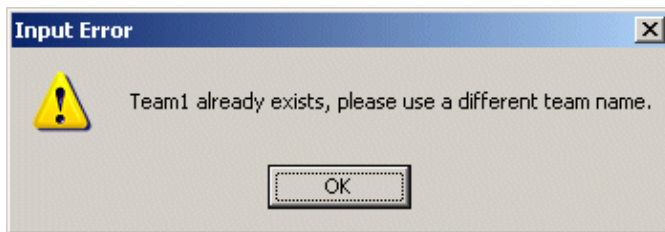
4. Click the **OK** button. When team configuration has been correctly performed, one Virtual Team adapter driver will be created for each configured team.

   When you create a generic trunking team, you cannot select a Standby Member. Standby Members only work with Smart Load Balance and Failover Teams.

5. Configure the Team IP address if necessary. If other adapters in your system use TCP/IP bindings, the TCP/IP Properties window will open.

*NOTE – Not all vendor adapters are supported or fully certified for Teaming. If an adapter is not (fully) supported, you can click **List All Supported Adapters** to display a list of fully supported adapters.*
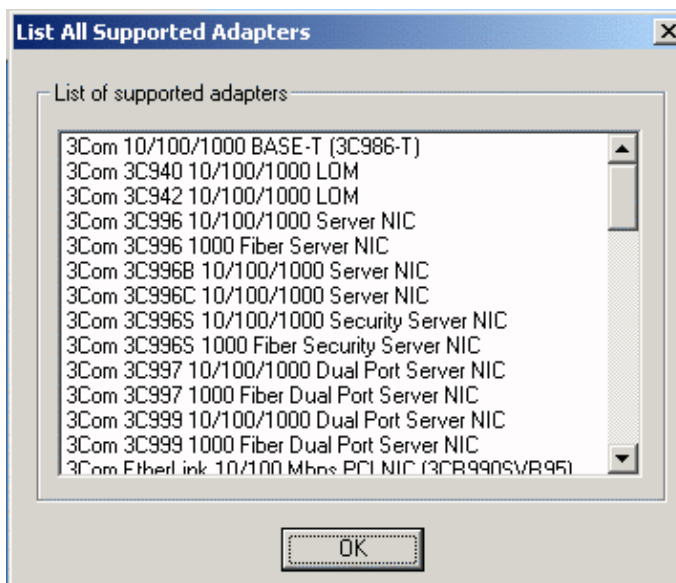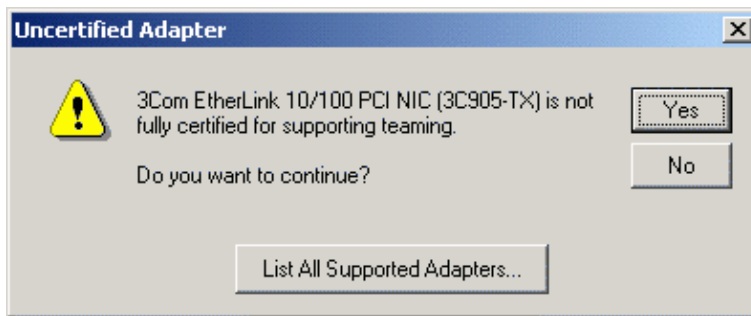
6. To access the Internet Protocol Properties window in Windows 2000, right click on the **My Network Places** icon and select **Properties**.
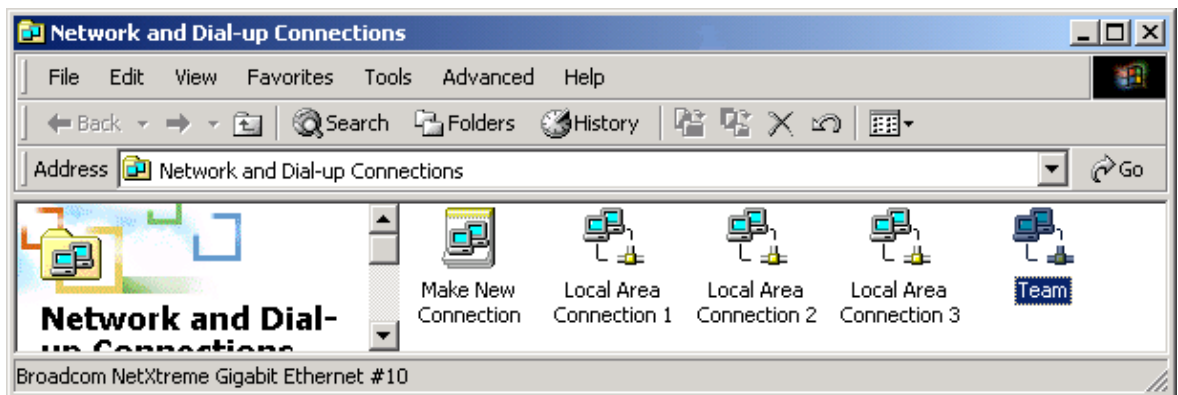
7. When the Network and Dial–up Connections window opens, right–click on any network adapter and select **Properties**. Then select **Internet Protocol** and click **Properties**. This displays the Internet Protocol (TCP/IP) Properties window.

To set an adapter's IP address, use the following menu:
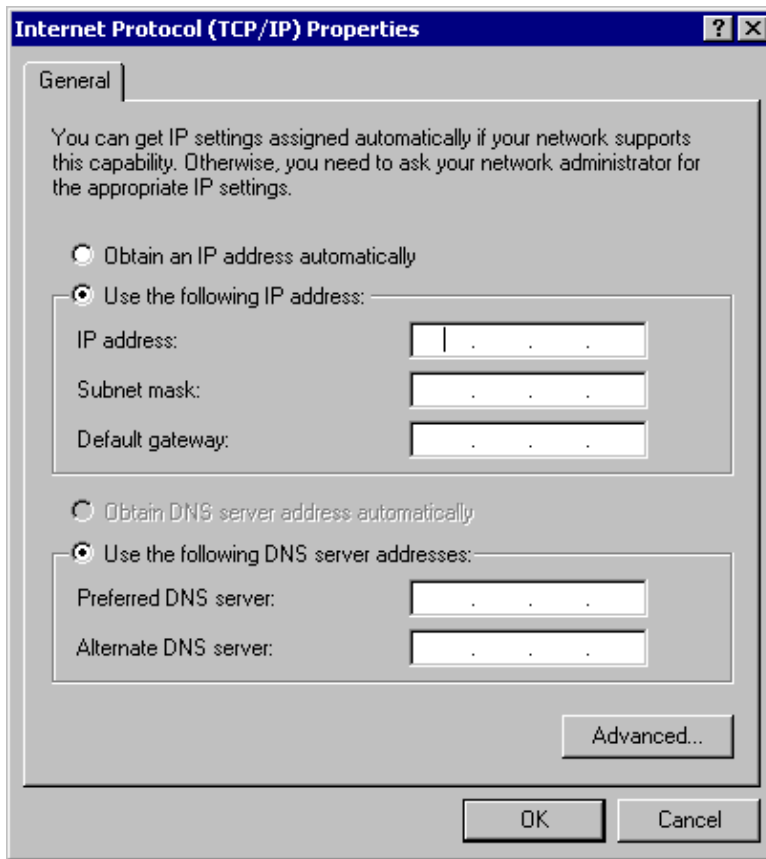
8. Configure the IP address and any other necessary TCP/IP configuration for the team and click the **OK** button when finished.

Adding a VLAN

You can add VLANs to a team. The concept behind this is that you are adding multiple virtual adapters that are on different subnets. The benefit of this is that your server can have one NIC that can belong to multiple subnets. With a VLAN you can couple the functionality of load balancing for the Load Balance Members and you can employ a failover adapter.

You can define up to 64 VLANs per team. VLANs can only be created when all members are Broadcom adapters. If you try to create a VLAN with a non–Broadcom adapter, an error message displays.
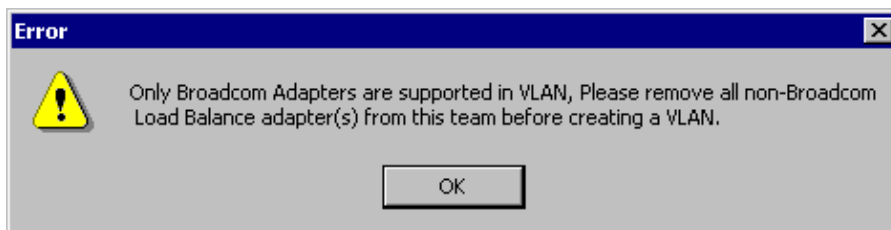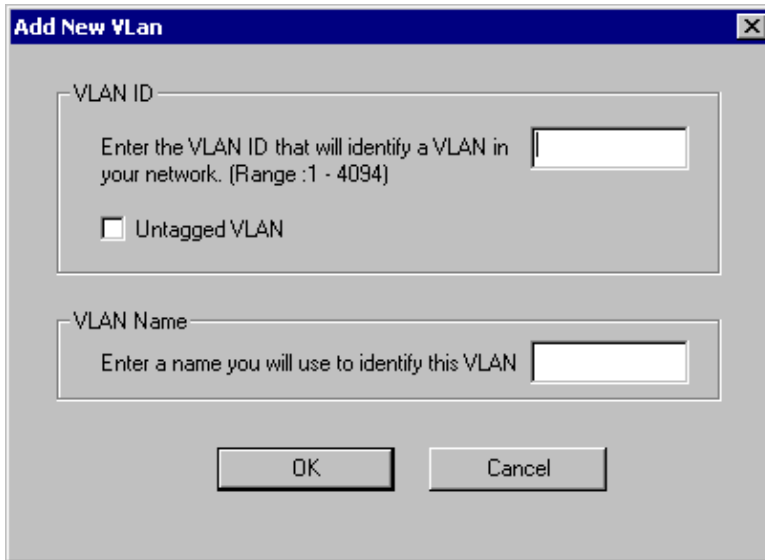
NOTE – Disabled Broadcom adapters are not recognized and will not allow the creation of a VLAN. If you attempt to create a VLAN with a disabled Broadcom adapter, the

error message above will appear.

To configure a new VLAN, perform the following steps:

1. From the Load Balance/Virtual LAN window, select the team to add the VLAN, then click the **Add VLAN** button.

The Untagged VLAN checkbox is exclusively used by the VLAN ID field. To use VLAN ID zero, simply check this box.

If you enter a VLAN name or ID and the name already exists, an Input Error message is displayed similar to the one below:
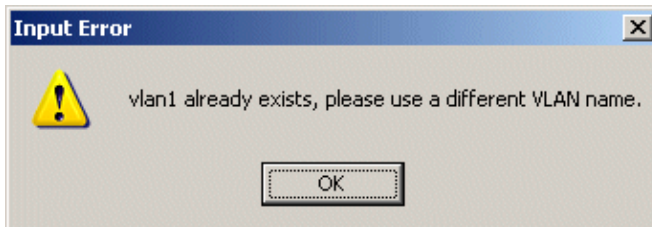
2. When you are finished adding VLANs to this team, click the **OK** button. A new virtual adapter is created for each VLAN.

NOTE – To maintain optimum adapter performance, your system should have 64 MB of system memory for each eight VLANs created per adapter.

Deleting a VLAN

NOTE – If you delete a Team, any VLANs configured for that team will also be deleted.

Deleting a VLAN   21

To delete a configured VLAN, perform the following steps:

1. From the Load Balance/Virtual LAN window, select the VLAN you want to delete and click the **Remove VLAN** button. The selected VLAN will be deleted from the Load Balance/Virtual LAN Configuration window.
2. When you are finished deleting VLANs, click the **OK** button to accept the changes.

Save and Restore Configuration

Save Configuration

To save a configuration, perform the following:

1. With the Team and VLAN configuration loaded, click **Save as** at the Broadcom Advanced Control Suite "Load Balance/Virtual LAN" tab.
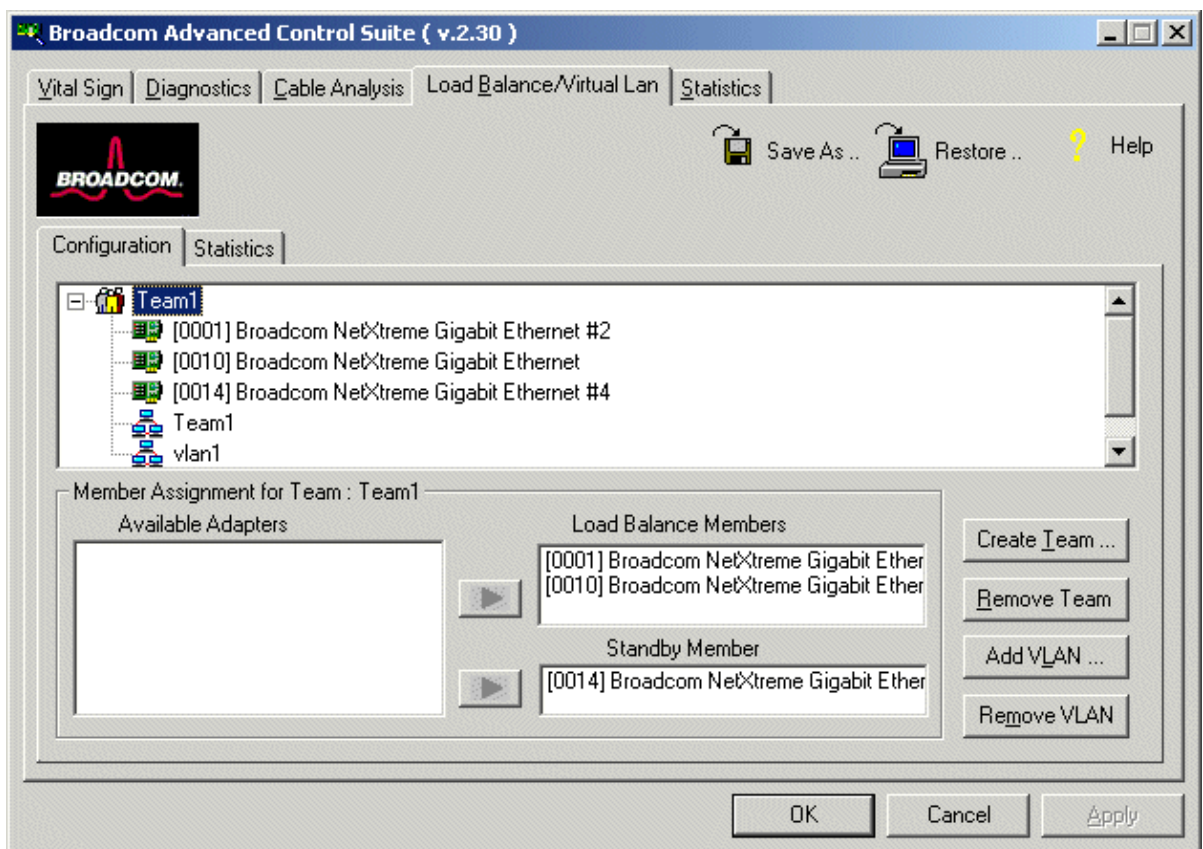
2. At the **Save as** screen, enter the path and filename of the new configuration file. A "bcg" extension will be placed on the filename. Click **Save**.
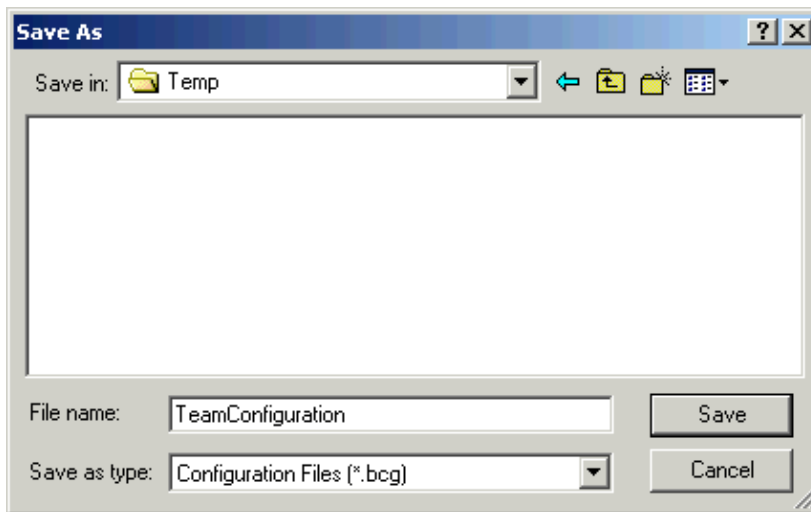
A configuration file will be placed in the directory as shown below.
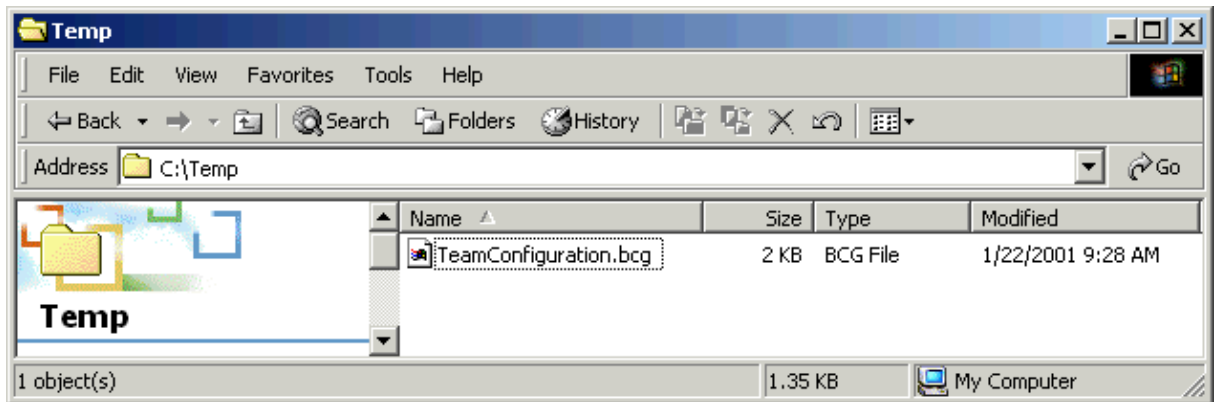
This new configuration file is a text file and can be viewed by any text editor. As shown below, it contains both adapter and team configuration information.

```
TeamConfiguration.bcg - Notepad                                    _ |□| ×|
File  Edit  Format  Help
Installed Network Adapters
   Adapter : Broadcom NetXtreme Gigabit Ethernet #3
      IP Address : 172.16.7.2
      Mac Address : 00-10-18-01-7A-9C
      Driver Status : Driver Loaded.   Normal Operating Mode.
      Driver Version : 2.13
      [BUS]Device Number : [3] 10
      Interrupt : 24
      Memory Address : 0xFABE0000
      PCI Bus Mode : PCI  33MHZ 64 Bit Bus.
      Link Status :
         Link Pass
         Local Receive OK
         Remote Receive OK

   Adapter : Broadcom NetXtreme Gigabit Ethernet
      IP Address :
      Mac Address : 00-10-18-01-08-1F
      Driver Status : Driver Loaded.   Normal Operating Mode.
      Driver Version : 2.13
      [BUS]Device Number : [0] 7
      Interrupt : 21
      Memory Address : 0xFBEE0000
      PCI Bus Mode : PCI  33MHZ 32 Bit Bus.
      Link Status :
         Link Fail
         Local Receive Fail
         Remote Receive Fail

   Adapter : Broadcom NetXtreme Gigabit Ethernet #4
      IP Address :
      Mac Address : 00-10-18-01-08-21
      Driver Status : Driver Loaded.   Normal Operating Mode.
      Driver Version : 2.13
      [BUS]Device Number : [12] 13
      Interrupt : 20
      Memory Address : 0xF99F0000
      PCI Bus Mode : PCI  66MHZ 64 Bit Bus.
      Link Status :
         Link Fail
```

Restore Saved Configuration

To restore a saved configuration, perform the following:

1. Click Restore at the Broadcom Advanced Control Suite "Load Balance/Virtual LAN" tab.
2. If a configuration is already loaded, the Restore Configuration screen will appear. Click **Yes** to continue. However, note that all current configuration data currently loaded will be lost. To save the current configuration, perform the Save Configuration procedure above,

```
Restore Configuration                    ×|
  Do you want to save current configuration?

         [  Yes  ]        [  No  ]
```
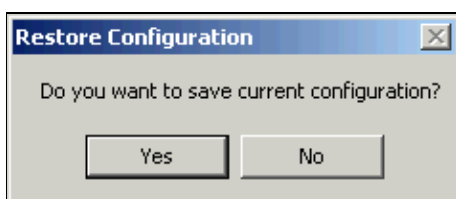
3. At the Open screen, select the configuration file to be restored and click **Open**.
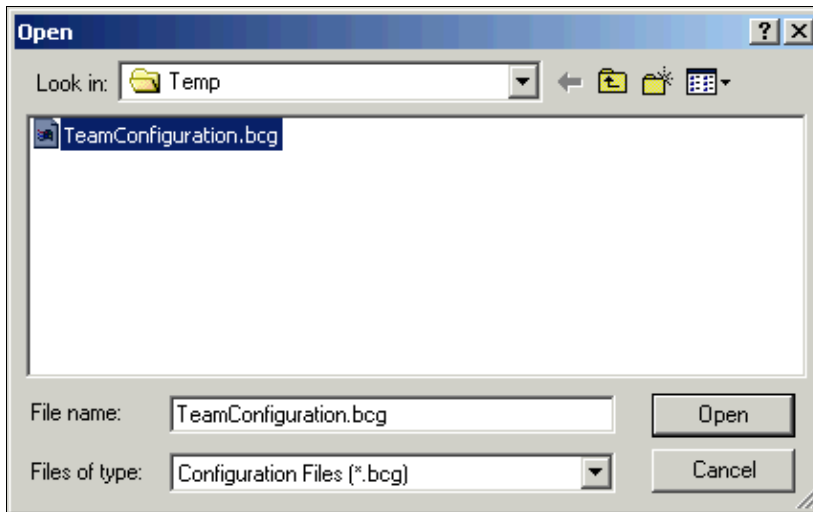
NOTE – The Open screen will navigate to the folder where the last configuration file was stored. If the configuration file to be restored is elsewhere, navigate to that location to select the file.

4. The new configuration will be loaded as shown below. Click **Apply** to complete the restoration. Until **Apply** is clicked, the configuration has not been restored.
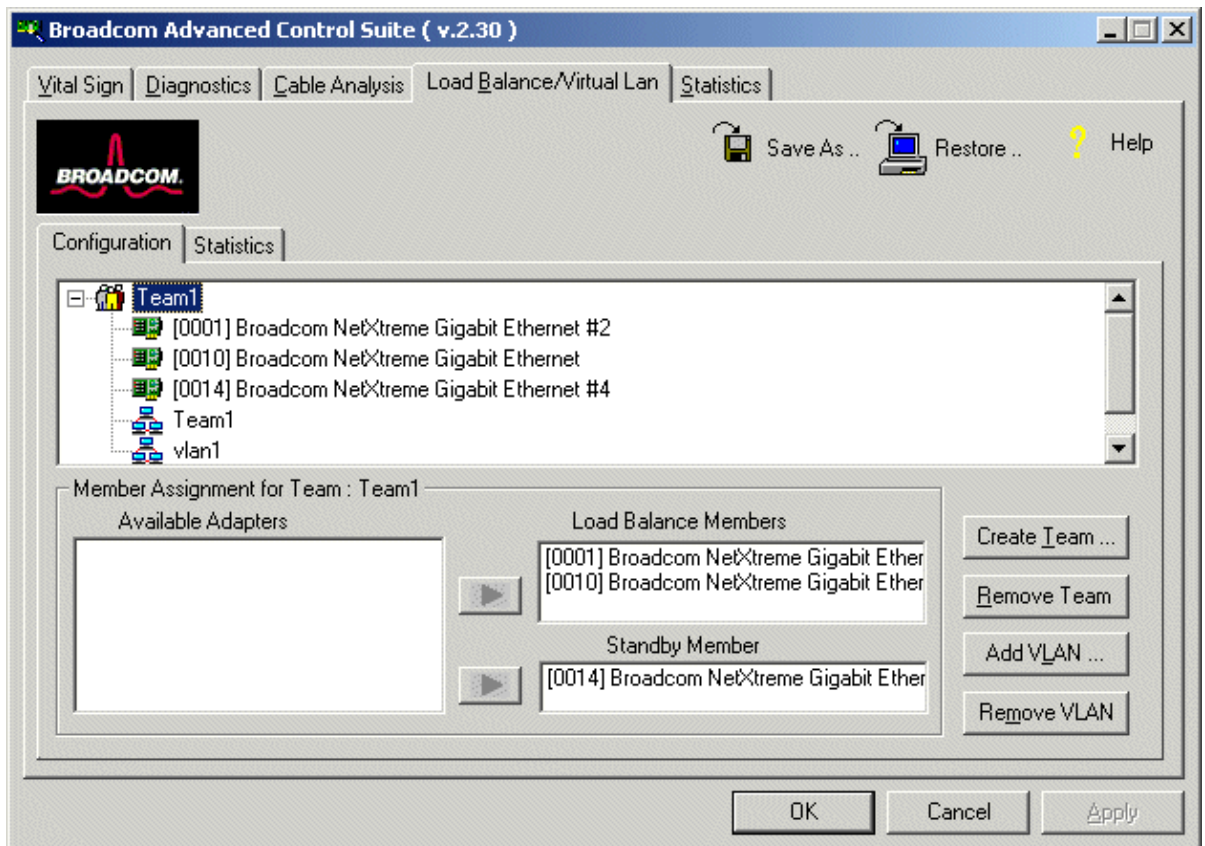
Load Balance/Virtual LAN Statistics

The following shows the screen that displays when you select the Statistics tab.
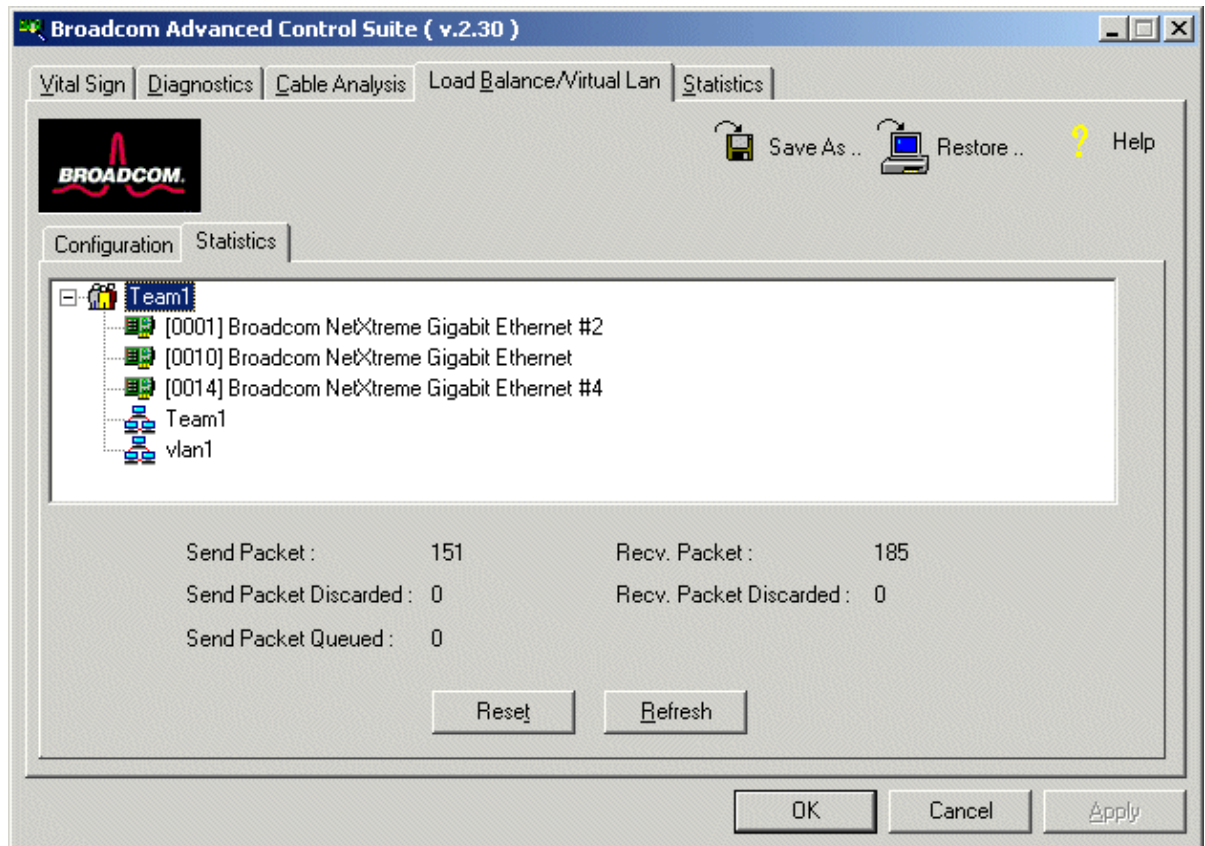
Statistics

The Statistics screen allows you to view traffic statistics for both Broadcom and non–Broadcom adapters. Statistical values and coverage is more comprehensive for Broadcom than for non–Broadcom adapters.

NOTE – If a Broadcom adapter is disabled, its team will not be displayed in the Statistics window.

General Tab
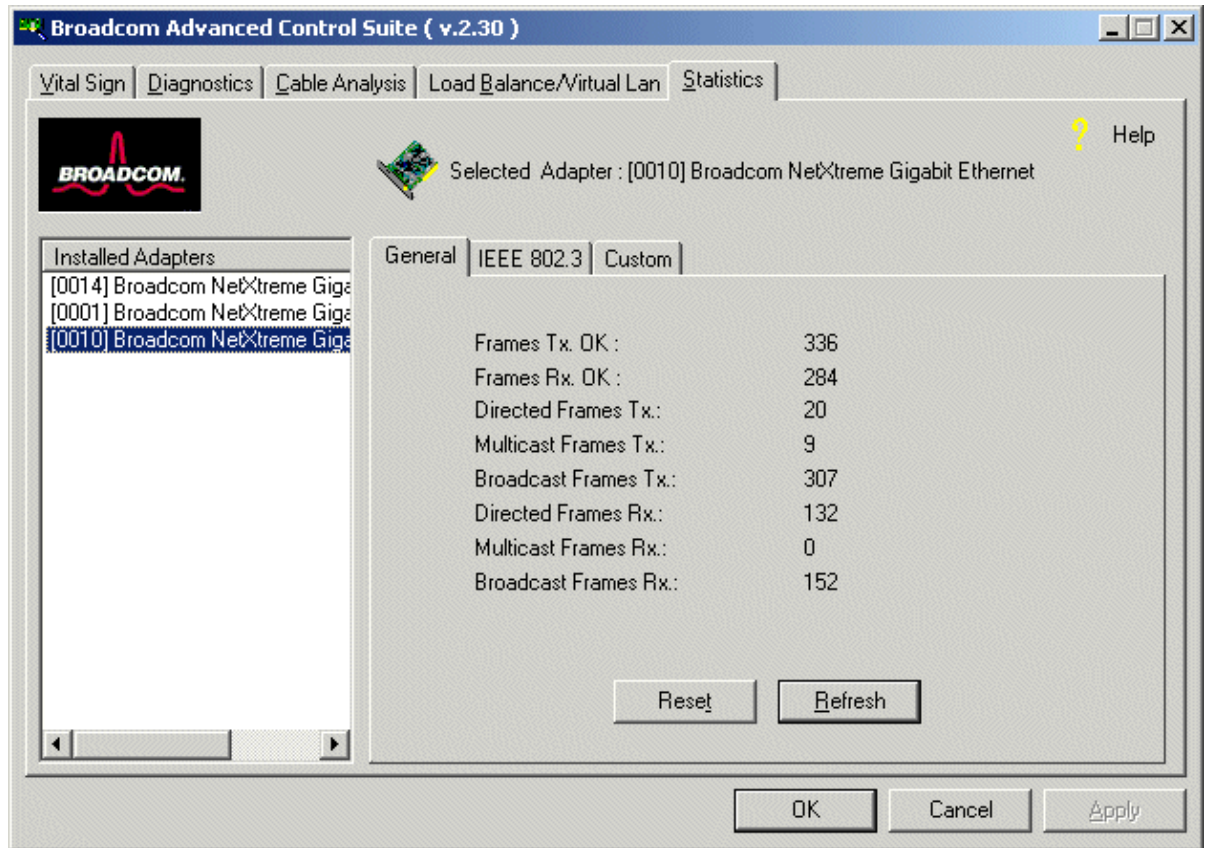
Interface components of the BACS Statistics/General tab window are described below:

- Frames Tx OK: A count of frames that are successfully transmitted. This counter is incremented when the TransmitStatus is reported as transmitOK.
- Frames Rx OK: A count of frames that are successfully received (receiveOK). This does not include frames received with frame–too–long, FCS, length or alignment errors, or frames lost due to internal MAC sublayer error. This counter is incremented when the ReceiveStatus is reported as receive OK.
- Directed Frames Tx: A count of directed data frames that are successfully transmitted.
- Multicast Frames Tx: A count of frames that are successfully transmitted, as indicated by the status value transmitOK, to a group destination address other than broadcast.
- Broadcast Frames Tx: A count of the frames that were successfully transmitted as indicated by the TransmitStatus transmitOK, to the broadcast address. Frames transmitted to multicast addresses are not broadcast frames and are excluded.
- Directed Frames Rx: A count of directed data frames that are successfully received.
- Multicast Frames Rx: A count of frames that are successfully received and are directed to an active nonbroadcast group address. This does not include frames received with frame–too–long, FCS, length or alignment errors, or frames lost due to internal MAC sublayer error. This counter is incremented as indicated by the receiveOK status.
- Broadcast Frames Rx: A count of frames that are successfully received and are directed to the broadcast group address. This does not include frames received with frame–too–long, FCS, length or alignment errors, or frames lost due to internal MAC sublayer error. This counter is incremented as indicated by the receiveOK status.

IEEE 802.3 Tab
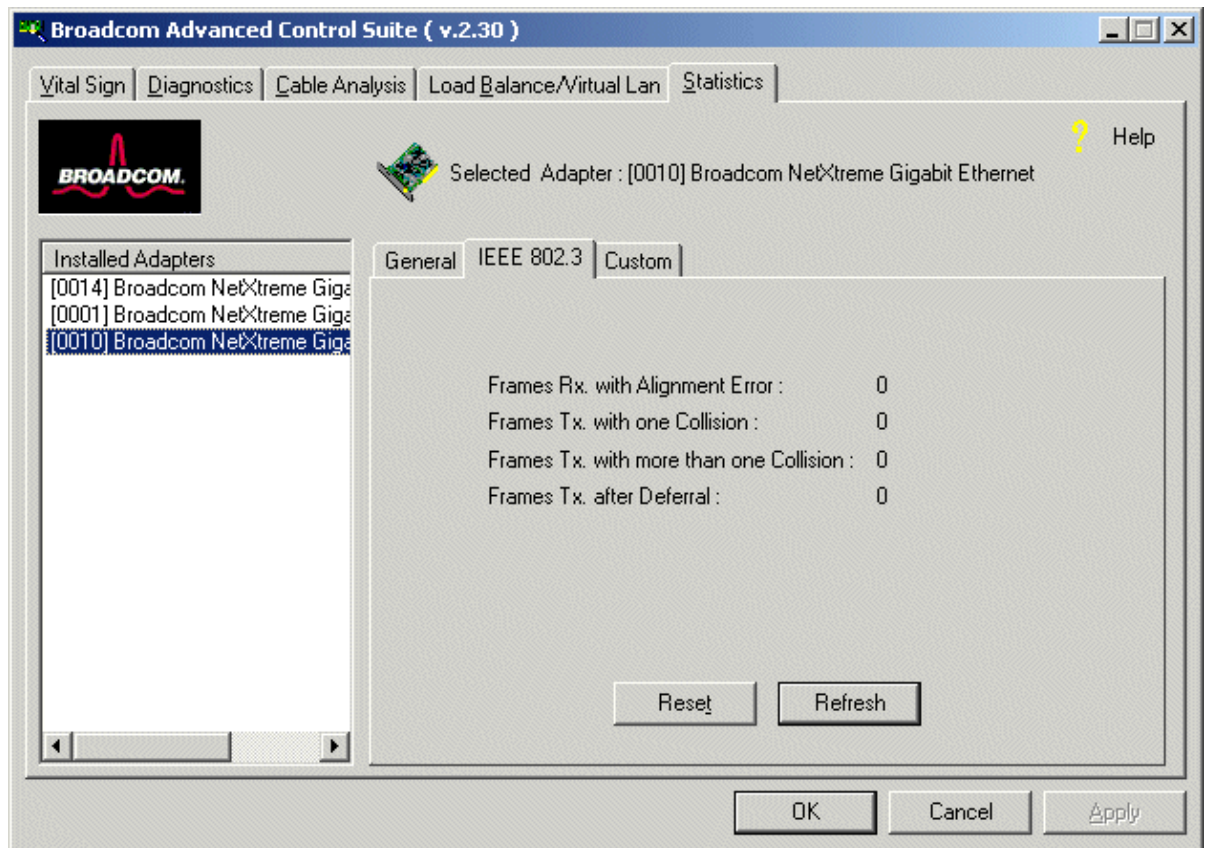
Interface components of the BACS Statistics/IEEE 802.3 tab window are described below:

- Frames Rx with Alignment Error: A count of frames that are not an integral number of octets in length and do not pass the FCS check. This counter is incremented when the ReceiveStatus is reported as alignmentError.
- Frames Tx with one Collision: A count of frames that are involved in a single collision, and are subsequently transmitted successfully. This counter is incremented when the result of a transmission is reported as transmitOK and the attempt value is 2.
- Frames Tx with more than one Collision: A count of frames that are involved in more than one collision, and are subsequently transmitted successfully. This counter is incremented when the TransmitStatus is reported as transmitOK and the value of the attempts variable is greater than 2 and less or equal to attemptLimit.
- Frames Tx after Deferral: A count of frames whose transmission was delayed on its first attempt because the medium was busy. Frames involved in any collision are not counted.

Custom Tab
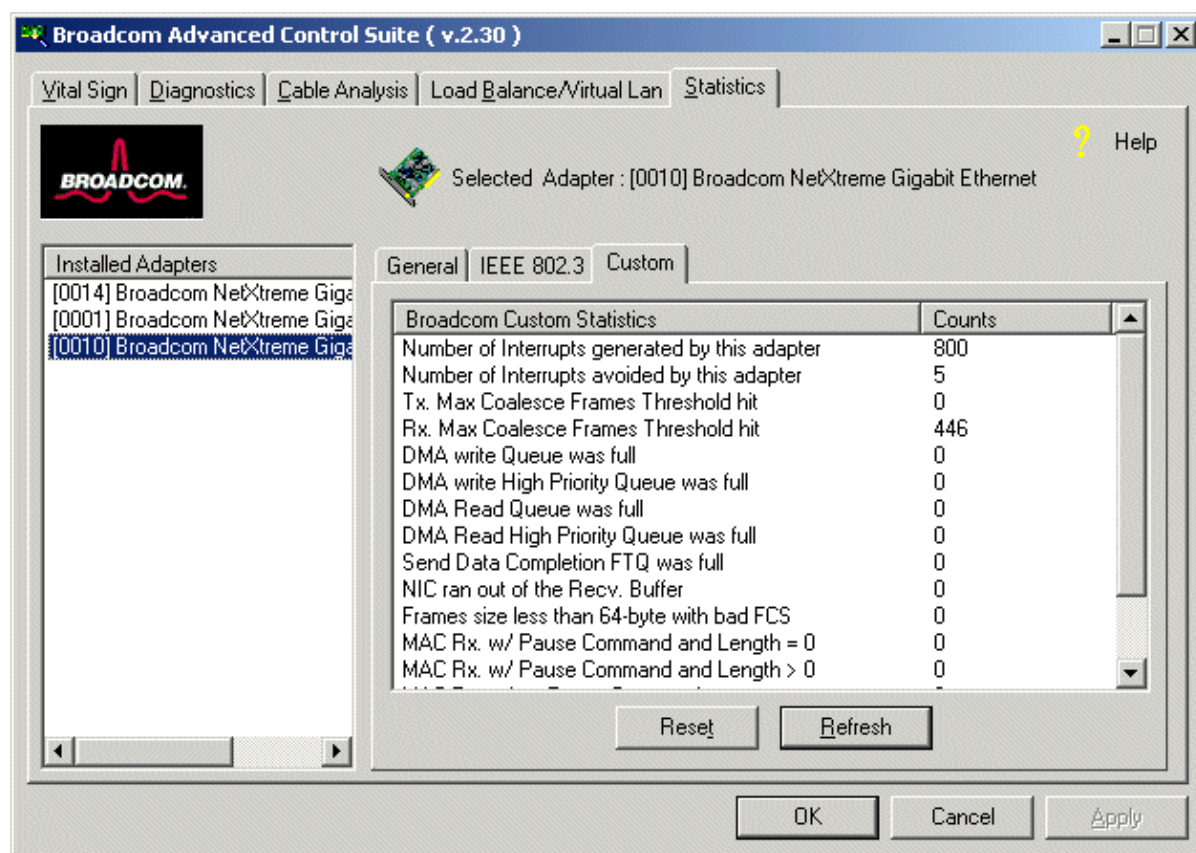
*NOTE – The **Custom** tab will only appear for an enabled Broadcom adapter.*

A complete view of Interface components of the BACS Statistics/Custom tab window are shown below. Their descriptions follow:

- Number of Interrupts generated by this adapter: Number of interrupts generated by NIC.
- Number of Interrupts avoided by this adapter: Number of interrupts avoided by NIC.
- Tx. Max Coalesce Frames Threshold hit: Number of times Send Max Coalesce Frames Threshold hit.
- Rx. Max Coalesce Frames Threshold hit: Number of times Recv Max Coalesce Frames Threshold hit.

- DMA write Queue was full: Number of times DMA write queue was full.
- DMA write High Priority Queue was full: Number of times DMA write high priority queue was full.
- DMA Read Queue was full: Number of times DMA read queue was full.
- DMA Read High Priority Queue was full: Number of times DMA read high priority queue was full.
- Send Data Completion FTQ was full: Number of times send data completion FTQ(Flow Through Queue) was full.
- NIC ran out of the Recv. Buffer: Number of times NIC ran out of the Recv Buffer Descriptors.
- Frames size less than 64–byte with bad FCS: Frames size less than 64–byte with bad FCS(Frame Checksum).
- MAC Rx. w/ Pause Command and Length = 0: MAC control frames with pause command and length equal to zero.
- MAC Rx. w/ Pause Command and Length greater than 0: MAC control frames with pause command and length greater than zero.
- MAC Rx. w/ no Pause Command: MAC control frames with no pause command.
- MAC Sent Xon: MAC Transmit with Xon was on.
- MAC Sent Xoff: MAC Transmit with Xon was off.

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DOS Diagnostic User's Guide

This chapter provides the following information:

- Introduction

- Prerequisites

- Functions List

- Function Description

- Diagnostic Tests

- Error Messages

Introduction

This document provides the information on how to use the DOS diagnostic utilities program on Broadcom 570x Gigabit Integrated Controller, in particular BCM5700 and its related components.

All commands can be entered from DOS prompt or CLI, the Command Line Interface, prompt. When program is run without parameter, the CLI mode is entered. Otherwise, the parameter will be used as command to be executed and exit the program after.

In CLI, assuming there are three devices in the system, all devices information always displayed before each prompt as the following example:

```
C Brd:Rv    Bus    PCI Spd Base Irq EEP    MAC         Fmw       Configuration
- ------- ------- --- --- ---- -- ---- ------------ ----------- --------------
0 5702:A2 02:0A:0 32  33   FEAF  3 128K 0010180416DB 5702-v2.24a PW,auto
1 5702:A2 02:0B:0 32  33   FEAD 11 128K 0010180416C4 5702-v2.24a PW,auto
2 5703:A2 02:0C:0 32  33   FEAB  9 128K 0010180416B6 5703-v2.21  PW,auto
```

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Prerequisites

OS:	Dos 6.22
Software:	b57udiag.exe.

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Functions List

cmd	Functions
upgfrm	Upgrade PXE or Boot Code from a file
dir	Displays the file directory in NVRAM
setwol	Enable/Disable WOL
setpxe	Enable/Disable PXE
setasf	Enable/Diable ASF
nictest	Run a set of NIC tests
exit	Exit the program
device	Show or switch device
version	Display program version
help	Display the commands available
dos	Execute a DOS command
reset	Reset chip
cls	Clear screen
asfprg	Program ASF firmware into NVRAM

Functions Description

upgfrm

cmd: upgfrm

Description: Upgrade PXE or Boot Code from a file

Syntax: upgrm <pxe:boot> filename

This command reads code from a file and programs it into the pxe or boot area. Both parameters, the programming target "pxe" or "boot" and filename must be specified.

Options:

–f <string>	Input file
–p	Upgrade PXE code
–b	Upgrade Boot code
–d	Do not perform device check

dir

cmd: dir

Description: Displays the file directory in NVRAM

Example:

```
Entry Type SRAM    Addr EEP  Offset     Length   Execute Version
----- ------------ --------- ---------- -------- ------- -------
      BootCode     08003000  00000200   000011B0 CPUA (2) 5702-v2.24a
  0   PXE          00010000  000013B0   0000C854 no       2.2.7
```

setwol

cmd: set wol

Description: Enable/Disable WOL.

Syntax: set wol –e/–d

Options:

–e   Enable WOL

–d   Disable WOL

setpxe

cmd: set pxe

Description: Enable/Disable PXE and set PXE speed.

Syntax: set pxe –switch

Options:

–e   Enable PXE

–d   Disable PXE

–s<DEC> Specify PXE speed (default = 0)

```
Speed: 0 = auto
       1 = 10HD
       2 = 10FD
       3 = 100HD
       4 = 100FD
```

setasf

cmd: setasf

Description: Enable/Disable ASF.

Syntax: setasf –switch

Options:

–e	Enable ASF
–d	Disable ASF

nictest

cmd: nictest

Description: Run a set of NIC tests.

Syntax: nictest [test list]

Example: See Diagnostic Tests for detail on test description.

abcd	runs all tests
b	runs all tests in group b
a3 b1	runs test a3 and b1 only
a124b2	runs tests a1, a2, a4 and b2

If no test list is entered, the diagcfg setting is used.

Options:

–n <DEC>	iteration
–e	run NVRAM verification also

exit

cmd: exit

Description: Exit from CLI mode

Syntax: exit

Example:

```
b57udiag> exit
```

device

cmd: device

Description: Show or switch device.

Syntax: device <dev>

Options:

−n <HEX>	Device number (default = 00000000)
−r	Remove all current devices and rescan available devices.
−s	Silent mode – don not display devices

version

cmd: version

Description: Display software version.

Syntax: version

Example:

```
C:\>b57udiag –version
Copyright (c) 2000, 2001 Broadcom Corporation, all rights
reserved
Broadcom NetXtreme User Diagnostic 3.09 (06/14/02)
```

help

cmd: help

Description: Displays the help commands available.

Syntax: help

Example:

```
  C:\>b57udiag –help
Copyright (c) 2000, 2001 Broadcom Corporation, all rights
reserved
Broadcom NetXtreme User Diagnostic 3.09 (06/14/02)
```

cmd	Functions
upgfrm	Upgrade PXE or Boot Code from a file
dir	Displays the file directory in NVRAM
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setasf	Enable/Diable ASF
nictest	Run a set of NIC tests
exit	Exit the program
device	Show or switch device
version	Display program version
help	Display the commands available
dos	Execute a DOS command
reset	Reset chip
cls	Clear screen
asfprg	Program ASF firmware into NVRAM

dos

cmd: dos

Description: Execute DOS command.

Syntax: dos <dos command>

If not parameter is entered, DOS shell is entered.

reset

cmd: reset

Description: Reset chip

Syntax: reset

Options:

–c	Simulate cold reset
–w	Wait for firmware signature
–t	Display time from reset to firmware invert signature

cls

cmd: cls

Description: Clear screen.

Syntax: cls

asfprg

cmd: asfprg

Description: Program asf firmawre into NVRAM

Syntax: asfprg [init_img [rx_img [tx_img]]]

The default files names are asfinit.bin, asfcpua.bin, and asfcpub.bin, which can be over written by parameters.

Options:

−v<HEX>   Verbose leverl (0,1,2) (def=00000001)

Diagnostic Tests

The tests are divided into four groups: Register Tests, Memory Tests, Miscellaneous Tests, and Data Tests. They numbered as group 'A', 'B', 'C', and 'D'.

Test Names

Group A.

A1. Indirect Register Test
A2. Control Register Test
A3. Interrupt Test
A4. BIST
A5. PCI Cfg Register Test

Group B.

B1. Scratch Pad Test
B2. BD SRAM Test
B3. DMA SRAM Test
B4. MBUF SRAM Test
B5. MBUF SRAM via DMA Test
B6. External SRAM Test

Group C.

C1. EEPROM Test
C2. CPU Test
C3. DMA Test
C4. MII Test
C5. VPD Test
C6. ASF Test
C7. ROM Expansion Test

Group D.

D1. Mac Loopback Test
D2. Phy Loopback Test
D3. RJ45 Loopback Test
D4. MII Miscellaneous Test
D5. MSI Test

Error Codes

Code	Message
1.	Got 0x%08x @ 0x%08x. Expected 0x%08x
2.	Cannot run test while chip is running
3.	Invalid NIC device
4.	Read only bit %s got changed after writing zero at offset 0x%X
5.	Read only bit %s got changed after writing 1's at offset 0x%X
6.	Read/Write bit %s did not get cleared after writing zero at offset
7.	Read/Write bit %s did not get set after writing 1's at offset 0x%X
8.	BIST failed
9.	Could not generate interrupt
10.	Test aborted by user
11.	Tx DMA:Got 0x%08x @ 0x%08x. Expected 0x%08x
12.	Rx DMA:Got 0x%08x @ 0x%08x. Expected 0x%08x
13.	Tx DMA failed
14.	Rx DMA failed
15.	Data error, got 0x%08X at 0x%08X, expected 0x%08X
16.	Second read error, got 0x%08X at 0x%08X, expected 0x%08X
17.	Failed writing EEPROM at 0x%04X
18.	Failed reading EEPROM at 0x%04X
19.	EEPROM data error, got 0x08X at 0x04X, expected 0x%08X
20.	Cannot open file %s
21.	Invalid CPU image file %s
22.	Invalid CPU image size %d
23.	Cannot allocate memory
24.	Cannot reset CPU
25.	Cannot release CPU

```
26.      CPU test failed
27.      Invalid Test Address Range
                Valid NIC address is 0x%08x-0x%08x and exclude 0x%08x-0x%08x
28.      DMA:Got 0x%08x @ 0x%08x. Expected 0x%08x
29.      Unsupported PhyId %04X:%04X
30.      Too many registers specified in the file, max is %d
31.      Cannot write to VPD memory
32.      VPD data error, got %08X @ 0x04X, expected %08X
33.      No good link! Check Loopback plug
34.      Cannot TX Packet!
35.      Requested to Tx %d. Only %d is transmitted
36.      Expected %d packets. Only %d good packets are received
                %d unknown packets have been received.
                %d bad packets have been received.
37.      %c%d is an invalid Test
38              EEPROM checksum error
39              Error in reading WOL/PXE
40              Error in writing WOL/PXE
41              No external memory detected
42              DMA buffer %04X is large, size must be less than %04X
43              File size %d is too big, max is %d
44              Invalid %s
45              Failed writing 0x%x to 0x%x
46              *1
47              *1
48              *1
49              *1
50              Cannot perform task while chip is not running. (need driver)
51              Cannot open register define file or content is bad
52              ASF Reset bit did not self-cleared
53              ATTN_LOC %d cannot be mapped to %cX CPU event bit %d
54              %s Regsiter is not cleared to zero after reset
55              Cannot start poll_ASF Timer
56              poll_ASF bit did not get reset after acknowleged
57              Timestamp Counter is not counding
58              %s Timer is not working
59              Cannot clear bit %s in %cX CPU event register
60              Invalid "EEPROM_FILENAME" file size, expected %d but only can read
61              Invalid magic value in %s, expected %08x but found %08x
62              Invalid manufature revision, expected %c but found %c
63              Invalid Boot Code revision, expected %d.%d but found %d.%d
64              Cannot write to EEPROM
65              Cannot read from EEPROM
66              Invalid Checksum
67              Invalid Magic Value
68              Invalid MAC address, expected %02X-%02X-%02X-%02X-%02X-%02X
69              Slot error, expected an UUT to be found at location %02X:%02X:00
70              Adjacent memory has been corrupted while testing block 0x%08x-0x%0
                Got 0x%08x @ address 0x%08x. Expected 0x%08x
```

*1 Internal Use. Program will not generate this error.

Test Descriptions

A1. Indirect Register Test

Command: regtest –i

Function: Using indirect addressing method, writing increment data into MAC hash Register table and read back for verification. The memory read/write is done 100 times while increment test data.

Default: Test Enabled

A2. Control Register Test

Command: regtest

Function: Each Register specified in the configuration contents read only bit and read/write bit defines. The test writing zero and one into the test bits to insure the read only bits are not changed, and read/write bits are changed accordingly.

Default: Test Enabled.

Default Register table

The test will try to read the register configuration file 'ctrlreg.txt' for the register defines. If the file does not exist a default register offset and mask bits will be used.

Offset	R/O Mask	R/W Mask
0x00000400	0x00000000	0x007fff8c
0x00000404	0x03800107	0x00000000
0x00000408	0x00000000	0x07c01400
0x0000040c	0x00000000	0xc000007f
0x00000410	0x00000000	0x0000ffff
0x00000414	0x00000000	0xffffffff
0x00000418	0x00000000	0x0000ffff
0x0000041c	0x00000000	0xffffffff
0x00000420	0x00000000	0x0000ffff
0x00000424	0x00000000	0xffffffff
0x00000428	0x00000000	0x0000ffff
0x0000042c	0x00000000	0xffffffff
0x00000430	0x00000000	0xffffffff
0x00000434	0x00000000	0x0fffffff
0x0000043c	0x00000000	0x0000ffff
0x00000440	0x00000000	0x001fffff
0x00000444	0x00000000	0x0000ffff
0x00000448	0x0000ffff	0x00000000
0x0000044c	0x00000000	0x0fffffff
0x00000450	0x00000000	0x00000001
0x00000454	0x00000000	0x00008013
0x00000458	0x00000000	0x00000000
0x0000045c	0x00000000	0x00000070
0x00000460	0x00000009	0x00000000
0x00000464	0x00000000	0x00003fff
0x00000468	0x00000000	0x000007fc
0x0000046c	0x00000001	0x00000000
0x00000470	0x00000000	0xffffffff
0x00000474	0x00000000	0xffffffff

```
0x00000478 0x00000000 0xffffffff
0x0000047c 0x00000000 0xffffffff
0x00000480 0x00000000 0xffffffff
0x00000484 0x00000000 0xffffffff
0x00000488 0x00000000 0xffffffff
0x0000048c 0x00000000 0xffffffff
0x00000490 0x00000000 0xffffffff
0x00000494 0x00000000 0xffffffff
0x00000498 0x00000000 0xffffffff
0x0000049c 0x00000000 0xffffffff
0x000004a0 0x00000000 0xffffffff
0x000004a4 0x00000000 0xffffffff
0x000004a8 0x00000000 0xffffffff
0x000004ac 0x00000000 0xffffffff
0x000004b0 0x00000000 0xffffffff
0x000004b4 0x00000000 0xffffffff
0x000004b8 0x00000000 0xffffffff
0x000004bc 0x00000000 0xffffffff
0x000004c0 0x00000000 0xffffffff
0x000004c4 0x00000000 0xffffffff
0x000004c8 0x00000000 0xffffffff
0x000004cc 0x00000000 0xffffffff
0x000004d0 0x00000000 0xffffffff
0x000004d4 0x00000000 0xffffffff
0x000004d8 0x00000000 0xffffffff
0x000004dc 0x00000000 0xffffffff
0x000004e0 0x00000000 0xffffffff
0x000004e4 0x00000000 0xffffffff
0x000004e8 0x00000000 0xffffffff
0x000004ec 0x00000000 0xffffffff
0x000004f0 0x00000000 0xffffffff
0x000004f4 0x00000000 0xffffffff
0x000004f8 0x00000000 0xffffffff
0x000004fc 0x00000000 0xffffffff
0x00000500 0x00000000 0x000000f8
0x00000c00 0x00000000 0x00000006
0x00000c04 0x00000004 0x00000000
0x00000c08 0x00000000 0x00000003
0x00000c0c 0x00000000 0x00ffffff
0x00000c80 0xffffffff 0x00000000
0x00000c84 0xffffffff 0x00000000
0x00000c88 0xffffffff 0x00000000
0x00000c8c 0xffffffff 0x00000000
0x00000c90 0xffffffff 0x00000000
0x00000c94 0xffffffff 0x00000000
0x00000c98 0xffffffff 0x00000000
0x00000c9c 0xffffffff 0x00000000
0x00000ca0 0xffffffff 0x00000000
0x00000ca4 0xffffffff 0x00000000
0x00000ca8 0xffffffff 0x00000000
0x00000cac 0xffffffff 0x00000000
```

```
0x00000cb0 0xffffffff 0x00000000
0x00000cb4 0xffffffff 0x00000000
0x00000cb8 0xffffffff 0x00000000
0x00000cbc 0xffffffff 0x00000000
0x00000cc0 0xffffffff 0x00000000
0x00000cc4 0xffffffff 0x00000000
0x00000cc8 0xffffffff 0x00000000
0x00000ccc 0xffffffff 0x00000000
0x00000cd0 0xffffffff 0x00000000
0x00000cd4 0xffffffff 0x00000000
0x00000cd8 0xffffffff 0x00000000
0x00000cdc 0xffffffff 0x00000000
0x00001000 0x00000000 0x00000002
0x00001400 0x00000000 0x00000006
0x00001404 0x00000004 0x00000000
0x00001408 0x0000ffff 0x00000000
0x00001440 0x0000000f 0x00000000
0x00001444 0x0000000f 0x00000000
0x00001448 0x0000000f 0x00000000
0x0000144c 0x0000000f 0x00000000
0x00001450 0x0000000f 0x00000000
0x00001454 0x0000000f 0x00000000
0x00001458 0x0000000f 0x00000000
0x0000145c 0x0000000f 0x00000000
0x00001460 0x0000000f 0x00000000
0x00001464 0x0000000f 0x00000000
0x00001468 0x0000000f 0x00000000
0x0000146c 0x0000000f 0x00000000
0x00001470 0x0000000f 0x00000000
0x00001474 0x0000000f 0x00000000
0x00001478 0x0000000f 0x00000000
0x0000147c 0x0000000f 0x00000000
0x00001800 0x00000000 0x00000006
0x00001804 0x00000004 0x00000000
0x00001808 0xffffffff 0x00000000
0x0000180c 0xffffffff 0x00000000
0x00001810 0xffffffff 0x00000000
0x00001814 0xffffffff 0x00000000
0x00001818 0xffffffff 0x00000000
0x0000181c 0xffffffff 0x00000000
0x00001820 0xffffffff 0x00000000
0x00001824 0xffffffff 0x00000000
0x00001828 0xffffffff 0x00000000
0x0000182c 0xffffffff 0x00000000
0x00001830 0xffffffff 0x00000000
0x00001834 0xffffffff 0x00000000
0x00001838 0xffffffff 0x00000000
0x0000183c 0xffffffff 0x00000000
0x00001840 0xffffffff 0x00000000
0x00001844 0xffffffff 0x00000000
0x00001c00 0x00000000 0x00000002
```

```
0x00002000 0x00000000 0x0000001e
0x00002004 0x0000001c 0x00000000
0x0000200c 0xffffffff 0x00000000
0x00002010 0x00000000 0x00003fff
0x00002014 0x00000000 0x00000003
0x00002100 0xffffffff 0x00000000
0x00002104 0xffffffff 0x00000000
0x00002108 0xffffffff 0x00000000
0x00002110 0xffffffff 0x00000000
0x00002114 0xffffffff 0x00000000
0x00002118 0xffffffff 0x00000000
0x00002120 0xffffffff 0x00000000
0x00002124 0xffffffff 0x00000000
0x00002128 0xffffffff 0x00000000
0x00002130 0xffffffff 0x00000000
0x00002134 0xffffffff 0x00000000
0x00002138 0xffffffff 0x00000000
0x00002140 0xffffffff 0x00000000
0x00002144 0xffffffff 0x00000000
0x00002148 0xffffffff 0x00000000
0x00002150 0xffffffff 0x00000000
0x00002154 0xffffffff 0x00000000
0x00002158 0xffffffff 0x00000000
0x00002160 0xffffffff 0x00000000
0x00002164 0xffffffff 0x00000000
0x00002168 0xffffffff 0x00000000
0x00002170 0xffffffff 0x00000000
0x00002174 0xffffffff 0x00000000
0x00002178 0xffffffff 0x00000000
0x00002180 0xffffffff 0x00000000
0x00002184 0xffffffff 0x00000000
0x00002188 0xffffffff 0x00000000
0x00002190 0xffffffff 0x00000000
0x00002194 0xffffffff 0x00000000
0x00002198 0xffffffff 0x00000000
0x000021a0 0xffffffff 0x00000000
0x000021a4 0xffffffff 0x00000000
0x000021a8 0xffffffff 0x00000000
0x000021b0 0xffffffff 0x00000000
0x000021b4 0xffffffff 0x00000000
0x000021b8 0xffffffff 0x00000000
0x000021c0 0xffffffff 0x00000000
0x000021c4 0xffffffff 0x00000000
0x000021c8 0xffffffff 0x00000000
0x000021d0 0xffffffff 0x00000000
0x000021d4 0xffffffff 0x00000000
0x000021d8 0xffffffff 0x00000000
0x000021e0 0xffffffff 0x00000000
0x000021e4 0xffffffff 0x00000000
0x000021e8 0xffffffff 0x00000000
0x000021f0 0xffffffff 0x00000000
```

```
0x000021f4 0xffffffff 0x00000000
0x000021f8 0xffffffff 0x00000000
0x00002200 0x000003ff 0x00000000
0x00002204 0x000003ff 0x00000000
0x00002208 0x000003ff 0x00000000
0x0000220c 0x000003ff 0x00000000
0x00002210 0x000003ff 0x00000000
0x00002214 0x000003ff 0x00000000
0x00002218 0x000003ff 0x00000000
0x0000221c 0x000003ff 0x00000000
0x00002220 0x000003ff 0x00000000
0x00002224 0x000003ff 0x00000000
0x00002228 0x000003ff 0x00000000
0x0000222c 0x000003ff 0x00000000
0x00002230 0x000003ff 0x00000000
0x00002234 0x000003ff 0x00000000
0x00002238 0x000003ff 0x00000000
0x0000223c 0x000003ff 0x00000000
0x00002240 0x000003ff 0x00000000
0x00002244 0x000003ff 0x00000000
0x00002248 0x000003ff 0x00000000
0x0000224c 0x000003ff 0x00000000
0x00002250 0x000003ff 0x00000000
0x00002254 0x000003ff 0x00000000
0x00002258 0x000003ff 0x00000000
0x00002400 0x00000000 0x0000001e
0x00002404 0x0000001c 0x00000000
0x00002408 0x00000000 0x0000ffff
0x00002440 0x00000000 0xffffffff
0x00002444 0x00000000 0xffffffff
0x0000244c 0x00000000 0xffffffff
0x00002450 0x00000000 0xffffffff
0x00002454 0x00000000 0xffffffff
0x0000245c 0x00000000 0xffffffff
0x00002460 0x00000000 0xffffffff
0x00002464 0x00000000 0xffffffff
0x0000246c 0x00000000 0xffffffff
0x00002470 0xffffffff 0x00000000
0x00002474 0xffffffff 0x00000000
0x00002478 0xffffffff 0x00000000
0x00002480 0xffffffff 0x00000000
0x00002484 0xffffffff 0x00000000
0x00002488 0xffffffff 0x00000000
0x0000248c 0xffffffff 0x00000000
0x00002490 0xffffffff 0x00000000
0x00002494 0xffffffff 0x00000000
0x00002498 0xffffffff 0x00000000
0x0000249c 0xffffffff 0x00000000
0x000024a0 0xffffffff 0x00000000
0x000024a4 0xffffffff 0x00000000
0x000024a8 0xffffffff 0x00000000
```

```
0x000024ac 0xffffffff 0x00000000
0x000024b0 0xffffffff 0x00000000
0x000024b4 0xffffffff 0x00000000
0x000024b8 0xffffffff 0x00000000
0x000024bc 0xffffffff 0x00000000
0x000024c0 0xffffffff 0x00000000
0x00002800 0x00000000 0x00000002
0x00002c00 0x00000000 0x00000004
0x00002c04 0x00000004 0x00000000
0x00002c14 0x00000000 0xffffffff
0x00002c18 0x00000000 0xffffffff
0x00002c1c 0x00000000 0xffffffff
0x00003000 0x00000000 0x00000006
0x00003004 0x00000004 0x00000000
0x00003008 0x00000000 0x0000000f
0x0000300c 0x00000000 0x0000001f
0x00003010 0x00000000 0x0000003f
0x00003400 0x00000000 0x00000004
0x00003404 0x00000004 0x00000000
0x00003800 0x00000000 0x00000006
0x00003804 0x00000004 0x00000000
0x00003c00 0x00000000 0x00000002
0x00003c04 0x00000004 0x00000000
0x00003c08 0x00000000 0xffffffff
0x00003c0c 0x00000000 0xffffffff
0x00003c10 0x00000000 0xffffffff
0x00003c14 0x00000000 0xffffffff
0x00003c18 0x00000000 0xffffffff
0x00003c1c 0x00000000 0xffffffff
0x00003c20 0x00000000 0xffffffff
0x00003c24 0x00000000 0xffffffff
0x00003c28 0x00000000 0xffffffff
0x00003c30 0x00000000 0xffffffff
0x00003c34 0x00000000 0xffffffff
0x00003c38 0x00000000 0xffffffff
0x00003c3c 0x00000000 0xffffffff
0x00003c40 0xffffffff 0x00000000
0x00003c44 0xffffffff 0x00000000
0x00003c80 0x00000000 0x000007ff
0x00003c84 0x00000000 0x000007ff
0x00003c88 0x00000000 0x000007ff
0x00003c8c 0x00000000 0x000007ff
0x00003c90 0x00000000 0x000007ff
0x00003c94 0x00000000 0x000007ff
0x00003c98 0x00000000 0x000007ff
0x00003c9c 0x00000000 0x000007ff
0x00003ca0 0x00000000 0x000007ff
0x00003ca4 0x00000000 0x000007ff
0x00003ca8 0x00000000 0x000007ff
0x00003cac 0x00000000 0x000007ff
0x00003cb0 0x00000000 0x000007ff
```

```
0x00003cb4 0x00000000 0x000007ff
0x00003cb8 0x00000000 0x000007ff
0x00003cbc 0x00000000 0x000007ff
0x00003cc0 0x00000000 0x000001ff
0x00003cc4 0x00000000 0x000001ff
0x00003cc8 0x00000000 0x000001ff
0x00003ccc 0x00000000 0x000001ff
0x00003cd0 0x00000000 0x000001ff
0x00003cd4 0x00000000 0x000001ff
0x00003cd8 0x00000000 0x000001ff
0x00003cdc 0x00000000 0x000001ff
0x00003ce0 0x00000000 0x000001ff
0x00003ce4 0x00000000 0x000001ff
0x00003ce8 0x00000000 0x000001ff
0x00003cec 0x00000000 0x000001ff
0x00003cf0 0x00000000 0x000001ff
0x00003cf4 0x00000000 0x000001ff
0x00003cf8 0x00000000 0x000001ff
0x00003cfc 0x00000000 0x000001ff
0x00004000 0x00000000 0x03fffffe
0x00004004 0x00000000 0x00000000
0x00004008 0x00000000 0x001fffff
0x0000400c 0x00000000 0x001fffff
0x00004400 0x00000000 0x00000000
0x00004404 0x00000014 0x00000000
0x00004408 0x00000000 0x007fffff
0x0000440c 0x00000000 0x007fffff
0x00004410 0x00000000 0x0000ffff
0x00004414 0x00000000 0x0000ffff
0x00004418 0x00000000 0x0000ffff
0x0000441c 0x00000000 0x0000ffff
0x00004420 0xffffffff 0x00000000
0x00004424 0x00000000 0x0000ffff
0x00004428 0xffffffff 0x00000000
0x0000442c 0xffffffff 0x00000000
0x00004430 0xffffffff 0x00000000
0x00004434 0x00000000 0x000001ff
0x00004438 0x00000000 0x000001ff
0x00004440 0xffffffff 0x00000000
0x00004448 0xffffffff 0x00000000
0x0000444c 0xffffffff 0x00000000
0x00004450 0xffffffff 0x00000000
0x00004454 0xffffffff 0x00000000
0x00004800 0x00000000 0x000003fc
0x00004804 0x00000000 0x00000000
0x00004c00 0x00000000 0x000003fc
0x00004c04 0x000003fc 0x00000000
0x00005800 0x00000000 0xffffffff
0x00005804 0x00000000 0xffffffff
0x00005808 0x00000000 0xffffffff
0x0000580c 0x00000000 0xffffffff
```

```
0x00005810 0x00000000 0xffffffff
0x00005814 0x00000000 0xffffffff
0x00005818 0x00000000 0xffffffff
0x0000581c 0x00000000 0xffffffff
0x00005820 0x00000000 0xffffffff
0x00005824 0x00000000 0xffffffff
0x00005828 0x00000000 0xffffffff
0x0000582c 0x00000000 0xffffffff
0x00005830 0x00000000 0xffffffff
0x00005834 0x00000000 0xffffffff
0x00005838 0x00000000 0xffffffff
0x0000583c 0x00000000 0xffffffff
0x00005840 0x00000000 0xffffffff
0x00005844 0x00000000 0xffffffff
0x00005848 0x00000000 0xffffffff
0x0000584c 0x00000000 0xffffffff
0x00005850 0x00000000 0xffffffff
0x00005854 0x00000000 0xffffffff
0x00005858 0x00000000 0xffffffff
0x0000585c 0x00000000 0xffffffff
0x00005860 0x00000000 0xffffffff
0x00005864 0x00000000 0xffffffff
0x00005868 0x00000000 0xffffffff
0x0000586c 0x00000000 0xffffffff
0x00005870 0x00000000 0xffffffff
0x00005874 0x00000000 0xffffffff
0x00005878 0x00000000 0xffffffff
0x0000587c 0x00000000 0xffffffff
0x00005880 0x00000000 0xffffffff
0x00005884 0x00000000 0xffffffff
0x00005888 0x00000000 0xffffffff
0x0000588c 0x00000000 0xffffffff
0x00005890 0x00000000 0xffffffff
0x00005894 0x00000000 0xffffffff
0x00005898 0x00000000 0xffffffff
0x0000589c 0x00000000 0xffffffff
0x000058a0 0x00000000 0xffffffff
0x000058a4 0x00000000 0xffffffff
0x000058a8 0x00000000 0xffffffff
0x000058ac 0x00000000 0xffffffff
0x000058b0 0x00000000 0xffffffff
0x000058b4 0x00000000 0xffffffff
0x000058b8 0x00000000 0xffffffff
0x000058bc 0x00000000 0xffffffff
0x000058c0 0x00000000 0xffffffff
0x000058c4 0x00000000 0xffffffff
0x000058c8 0x00000000 0xffffffff
0x000058cc 0x00000000 0xffffffff
0x000058d0 0x00000000 0xffffffff
0x000058d4 0x00000000 0xffffffff
0x000058d8 0x00000000 0xffffffff
```

```
0x000058dc  0x00000000  0xffffffff
0x000058e0  0x00000000  0xffffffff
0x000058e4  0x00000000  0xffffffff
0x000058e8  0x00000000  0xffffffff
0x000058ec  0x00000000  0xffffffff
0x000058f0  0x00000000  0xffffffff
0x000058f4  0x00000000  0xffffffff
0x000058f8  0x00000000  0xffffffff
0x000058fc  0x00000000  0xffffffff
0x00005900  0x00000000  0xffffffff
0x00005904  0x00000000  0xffffffff
0x00005908  0x00000000  0xffffffff
0x0000590c  0x00000000  0xffffffff
0x00005910  0x00000000  0xffffffff
0x00005914  0x00000000  0xffffffff
0x00005918  0x00000000  0xffffffff
0x0000591c  0x00000000  0xffffffff
0x00005920  0x00000000  0xffffffff
0x00005924  0x00000000  0xffffffff
0x00005928  0x00000000  0xffffffff
0x0000592c  0x00000000  0xffffffff
0x00005930  0x00000000  0xffffffff
0x00005934  0x00000000  0xffffffff
0x00005938  0x00000000  0xffffffff
0x0000593c  0x00000000  0xffffffff
0x00005940  0x00000000  0xffffffff
0x00005944  0x00000000  0xffffffff
0x00005948  0x00000000  0xffffffff
0x0000594c  0x00000000  0xffffffff
0x00005950  0x00000000  0xffffffff
0x00005954  0x00000000  0xffffffff
0x00005958  0x00000000  0xffffffff
0x0000595c  0x00000000  0xffffffff
0x00005960  0x00000000  0xffffffff
0x00005964  0x00000000  0xffffffff
0x00005968  0x00000000  0xffffffff
0x0000596c  0x00000000  0xffffffff
0x00005970  0x00000000  0xffffffff
0x00005974  0x00000000  0xffffffff
0x00005978  0x00000000  0xffffffff
0x0000597c  0x00000000  0xffffffff
0x00005980  0x00000000  0xffffffff
0x00005984  0x00000000  0xffffffff
0x00005988  0x00000000  0xffffffff
0x0000598c  0x00000000  0xffffffff
0x00005990  0x00000000  0xffffffff
0x00005994  0x00000000  0xffffffff
0x00005998  0x00000000  0xffffffff
0x0000599c  0x00000000  0xffffffff
0x000059a0  0x00000000  0xffffffff
0x000059a4  0x00000000  0xffffffff
```

```
0x000059a8  0x00000000  0xffffffff
0x000059ac  0x00000000  0xffffffff
0x000059b0  0x00000000  0xffffffff
0x000059b4  0x00000000  0xffffffff
0x000059b8  0x00000000  0xffffffff
0x000059bc  0x00000000  0xffffffff
0x000059c0  0x00000000  0xffffffff
0x000059c4  0x00000000  0xffffffff
0x000059c8  0x00000000  0xffffffff
0x000059cc  0x00000000  0xffffffff
0x000059d0  0x00000000  0xffffffff
0x000059d4  0x00000000  0xffffffff
0x000059d8  0x00000000  0xffffffff
0x000059dc  0x00000000  0xffffffff
0x000059e0  0x00000000  0xffffffff
0x000059e4  0x00000000  0xffffffff
0x000059e8  0x00000000  0xffffffff
0x000059ec  0x00000000  0xffffffff
0x000059f0  0x00000000  0xffffffff
0x000059f4  0x00000000  0xffffffff
0x000059f8  0x00000000  0xffffffff
0x000059fc  0x00000000  0xffffffff
0x00005a04  0x00000000  0xffffffff
0x00005a0c  0x00000000  0xffffffff
0x00005c10  0x00000000  0x00000005
0x00005c14  0xffffffff  0x00000000
0x00005c24  0xffffffff  0x00000000
0x00005c34  0xffffffff  0x00000000
0x00005c44  0xffffffff  0x00000000
0x00005c54  0xffffffff  0x00000000
0x00005c64  0xffffffff  0x00000000
0x00005c74  0xffffffff  0x00000000
0x00005c84  0xffffffff  0x00000000
0x00005c94  0xffffffff  0x00000000
0x00005ca4  0xffffffff  0x00000000
0x00005cb4  0xffffffff  0x00000000
0x00005cc4  0xffffffff  0x00000000
0x00005cd4  0xffffffff  0x00000000
0x00005ce4  0xffffffff  0x00000000
0x00005cf4  0xffffffff  0x00000000
0x00005d04  0xffffffff  0x00000000
0x00005d14  0xffffffff  0x00000000
0x00006000  0x00000000  0x0000007e
0x00006400  0x00000000  0x00000002
0x00006800  0x00000000  0xfffffff7
0x00006804  0x0001e000  0x00000ffe
0x00006808  0x00000000  0x03ffc008
```

A3. Interrupt Test

Command: intrtest

Function: This test verifies the interrupt functionality. It enables interrupt and waits for interrupt to occur. It waits for 500ms and reports error if could not generate interrupts.

Default: Enabled

A4. BIST

Command: bist

Function: Hardware Built–In–Self–Test (BIST). This test initiates BIST, and wait for the test result returned by hardware.

Default: Due to the intermittent failure, this test is currently disabled by default

A5. PCI Cfg Register Test

Command: pcicfg

Function: This test verifies the access integrity of the PCI config registers.

B1. Scratch Pad Test

Command: memtest –s

Function: This test tests the scratch pad SRAM on board. The following tests are performed:

Data Pattern Test: Write test data into SRAM, read back to ensure data is correct. The test data used is 0x00000000, 0xffffffff, 0xaa55aa55, and 0x55aa55aa.

Alternate Data Pattern Test: Write test data into SRAM. Write complement test data into next address. Read back both data to insure the data is correct. After the test, the program reads back data one more time to insure the data stays correct. The test data used is 0x00000000, 0xffffffff, 0xaa55aa55, and 0x55aa55aa.

Address Test: Write each address with unique increment data. Read back data to insure data is correct. After fill the entire data with the unique data, the program reads back data again to insure data stays the same.

WalkingOne bit Test: For each address. Data one is written and read back for testing. Then shift the data left one bit, so the data becomes two and do the same test again. It repeats for 32 times until the test bit is shifted out of test data. The same is test is repeated for entire test range.

Pseudo Random Data Test: A pre–calculated pseudo random data is used to write a unique data into each test RAM. After the first pass the test, the program reads back one more time to insure data stays correct.

Default: Enabled

B2. BD SRAM Test

Command: memtest –b

Function: This test tests the BD SRAM. This performs exact the same way of testing as described in B1. Scratch Pad Test.

Default: Enabled

B3. DMA SRAM Test

Command: memtest –d

Function: It tests DMA SRAM by performing the tests described in test B1. The Scratch Pad Test.

Default: Enabled

B4. MBUF SRAM Test

Command: memtest –m

Function: It tests DMA SRAM by performing the tests described in test B1. The Scratch Pad Test.

Default: Enabled

B5. MBUF SRAM via DMA Test

Command: memtest –x

Function: Eight test pattern data are used in the test. They are described below. A 0x1000 sized data buffer is used for this test. Before each pattern test, the buffer is initialized and filled with the test pattern. It then, performs size 0x1000 transmit DMA from host buffer to NIC MBUF memory. Verify the data integrity in MBUF against host memory and repeat the DMA for the entire MBUF buffer. Then it performs receive DMA from NIC to host. The 0x1000–byte test buffer is cleared to zero before each receive–DMA. Verify the data integrity and test is repeated for the entire MBUF SRAM range.

Test Pattern	Description
"16 00's 16 FF's"	Full the entire host DMA buffer with 16 bytes of 00's and then 16 bytes of FF's.
"16 FF's 16 0's"	Full the entire host DMA buffer with 16 bytes of 00's and then 16 bytes of FF's.
"32 00's 32 FF's"	Full the entire host DMA buffer with 32 bytes of 00's and then 32 bytes of FF's.

"32 FF's 32 00's"	Full the entire host DMA buffer with 32 bytes of FF's and then 32 bytes of 00's.
"00000000's"	Full the entire host DMA buffer with all zeros.
"FFFFFFFF's"	Full the entire host DMA buffer with all FF's.
"AA55AA55's"	Full the entire host DMA buffer with data 0xAA55AA55.
"55AA55AA's"	Full the entire host DMA buffer with data 0xAA55AA55.

Default: Enabled

B6. External SRAM Test

Command: memtest –e

Function: It tests DMA SRAM by performing the tests described in test B1. The Scratch Pad Test.

Default: Disabled

C1. EEPROM Test

Command: setest

Function: An increment test data is used in EEPROM test. It fills the test data into the test range and read back to verity the content. After the test, it fills data with zero to clear the memory.

Default: Enabled

C2. CPU Test

Command: cputest

Function: This test opens the file cpu.bin. If file exists and content is good, it loads code to rx and tx CPU and verifies CPU execution.

Default: Enabled

C3. DMA Test

Command: dmatest

Function: Both high and low priorities DMA are tested. It moves data from host memory to NIC SRAM, verifies data, and then moves data back to host memory again to verify data.

Default: Enabled

C4. MII Test

Command: miitest

Function: The function is identical to A2. Control Register Test. Each Register specified in the configuration contents read only bit and read/write bit defines. The test writing zero and one into the test bits to insure the read only bits value are not changed, and read/write bits are changed accordingly.

Default: Test Enabled.

Default Register table

The test will try to read the register configuration file 'miireg.txt' for the register defines. If the file does not exists, the following table is used:

Offset	R/O Mask	R/W Mask
0x00	0x0000	0x7180
0x02	0xffff	0x0000
0x03	0xffff	0x0000
0x04	0x0000	0xffff
0x05	0xefff	0x0000
0x06	0x0001	0x0000
0x07	0x0800	0xb7ff
0x08	0xffff	0x0000
0x09	0x0000	0xff00
0x0a	0x7c00	0x0000
0x10	0x0000	0xffbf
0x11	0x3300	0x0000
0x19	0x001f	0x0000
0x1e	0x0000	0xffff
0x1f	0x0000	0xffff

C5. VPD Test

Command: vpdtest

Function: It saves the content of VPD first before perform the test. Once it is done, it writes one of the five pattern test data, 0xff, 0xaa, 0x55, increment data, or decrement data, into VPD memory. By default, increment data pattern is used. It writes and reads back the data for the entire test range, and then restores the original content.

Default: Disabled

C6. ASF Test

Command: asftest

Function: m

1. **Reset test.**

Setting reset bit, poll for self–clearing. Verify reset value of registers.

2. **Event Mapping Test**

Setting SMB_ATTN bit. By changing ASF_ATTN LOC bits, verify the mapping bits in TX_CPU or RX_CPU event bits.

3. **Counter Test**

Clear WG_TO, HB_TO, PA_TO, PL_TO, RT_TO bits by setting those bits. Make sure the bits clear.

Clear Timestamp Counter. Writing a value 1 into each PL, PA, HB, WG, RT counters. Set TSC_EN bit.

Poll each PA_TO bit and count up to 50 times. Check if PL_TO gets set at the end of 50 times. Continue to count up to 200 times. Check if all other TO bits are set and verify Timestamp Counter is incremented.

C7. ROM Expansion Test

Command: romtest

Function: This function tests the ability to enable/disable/access the expansion rom on the device.

D1. Mac Loopback Test

Command: pkttest –m

Function: This is internal loopback data transmit/receive test. It initializes MAC into internal loopback mode, and transmits 100 packets. The data should be routed back to receive channel and receive by the receive routine, which verifies the integrity of data. One Gigabit rate is used for this test.

Default: Enabled

D2. Phy Loopback Test

Command: pkttest –p

Function: This test is same as D1. Mac Loopback Test except, the data is routed back via physical layer device. One Giga bit rate is used for this test.

Default: Enabled

D3. RJ45 Loopback Test

Command: pkttest –e

Function: This is external loopback test. From the UUT point of view, no loopback mode is configured. The data expected to be routed back by RJ45 loopback connector. 100M/s and 1000M/s are used for this test.

Default: Disabled

D4. MII Miscellaneous Test

Command: None

Function: This function tests the auto–polling and phy–interrupt capabilities.
These are the functionalities of the phy.

Default: Enabled

D5. MSI Test

Command: msitest

Function:

Default: Disabled

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Error Messages

```
/* 0 */          "PASS",
/* 1 */          "Got 0x%08X @ 0x%08X. Expected 0x%08X",
/* 2 */          "Cannot perform task while chip is running",
/* 3 */          "Invalid NIC device",
/* 4 */          "Read only bit %s got changed after writing zero at offset 0x%X",
/* 5 */          "Read only bit %s got changed after writing one at offset 0x%X",
/* 6 */          "Read/Write bit %s did not get cleared after writing zero at offset 0x%X",
/* 7 */          "Read/Write bit %s did not get set after writing one at offset 0x%X",
/* 8 */          "BIST failed",
/* 9 */          "Could not generate interrupt",
/* 10 */         "Aborted by user",
/* 11 */         "Tx DMA:Got 0x%08X @ 0x%08X. Expected 0x%08X",
/* 12 */         "Rx DMA:Got 0x%08X @ 0x%08X. Expected 0x%08X",
/* 13 */         "Tx DMA failed",
/* 14 */         "Rx DMA failed",
/* 15 */         "Data error, got 0x%08X at 0x%08X, expected 0x%08X",
/* 16 */         "Second read error, got 0x%08X at 0x%08X, expected 0x%08X",
/* 17 */         "Failed writing EEPROM at 0x%04X",
/* 18 */         "Failed reading EEPROM at 0x%04X",
/* 19 */         "EEPROM data error, got 0x08X at 0x04X, expected 0x%08X",
/* 20 */         "Cannot open file %s",
/* 21 */         "Invalid CPU image file %s",
/* 22 */         "Invalid CPU image size %d",
/* 23 */         "Cannot allocate memory",
/* 24 */         "Cannot reset CPU",
/* 25 */         "Cannot release CPU",
/* 26 */         "CPU test failed",
/* 27 */         "Invalid Test Address Range\nValid NIC address is 0x%08X-0x%08X and exclude 0x%
/* 28 */      "DMA:Got 0x%08X @ 0x%08X. Expected 0x%08X",
/* 29 */         "Unsupported PhyId %04X:%04X",
```

```
/* 30 */         "Too many registers specified in the file, max is %d",
/* 31 */         "Cannot write to VPD memory",
/* 32 */         "VPD data error, got %08X @ 0x04X, expected %08X",
/* 33 */         "No good link! Check Loopback plug",
/* 34 */         "Cannot TX Packet!",
/* 35 */         "Requested to Tx %d. Only %d is transmitted",
/* 36 */         "Expected %d packets. Only %d good packet(s) have been received\n%d unknown pac
/* 37 */         "%c%d is an invalid Test",
/* 38 */         "EEPROM checksum error",
/* 39 */         "Error in reading WOL/PXE",
/* 40 */         "Error in writing WOL/PXE",
/* 41 */         "No external memory detected",
/* 42 */         "DMA buffer %04X is large, size must be less than %04X",
/* 43 */         "File size %d is too big, max is %d",
/* 44 */         "Invalid %s",
/* 45 */         "Failed writing 0x%x to 0x%x",
/* 46 */         "",
/* 47 */         "Ambiguous command",
/* 48 */         "Unknown command",
/* 49 */         "Invalid option",
/* 50 */         "Cannot perform task while chip is not running. (need driver)",
/* 51 */         "Cannot open register define file or content is bad",
/* 52 */         "ASF Reset bit did not self-cleared",
/* 53 */         "ATTN_LOC %d cannot be mapped to %cX CPU event bit %d",
/* 54 */         "%s Regsiter is not cleared to zero after reset",
/* 55 */         "Cannot start poll_ASF Timer",
/* 56 */         "poll_ASF bit did not get reset after acknowleged",
/* 57 */         "Timestamp Counter is not counding",
/* 58 */         "%s Timer is not working",
/* 59 */         "Cannot clear bit %s in %cX CPU event register",
/* 60 */         "Invalid "EEPROM_FILENAME" file size, expected %d but only can read %d bytes",
/* 61 */         "Invalid magic value in %s, expected %08x but found %08x",
/* 62 */         "Invalid manufature revision, expected %c but found %c",
/* 63 */         "Invalid Boot Code revision, expected %d.%d but found %d.%d",
/* 64 */         "Cannot write to EEPROM",
/* 65 */         "Cannot read from EEPROM",
/* 66 */         "Invalid Checksum",
/* 67 */         "Invalid Magic Value",
/* 68 */         "Invalid MAC address, expected %02X-%02X-%02X-%02X-%02X-%02X",
/* 69 */         "Slot error, expected an UUT to be found at location %02X:%02X:00",
/* 70 */         "Adjacent memory has been corrupted while testing block 0x%08x-0x%08x\nGot 0x%0
/* 71 */         "The function is not Supported in this chip",
/* 72 */         "Packets received with CRC error",
/* 73 */         "MII error bits set: %04x",
/* 74 */         "CPU does not initialize MAC address register correctly",
/* 75 */         "Invalid firmware file format",
/* 76 */         "Resetting TX CPU Failed",
/* 77 */         "Resetting RX CPU Failed",
/* 78 */         "Invalid MAC address",
/* 79 */         "Mac address registers are not initialized correctly",
/* 80 */         "EEPROM Bootstrap checksum error",
```

Please read all restrictions and disclaimers.

Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

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Restrictions and Disclaimers

Release: 5700–UM403–R, September 20, 2002 (Version 6.5.x)

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Installing the Hardware: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

● System Requirements

● Safety Precautions

● Pre–Installation Checklist

● Adapter Installation Process

● Connecting the Network Cables

System Requirements

Before installing the Gigabit Ethernet Adapter, make sure your system meets the requirements listed for your operating system:

Windows 2000, NT, and .NET Requirements

- Pentium–based computer that meets Windows 2000 software requirements

- One open 32–bit or 64–bit PCI slot

- PCI v2.2 33/66 MHz Bus Interface (5700/5701/5703)

- PCI–X v1.0 64–bit 100 MHz Bus Interface (5701 only)

- 128 MB RAM (minimum)

- Microsoft Windows 2000 Server, Microsoft Windows 2000 Advanced Server, or Microsoft Windows Datacenter (Windows 2000 only)

- Microsoft Windows NT 4.0 Server with Service Pack 4 or later (Windows NT only)

- Microsoft Windows .NET Server, or Microsoft Windows .NET Enterprise Server (Windows .NET only)

NetWare Requirements

- Pentium–based computer that meets Novell NetWare 5.1 and 6.0 software requirements

- One open 32–bit or 64–bit PCI slot

- PCI v2.2 33/66 MHz Bus Interface (5700/5701/5703)

- PCI–X v1.0 64–bit 100 MHz Bus Interface (5701 only)

- 64 MB RAM (minimum)

- One of the following versions of Novell NetWare:
  - ◆ Novell NetWare 5.1 and 6.0, with Support Pack 3 or the most recent NetWare 5 Support Pack

You can get the appropriate updates from the Novell support website http://www.novell.com.

Linux Requirements

- Pentium–based computer that meets Linux software requirements

- One open 32–bit or 64–bit PCI slot

- PCI v2.2 33/66 MHz Bus Interface (5700/5701/5703)

- PCI–X v1.0 64–bit 100 MHz Bus Interface (5701 only)

- 128 MB RAM (minimum)

NOTE – Although the driver should work with many Linux kernel versions and distributions, it has only been tested on Red Hat 7.1, 7.2, and 7.3 Linux distributions for i386 and IA64 (kernel version 2.4.x). Furthermore, the driver has only been tested as a loadable module.

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Safety Precautions

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.

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Pre–Installation Checklist

1. Check that your server meets the hardware and software requirements listed under "System Requirements."

2. Verify that your system is using the latest BIOS.
3. Review the information in the readme.txt file on the CD–ROM for important information not available at the time this manual was created.

> *NOTE – If you acquired the adapter software on floppy disk or from the Broadcom support website, enter the path to where the adapter driver files reside on your system.*

4. If your system is active, shut it down.

5. When system shut down is complete, power OFF and unplug your system.
6. Holding the adapter card by the edges, remove it from its shipping package and place it on an antistatic surface.
7. Check the adapter for visible signs of damage, particularly on the card's edge connector. Never attempt to install any damaged adapter. If the adapter is damaged, report it to Broadcom.

Adapter Installation Process

The following instructions apply to installing the gigabit ethernet adapter in most systems. Refer to the manuals that were supplied with your system for details about performing these tasks on your particular system.

1. Review the Precautions and Pre–Installation Checklist. 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.
2. Remove the system cover, and select any empty PCI/PCI–X slot. If you do not know how to identify a PCI slot, refer to your system documentation.
3. Remove the blank cover–plate from the slot that you selected.
4. Holding the PCI/PCI–X card by the edges, align the adapter's connector edge with the PCI connector dock in the system.

> *NOTE – The connector dock in a 32–bit PCI slot is shorter than in a 64–bit PCI slot. Although the adapter is designed to fit in either slot type, when installed in a 32–bit PCI slot, part of the adapter's connector edge will remain undocked. This is perfectly normal.*

5. Applying even pressure at both corners of the card, push the adapter card until it is firmly seated in the PCI/PCI–X slot. When properly seated, the adapter's port connectors will be aligned with the slot opening, and its faceplate will be flush against the system chassis.

> **Caution—Do not use excessive force when seating the card, as 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 adapter with the adapter clip or screw.
7. Replace the system cover and disconnect any personal antistatic devices.

8. Power the system on.

Once the system returns to proper operation, the adapter hardware is fully installed. You must next connect the network cables.

Connecting the Network Cables

The BCM5700, 01, 02, and 03C adapters have one RJ−45 connector used for attaching the system to an Ethernet copper−wire segment. When automatic link negotiation is disabled, the port can be configured for 10 Mbps, 100 Mbps, or 1000 Mbps signaling and either half−duplex or full−duplex operation.

The BCM5701S, 03S base adapter has one fiber optic connector for attaching the system to a compatible link partner, or an IEEE 802.3z compliant gigabit switch. Upon connecting the system to the network and power is supplied, the adapter performs autonegotiation and attempts to establish the connection at 1000 Mbps full−duplex, only.

Perform the following procedure for connecting a network cable to the Gigabit Ethernet Adapter:

1. Prepare an appropriate cable. Table 1 lists the cable characteristics for connecting to 10/100/1000BASE−T ports, and Table 2 lists the cable characteristics for connecting to 1000BASE−SX fiber optic ports:

Table 1. 10/100/1000BASE−T Cable Specifications

Port Type	Connector	Media	Maximum Distance
10BASE−T	RJ−45	Cat. 3, 4, or 5 UTP	100 meters (328 feet)
100/1000BASE−T	RJ−45	Cat. 5 UTP	100 meters (328 feet)

Note – 1000BASE−T signaling requires four twisted pairs of Category 5 balanced cabling, as specified in ISO/IEC 11801:1995 and EIA/TIA−568−A (1995) and tested using procedures defined in TIA/EIA TSB95.

Table 2. 1000BASE−SX Fiber Optic Cable Specifications

Port Type	Connector	Media	Maximum Distance
1000BASE−SX	Fiber Optic	50 um multimode	550 meters (1,804 feet)
1000BASE−SX	Fiber Optic	62.5 um multimode	260 meters (853 feet)

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

2. Connect one end of the cable to the Adapter.

3. Connect the other end of the cable to the appropriate Ethernet network port or fiber optic port.

> *Note – Once the cable is properly connected at both ends, the adapter port LEDs should be functional. See Table 1 or Table 2 in "Introduction" for a description of adapter port LED operation. For driver installation and configuration instructions, refer to the software configuration for that specific driver.*

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Introduction: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

● Functional Description

● Features

● Physical Description

● Broadcom Advanced Server Program Overview

● Broadcom Advanced Server Program for Windows .NET

● Broadcom Advanced Server Program for Windows 2000

● Broadcom Advanced Server Program for Windows NT

● Broadcom Advanced Control Suite

● Broadcom Advanced Server Program for Novell NetWare

● Broadcom Advanced Server Program for Linux

● Creating a Driver Disk

Functional Description

The Gigabit Ethernet Adapter targets the increased congestion experienced at the backbone and server in today's networks, and provides a future upgrade path for high−end workstations that require more bandwidth than Fast Ethernet can provide.

The Broadcom NetXtreme™ Gigabit Ethernet Adapter connects a PCI or PCI−X (5701, 5702, 5703) compliant server or workstation to a Gigabit Ethernet network. This adapter incorporates a technology that transfers data at a maximum rate of one gigabit per second—10 times the rate of Fast Ethernet adapters.

The BCM5700, 5701, 02, 03 base adapters utilize twisted−pair media. At 100 or 1000 Mbps, the adapter uses 4−pair Category 5 cabling and Category 3 when they are running at 10 Mbps.
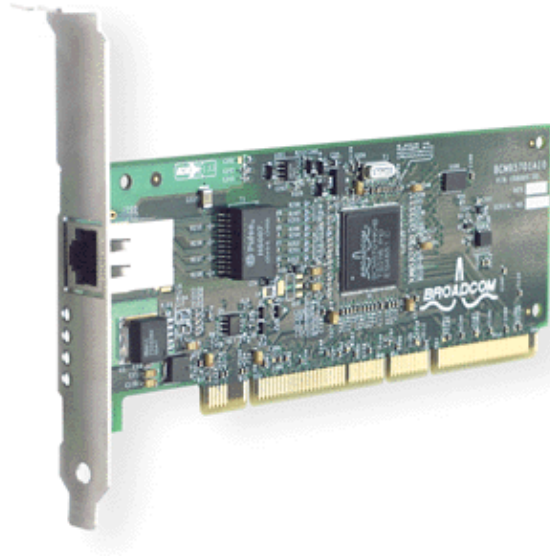
Figure 1. The Broadcom NetXtreme™ Gigabit Ethernet Adapter (5701 shown)
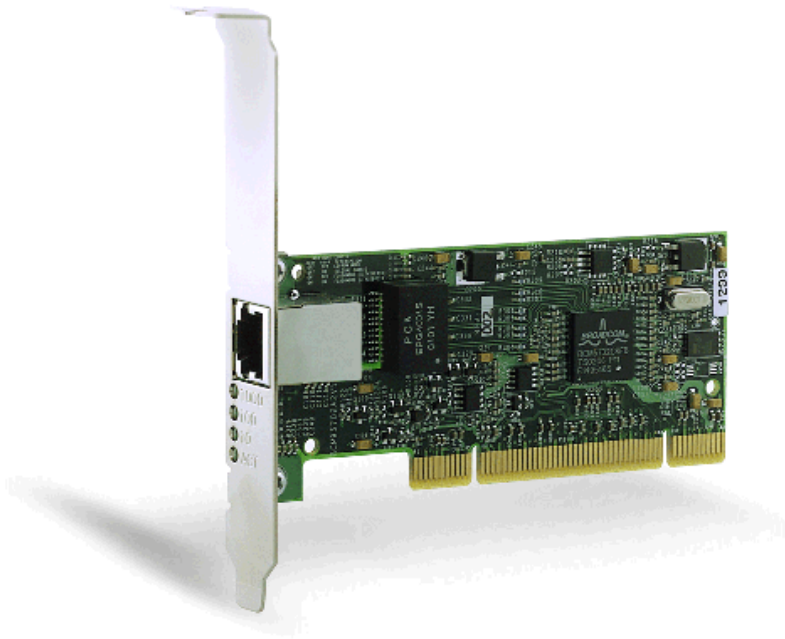
Figure 2. The Broadcom NetXtreme™ Gigabit Ethernet Adapter (5702 shown)
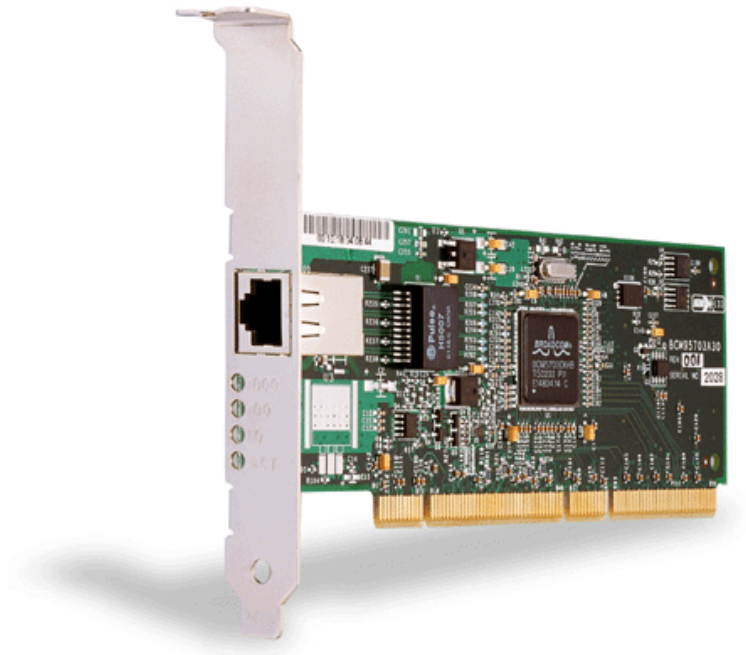
Figure 3. The Broadcom NetXtreme™ Gigabit Ethernet Adapter (5703C shown)

The BCM5701S or BCM5703S base adapters utilize fiber media. These adapters use fiber optic cabling and connector that meets 62.5/125um or 50/125um multimode specifications. These adapters operates at 1000 Mbps full–duplex mode only.
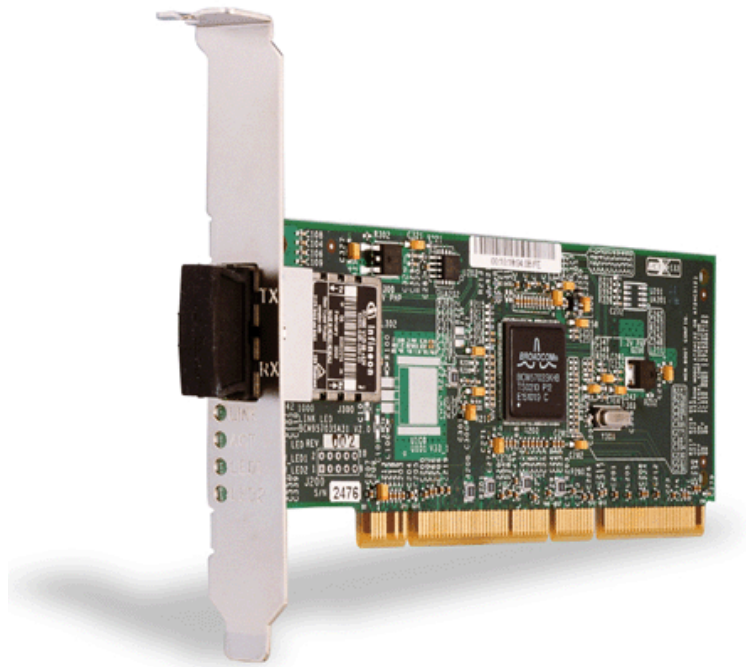
Figure 4. The Broadcom NetXtreme™ Fiber Optic Adapter (5703S shown)

Contents of Your Shipment

Included with your adapter are the following:

- Antistatic bag (used for protecting the adapter when stored or shipped). Keep the adapter in its packaging until ready for installation.
- CD−ROM with Gigabit Ethernet driver software and documentation.

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.

Features

The following is a list of the Broadcom NetXtreme™ Gigabit Ethernet Adapter features for all supported operating systems:

- Gigabit Ethernet (IEEE 802.3−1999)
- Logical Link Control (IEEE 802.2)
- Flow Control (IEEE 802.3X)
- Standard Ethernet frame size (1518 bytes)

- TBI (SERDES style) Transceiver interfaces
- Jumbo frames (9KB) – BCM5705 and Netware 5.1 do not support Jumbo Frames
- Layer 2 Priority Encoding (802.1P)
- Dual, High–Speed On–Chip RISC Processors
- Adaptive interrupt frequency
- Programmable rule checking and frame classification
- Up to 16 classes of service (CoS) (4 if no external memory)
- Up to 16 Distribution Rings (4 if no external memory)
- Integrated 96KB Frame Buffer Memory
- GMI/MII Management Interface
- 16M external SSRAM address space
- Selectable memory protection for external (on–board) memory
- Statistics for SNMP MIB II, Ethernet like MIB, and Ethernet MIB (802.3z, Clause 30)
- Four unique MAC unicast addresses
- Support for multicast addresses via 128 bits hashing hardware function
- Serial EEPROM (5703 uses Flash)
- Support for PXE available (tested against the following programs: Linux Red Hat PXE server, Windows 2000, Intel APITEST, DOS UNDI, 3Com boot server)
- JTAG support
- PCI v2.2 32/64–Bit, 33/66 MHz Bus Interface (5700, 5701, 5703)
- PCI–X v1.0 64–bit 100 MHz Bus Interface (5701, 5703)
- PCI Power Management Interface (v1.1)
- PCI Hot Plug (IBM, Compaq, Dell, and Microsoft)
- ACPI and Wake–on–LAN Support
- 64 Bit BAR support
- 3.3 V/1.8 V CMOS with 5V tolerant I/Os

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Physical Description

The faceplate on the 10/100/1000BASE–T adapter provides an RJ–45 connector for connecting the adapter to another network device.
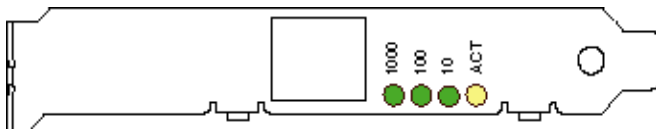
Figure 5. Broadcom NetXtreme™ Gigabit Ethernet Adapter Faceplate

The adapter faceplate has four LEDs, one for each port speed option (10 Mbps, 100 Mbps, and 1000 Mbps), and one for Activity. The three port speed LEDs indicate active links, and the ACT LED indicates data transfer status. Once the adapter is installed and the cables are connected properly, the appropriate speed LED is lit and the ACT LED is on if data traffic is present.

Once the adapter hardware has been properly installed on your system, the LEDs indicate the following adapter states:

Table 1. Gigabit Ethernet Port LED Status

LED	State	Description
1000	On	Good Gigabit Ethernet link.
	Off	No 1000 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.
100	On	Good 100 Mbps Fast Ethernet link.
	Off	No 100 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.
10	On	Good 10 Mbps Fast Ethernet link.
	Off	No 10 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.
ACT	Blinking	Brief bursts of data detected on the port.
	On	Streams of data detected on the port.
	Off	No data detected on the port.

The faceplate on the BCM5701/03S adapters provides two fiber optic connectors for attaching the adapter to a compatible link partner.

Figure 6. Broadcom 1000−SX Adapter Faceplate

The BCM5701S/03S adapters have four LEDs, one for Link status, and one for Activity (LED1 and LED2 and not used). Once the adapter is installed and the cables are connected properly, the Link LED is lit and the ACT LED will blink if data traffic is present.

Once the adapter hardware has been properly installed on your system, the LEDs indicate the following adapter states:

Table 1. Fiber Optic Port LED Status

LED	State	Description
Link	On	Valid fiber link.
	Off	No fiber link.
ACT	Blinking	Data traffic between the card and the switch.

	Off	No data traffic.
LED1	N/A	Not Used.
LED2	N/A	Not Used.

Broadcom Advanced Server Program (BASP) Overview

Introduction

BASP is a Broadcom intermediate software driver for Windows .NET, Windows 2000, Windows NT, NetWare, and Linux, that provides load–balancing, fault–tolerance, and VLAN features. These features are provided by creating teams (virtual adapters) that consist of multiple NIC interfaces. A team can consist of one to eight NIC interfaces and each interface can be designated primary or standby*. All primary interfaces in a team will participate in Load–balancing operations by sending and receiving a portion of the total traffic. Standby interfaces will take over in the event that all primary interfaces have lost their links. VLANs can be added to a team to allow multiple VLANs with different VLAN IDs. A virtual adapter is created for each VLAN added. Load–balancing and fault–tolerance features will work with any third party's NIC adapters. VLANs only work with Broadcom NIC adapters.

*NOTE – *Standby can only be used in Smart Load–Balance mode (see below).*

Limitations

Smart Load–Balance (SLB) is a protocol specific scheme and the level of support for IP, IPX, and other protocols are listed below.

	Failover/Failback – All Broadcom			Failover/Failback – Multivendor		
	IP	*IPX*	*NetBeui*	*IP*	*IPX*	*NetBeui*
W2K	Y	Y	Y	Y	N	N
NT 4.0	Y	Y	Y	Y	N	N
NW 5.x/6.0	Y	Y	N/S	Y	N	N/S
LX 7.2/7.3	Y	N/S	N/S	Y	N/S	N/S
	Load Balance – All Broadcom			**Load Balance – Multivendor**		
	IP	*IPX*	*NetBeui*	*IP*	*IPX*	*NetBeui*
W2K	Y	Y	N	Y	Y	N
NT 4.0	Y	Y	N	Y	Y	N
NW 5.x/6.0	Y	Y	N/S	Y	Y	N/S
LX 7.2/7.3	Y	N/S	N/S	Y	N/S	N/S

*Third party adapters must be NICE patched or NESL compliant to be fault tolerant and load balance in a multivendor team in Linux and Netware, respectively.

Smart Load–balance (SLB) mode works with all Ethernet switches without configuring the switch ports to any special trunking mode. Only IP traffic will be load–balanced in both inbound and outbound directions. IPX traffic will be load–balanced in outbound direction only. Other protocol packets will be sent and received through one primary NIC only. Fault–tolerance for non–IP traffic is only supported using Broadcom NICs. The Generic Trunking mode requires the Ethernet switch to support some form of port trunking mode (e.g. Cisco's Gigabit EtherChannel or other switch vendor's link aggregation mode). This mode is protocol–independent and all traffic should be load–balanced and fault–tolerant.

> *NOTE – Broadcom recommends disabling the spanning tree protocol at the switch when using BASP. This will minimize the downtime due to spanning tree loop determination when failing over.*

Broadcom Advanced Server Program for Windows .NET

The following options are supported under Windows .NET. Refer to "Windows .NET Driver Software," for additional information.

Failover and Load Balance

- Adapter teaming for failover heterogeneous support for released 3Com® 10/100 server adapters, released Intel® 10/100 server adapters, released Intel® 1000BASE–SX server adapters, Intel® Pro 1000/T server adapters, and Intel® 82559 and 82544 LAN on Motherboards (LOMs)
- Smart Load Balance™
- Generic Link Aggregation (GEC/FEC, Open trunk)
- Link aggregation (IEEE 802.3ad)

Virtual LAN (VLANs)

- Up to 64 VLANs (63 tagged and 1 untagged) per adapter using IEEE 802.1Q–1988 tagging. VLANs only work with Broadcom NIC adapters.

Offloading

- IP,TCP/UDP checksum
- Support for segmentation of large TCP packets

Power Management

- Wake on LAN (magic packet, specific pattern) at 10/100 Mbps only

> *NOTE – Adapter speed connection when the system is down waiting for a wake up signal is either 10Mbs or 100Mbs, but can return to 1000 when the system is up and*

running if connected to a 1000 Mbs capable switch. Systems intending to use WOL should be connected to a switch capable of both 1000 and 10 or 100 speeds.

PCI Hot plug

• Support for Microsoft PCI Hot plug

Broadcom Advanced Server Program for Windows 2000

The following options are supported under Windows 2000. Refer to "Windows 2000 Driver Software," for additional information.

Failover and Load Balance

• Adapter teaming for failover (heterogeneous support for released 3Com® 10/100 server adapters, released Intel® 10/100 server adapters, Intel® Pro 1000/T server adapters, and Intel® 82559 and 82544 LAN on Motherboards (LOMs)
• Smart Load Balance™
• Generic Link Aggregation (GEC/FEC, Open trunk)
• Link aggregation (IEEE 802.3ad)

Virtual LAN (VLANs)

• Up to 64 VLANs (63 tagged and 1 untagged) per adapter using IEEE 802.1Q–1988 tagging. VLANs only work with Broadcom NIC adapters.

Offloading

• IP,TCP/UDP checksum
• Support for segmentation of large TCP packets

Power Management

• Wake on LAN (magic packet, specific pattern) at 10/100 Mbps only

NOTE – Adapter speed connection when the system is down waiting for a wake up signal is either 10Mbs or 100Mbs, but can return to 1000 when the system is up and running if connected to a 1000 Mbs capable switch. Systems intending to use WOL should be connected to a switch capable of both 1000 and 10 or 100 speeds.

PCI Hot plug

• Support for Microsoft PCI Hot plug

Broadcom Advanced Server Program for Windows NT 4.0

The following options are supported under Windows NT. Refer to "Windows NT 4.0 Driver Software" for additional information.

Failover and Load Balance

- Adapter teaming for failover (heterogeneous support for released 3Com® 10/100 server adapters, released Intel® 10/100 server adapters, and Intel® 82559 and 82544 LAN on Motherboards (LOMs)
- Smart Load Balance™
- Generic Link Aggregation (GEC/FEC, Open trunk)
- Link aggregation (IEEE 802.3ad)

Virtual LAN (VLANs)

- Up to 64 VLANs (63 tagged and 1 untagged) per adapter using IEEE 802.1Q–1988 tagging. VLANs only work with Broadcom NIC adapters.

Power Management

- Wake on LAN (magic packet, specific pattern) at 10/100 Mbps only (5701, 5703)

NOTE – Adapter speed connection when the system is down waiting for a wake up signal is either 10Mbs or 100Mbs, but can return to 1000 when the system is up and running if connected to a 1000 Mbs capable switch. Systems intending to use WOL should be connected to a switch capable of both 1000 and 10 or 100 speeds.

PCI Hot plug

- Support for Compaq, Dell, and IBM PCI Hot plug

Broadcom Advanced Control Suite

The Broadcom Advanced Control Suite is a graphics user interface with the following functions. Refer to "Broadcom Advanced Control Suite " for additional information.

- Vital Sign – The Vital Sign screen allows you to view vital adapter information, network status, and network connectivity. Active Adapters are listed.

- Diagnostics – The Diagnostics screen allows you to view information for Broadcom–only adapters. This function is used to test the Broadcom network interface card or Broadcom LOM.

- Cable Analysis – From the Cable Analysis screen the user can monitor conditions of an Ethernet CAT5 cable connection within a cable plant in an Ethernet network. The software detects various cable conditions such as cable lengths between two given nodes, cable pair breakage, cable pair polarity, and data skew between cable pairs.

- Load Balance/Virtual LAN – The Load Balance/Virtual LANs screen allows you to configure advanced features. Any available adapter can be configured as part of a team.

- Statistics – The Statistics screen allows you to view traffic statistics for both Broadcom and non–Broadcom adapters. Statistical values and coverage is more comprehensive for Broadcom than for non–Broadcom adapters.

Broadcom Advanced Server Program for Novell NetWare

The following options are supported under Novell NetWare. Refer to "NetWare Driver Software," for additional information.

Failover and Load Balance

- Adapter teaming for failover (heterogeneous support for released 3Com® 10/100 server adapters, Intel® 10/100 server adapters, and Intel® 82559 and 82544 LAN on Motherboards (LOMs)
- Smart Load Balance™
- Generic Link Aggregation (GEC/FEC, Open trunk)
- Link aggregation (IEEE 802.3ad)

NESL Compliance

For optimum fault tolerance and recovery operations, BASP.LAN relies on the NIC drivers to generate NESL (NetWare Event Service Layer) events during link changes and other failure events. NESL is an optional feature in the ODI driver specification and not all drivers support it. For NESL events to propagate properly to BASP.LAN, ODINEB.NLM must be loaded before the NESL compliant ODI drivers.

Do the following to check if a NIC driver supports NESL events. Load BASP.LAN and create a team by binding the NIC adapter to the virtual slot (See instructions and examples below). In the "Virtual Adapter X Team Members" screen of the BASP.LAN's menu interface, the Link status of all bound NIC adapters are shown. Disconnect or connect the NIC adapter's cable and the link status shown on the screen should change immediately if the NIC driver supports NESL events.

Virtual LAN (VLANs)

- Up to 64 VLANs (63 tagged and 1 untagged) per adapter using IEEE 802.1Q–1988 tagging (64 is the maximum configurable, although 32 is the maximum operable). VLANs only work with Broadcom or Alteon® NIC adapters.

Offloading

- IP, TCP/UDP checksum – NetWare 5.0 or greater only

Power Management

- Wake on LAN (magic packet, specific pattern) at 10/100 Mbps only (5701, 5703)

PCI Hot plug

- Support for Dell PCI Hot plug

Broadcom Advanced Server Program for Linux

The following options are supported under Linux. Refer to "Linux Driver Software" for additional information.

Failover and Load Balance

- SLB mode works with all Ethernet switches without configuring the switch ports to any special trunking mode. Only IP traffic will be load–balanced in both inbound and outbound directions.
- Generic trunking mode does not require NICE and can work with any NIC, however, it requires the Ethernet switch to support the technology and be properly configured. This mode is protocol–independent and all traffic should be load–balanced and fault–tolerant.
- 802.3ad mode requires NICE drivers and Ethernet switches supporting IEEE 802.3ad Link Aggregation. This mode is protocol–independent and all traffic should be load–balanced and fault–tolerant. All the physical interfaces in the 802.3ad teams are defaulted to be LACP active. A 802.3ad team requires all the member NICs support NICE. All the member NICs, once in the 802.3ad team, will be set with the same MAC address.

Virtual LAN (VLAN)

- VLANs can be added to a team to allow multiple VLANs with different VLAN IDs. A virtual device is created for each VLAN added.

Power Management

- Wake on LAN (magic packet, specific pattern) at 10/100 Mbps only (5701, 5703)

NOTE – Adapter speed connection when the system is down waiting for a wake up signal is either 10Mbs or 100Mbs, but can return to 1000 when the system is up and running if connected to a 1000 Mbs capable switch. Systems intending to use WOL should be connected to a switch capable of both 1000 and 10 or 100 speeds.

Creating a Driver Disk

Create driver disks using the Broadcom MakeDisk utility (setup.exe file). This utility runs under Windows, and allows you to create disks with the following drivers:

- Windows NT
- Windows 2000
- Windows .NET 32 Bit
- Window .NET 64 Bit
- Netware
- DOS ODI
- Windows NT BASP
- Windows 2000 BASP
- Netware BASP

To create a driver disk, perform the following:

1. Insert a 3.5" disk into floppy drive A (default) or B.
2. Insert the Dell CD–ROM into your system's CD–ROM drive.
3. If the CD–ROM does not autorun, then run the makedisk file (\MakeDisk\setup.exe).
4. Follow the menu commands to the **Driver Selection** screen.
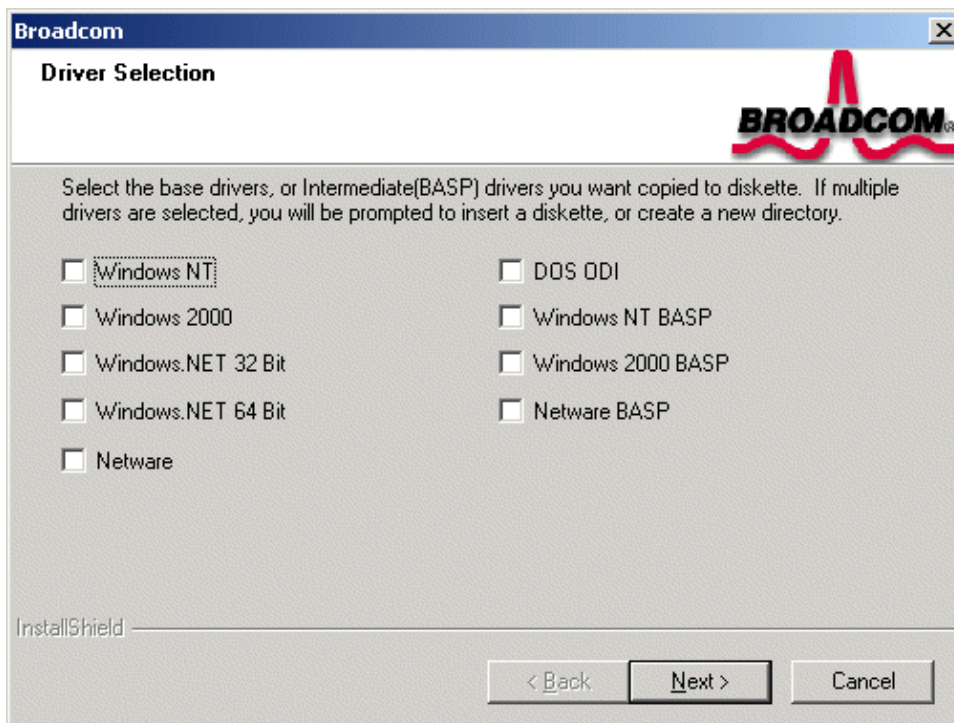
5. Select (check) the driver or drivers of choice. Note that selecting multiple drivers will result in creating multiple disks.
6. Click **Next**. The **Setup Needs the Next Disk** screen will appear.
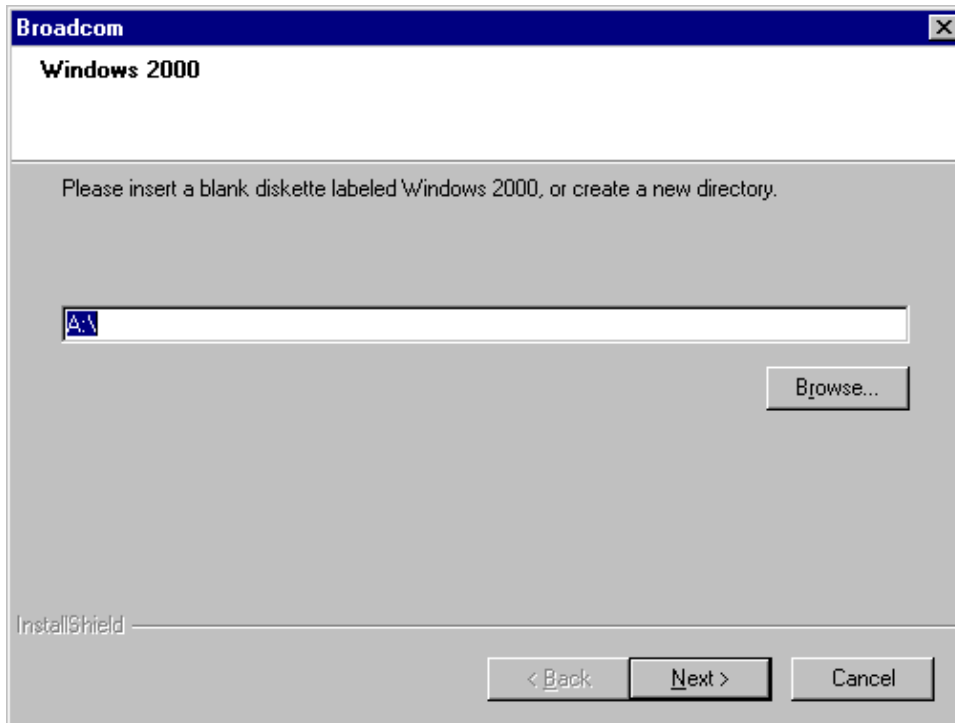
7. Ensure that a diskette is in the disk drive and click **OK**. The selected driver will be installed.
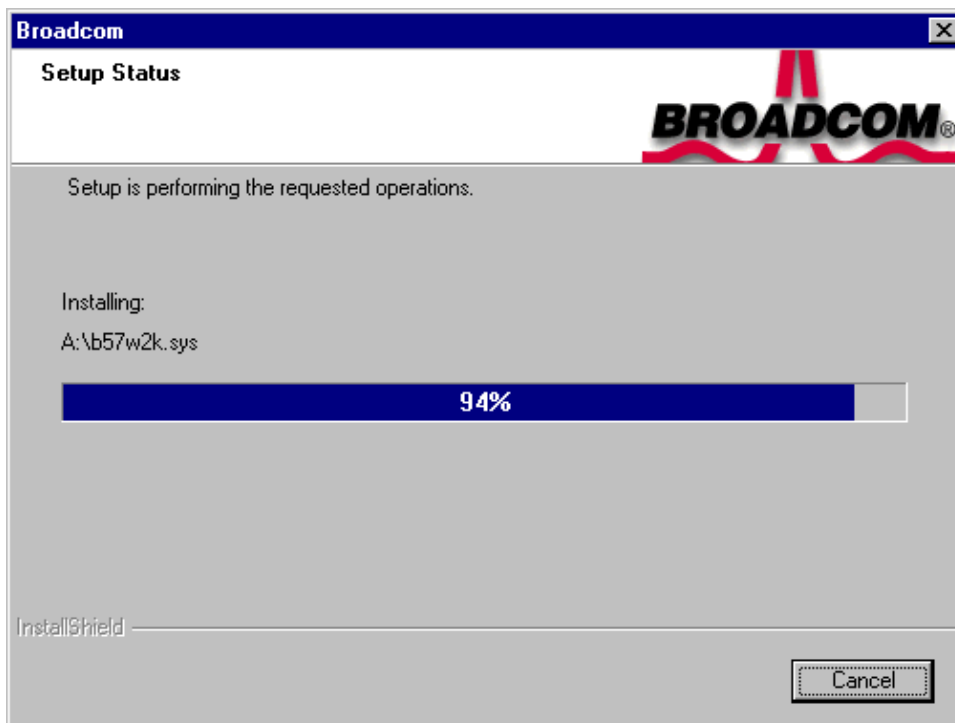
8. If more than one driver was selected, the **Setup Needs the Next Disk** screen will appear again. Insert another diskette and click **OK**.
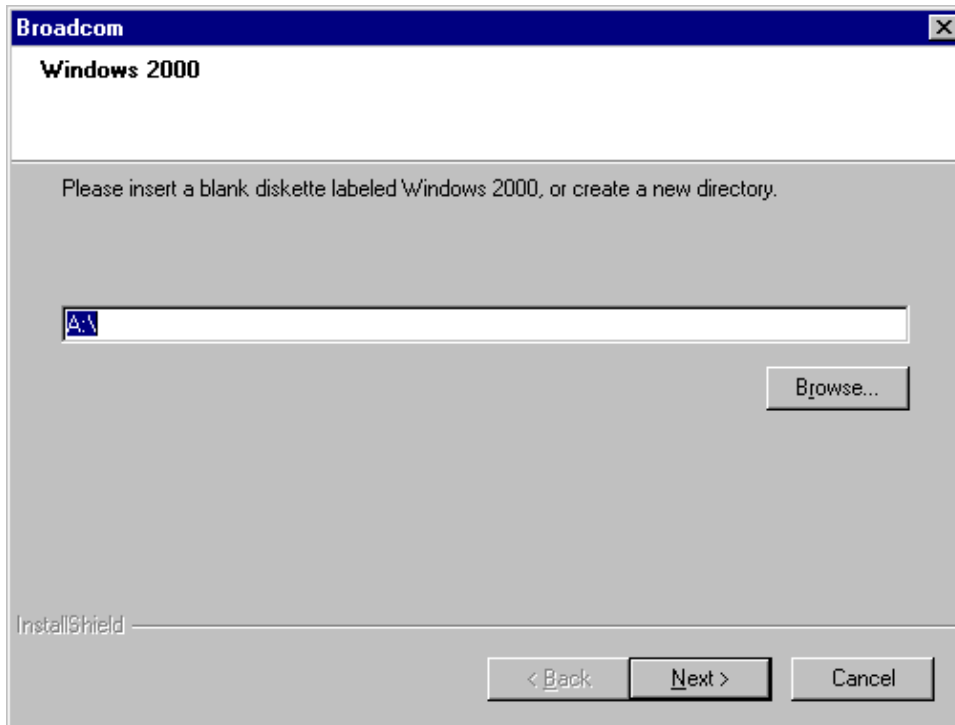
9. When all driver diskettes have been created, an information screen will appear confirming that the diskettes were successfully created. Click **OK**.
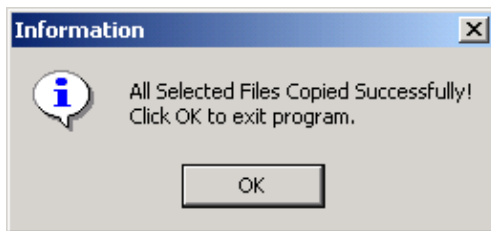
Please read all restrictions and disclaimers.

Linux Driver Software: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This document describes the installation and configuration of the Linux driver and BASP driver software for the Broadcom NetXtreme™ Gigabit Ethernet Adapter and includes the following sections:

- Linux Driver Software

- BASP Driver for Linux

Linux Driver Software

This section contains the following information:

- [Introduction](#)

- [Limitations](#)

- [Packaging](#)

- [Installing Source RPM Package](#)

- [Building Driver From TAR File](#)

- [Notes](#)

- [Patching PCI Files](#)

- [Patching Driver Into Kernel](#)

- [Network Installation](#)

- [Unloading and Removing the Driver](#)

- [Module Parameters](#)

- [Driver Messages](#)

- [Statistics](#)

Introduction

This section describes the Linux driver for the Broadcom NetXtreme BCM5700 series 10/100/1000 Mbps Ethernet Network Controllers.

Limitations

The current version of the Linux driver has been thoroughly tested on Red Hat 7.1, 7.2, 7.3 and SuSE 7.2 & 7.3 Linux distributions for i386 and ia64, and other similar Linux distributions using 2.4.x kernels.

The driver should also work on other big–endian and little–endian CPU platforms. The Makefile may have to be modified to include platform–specific compile switches, and some minor changes in the source files may also be required. Only very limited testing has been done on some CPU platforms other than i386 and ia64.

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Packaging

The Linux driver is released in two packaging formats: source RPM and compressed tar formats. The file names for the two packages are bcm5700–<version>.src.rpm and bcm5700–<version>.tar.gz, respectively. Identical source files to build the driver are included in both packages. The tar file contains additional utilities such as patches and driver diskette images for network installation.

Installing Source RPM Package

1. Install the source RPM package:

```
rpm -ivh bcm5700-<version>.src.rpm
```

> *NOTE – If installing the driver on SuSE 7.x distributions, refer to the Notes section below before continuing.*

2. Change the directory to the RPM path and build the binary driver for your kernel:

```
cd /usr/src/{redhat,OpenLinux,turbo,packages,rpm ..}
rpm -bb SPECS/bcm5700.spec
```

Note that the RPM path is different for different Linux distributions.

3. Install the newly built package (driver and man page):

```
rpm -ivh RPMS/i386/bcm5700-<version>.i386.rpm
```

Note that the −−force option is needed if installing on Red Hat 7.1, 7.2, and others that already contain an older version of the driver.

The driver will be installed in the following paths:

- ♦ 2.2.x kernels:
  ```
  /lib/modules/<kernel_version>/net/bcm5700.o
  ```
- ♦ 2.4.x kernels:
  ```
  /lib/modules/<kernel_version>/kernel/drivers/net/bcm5700.o
  ```

- ♦ 2.4.x kernels with bcm5700 driver patched in (e.g. Red Hat 7.1, 7.2):
  ```
  /lib/modules/<kernel_version>/kernel/drivers/net/bcm/bcm5700.o
  ```

  or

  ```
  /lib/modules/<kernel_version>/kernel/drivers/addon/bcm5700/bcm5700.o
  ```

4. Load the driver:

```
insmod bcm5700
```
5. To configure the network protocol and address, refer to Linux−specific documentation.

Building Driver From TAR File

1. Create a directory and extract the TAR files:

```
tar xvzf bcm5700-<version>.tar.gz
```

> *NOTE – If installing the driver on SuSE 7.x distributions, refer to the Notes section below before continuing.*

2. Build the driver bcm5700.o as a loadable module for the running kernel:

```
cd src
make
```
3. Test the driver by loading it:

```
insmod bcm5700.o
```
4. Install the driver and man page:

```
make install
```

> *NOTE – See the RPM instructions above for the location of the installed driver.*

5. To configure network protocol and address, refer to Linux−specific documentations.

Notes

> *NOTE – If compiling the driver under SuSE's 7.x kernel and errors are reported, follow the general guidelines below to rebuild the kernel source tree.*

Kernal Source Tree Guidelines

cd /usr/src/linux−<kernel_version>.SuSE
cp /boot/vmlinuz.config .config
cp /boot/vmlinuz.version.h include/linux/version.h
cp /boot/vmlinuz.autoconf.h include/linux/autoconf.h
make oldconfig
make dep

where <kernel_version> is the actual kernel version used in the SuSE distribution.
Example: `/usr/src/linux-2.4.4.SuSE`

Patching PCI Files (Optional)

To use the Red Hat kudzu hardware detection utility, a number of files containing PCI vendor and device information need to be patched with information on the BCM570x series NICs. Patch files for Red Hat 7.x are included. Apply the appropriate patch by running the patch command. For example, on Red Hat 7.2 for i386, apply the patch by doing the following:

```
patch -N -p1 -d /usr < pci-rh72-i386.patch
```

Run kudzu:

```
kudzu
```

Patching Driver Into Kernel (Optional)

Patch files are included for patching the driver into some of the latest 2.4.x kernel source trees. This step is optional and should only be done by users familiar with configuring and building the kernel. The patch will modify the orginal kernel's source code.

Follow the following steps to patch the driver into kernel:

1. Select the patch file that matches your kernel and apply the patch:

```
patch -p1 -d <kernel_src_root> <
bcm5700-<version>-2.4.<x>.patch
```

where `<version>` is the version of the bcm570x driver and 2.4.`<x>` is the version of the kernel to patch (e.g., 2.4.10).

NOTE – <kernel_src_root> is usually /usr/src/linux or /usr/src/linux–2.4.<x>

2. Configure the kernel to include the bcm570x driver. It can be found under Network Device Support > Ethernet (1000 Mbit) > Broadcom BCM5700 support when make menuconfig is run. Select built–in or module for the driver:

```
cd <kernel_src_root>
make menuconfig
```

3. Compile the kernel:

```
make dep
make clean
....
....
```

Network Installation

For network installations through NFS, FTP, or HTTP (using a network boot disk or PXE), a driver diskette that contains the bcm570x driver is needed for Red Hat 7.x. The driver diskette images for the most recent Red Hat 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 Red Hat's website.

To create the driver diskette, select the appropriate image file and do the following:

```
dd if=dd.img of=/dev/fd0H1440.
```

Unloading and Removing the Driver

Removing the Driver from an RPM Installation

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

```
rmmod bcm5700
```

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

```
rpm -e bcm5700
```

Removing the Driver from a TAR Installation

If the driver was installed using make install from the tar file, the driver bcm5700.o has to be manually deleted from the system. Refer to the section "Building Driver From TAR File" for the location of the installed driver.

Module Parameters

Optional parameters for the driver can be supplied as command line arguments to the insmod command. Typically, these parameters are set in the file /etc/modules.conf (see the man page for modules.conf). These parameters take the form

```
<parameter>=value[,value,...]
```

where the multiple values for the same parameter are for multiple NICs installed in the system.

> *NOTE – The default or other meaningful values will be used when invalid values are selected. Some combinations of parameter values may conflict and lead to failures. The driver cannot detect all such conflicting combinations.*

All the module parameters are listed below.

- **line_speed**

  Selects the line speed of the link. This parameter is used together with full_duplex and auto_speed to select the speed and duplex operation of the link and the setting of autonegotiation. The valid values are:

  - ♦ 0 – Autonegotiate for highest speed supported by link partner (default)
  - ♦ 10 – 10 Mbps
  - ♦ 100 – 100 Mbps
  - ♦ 1000 – 1000 Mbps

  If line_speed is set to 10, 100, or 1000, the NIC will autonegotiate for the selected speed (and selected duplexity) if auto_speed is set to 1. If auto_speed is set to 0, the selected speed and duplexity will be set without autonegotiation. Note that 1000 Mbps must be negotiated for copper twisted pair links.

- **auto_speed**

  Enables or disables autonegotiation. The valid values are:

  - ♦ 0 – Autonegotiation disabled
  - ♦ 1 – Autonegotiation enabled (default)

  Note that this parameter is ignored and assumed 1 if line_speed is set to 0.

- **full_duplex**

  Selects the duplexity of the link. This paramter is used together with line_speed to select the speed and duplexity of the link. Note that this parameter is ignored if line_speed is 0. The valid values are:

  - ♦ 0 – half duplex
  - ♦ 1 – full duplex (default)

- **rx_flow_control**

Enables or disables receiving flow control (pause) frames. This parameter is used together with auto_flow_control. The valid values are:

  - ◆ 0 – pause receive disabled (default)
  - ◆ 1 – pause receive enabled if auto_flow_control is set to 0, or pause receive advertised if auto_flow_control is set to 1

- **tx_flow_control**

Enables or disables transmitting flow control (pause) frames. This parameter is used together with auto_flow_control. The valid values are:

  - ◆ 0 – pause transmit disabled (default)
  - ◆ 1 – pause transmit enabled if auto_flow_control is set to 0, or pause transmit advertised if auto_flow_control is set to 1

- **auto_flow_control**

Enables or disables autonegotiation of flow control. This parameter is used together with rx_flow_control and tx_flow_control to determine the advertised flow control capability. The valid values are:

  - ◆ 0 – flow control autonegotiation disabled (default)
  - ◆ 1 – flow control autonegotiation enabled with capability specified in rx_flow_control and tx_flow_control (only valid if line_speed is set to 0 or auto_speed is set to 1)

- **mtu**

Enables jumbo frames up to the specified MTU size. The valid range is from 1500 to 9000. Default is 1500. Note that the MTU size excludes the ethernet header size of 14 bytes. Actual frame size is MTU size + 14 bytes.

- **tx_checksum**

Enables or disables hardware transmit TCP/UDP checksum. The valid values are:

  - ◆ 0 – checksum disabled
  - ◆ 1 – checksum enabled (default)

- **rx_checksum**

Enables or disables hardware receive TCP/UDP checksum validation. The valid values are:

  - ◆ 0 – checksum disabled
  - ◆ 1 – checksum enabled (default)

- **scatter_gather**

Enables or disables scatter–gather and 64–bit DMA on x86. This option is only useful when running on TUX–enabled kernels or newer kernels with zero–copy TCP. The valid values are:

      ♦ 0 – scatter–gather and 64–bit DMA on x86 disabled
      ♦ 1 – scatter–gather and 64–bit DMA on x86 enabled (default)

- **tx_pkt_desc_cnt**

Configures the number of transmit descriptors. Default is 100. The valid range is from 1 to 600. Note that the driver may not be able to allocate the required amount of memory if this parameter is set too high.

- **rx_std_desc_cnt**

Configures the number of receive descriptors for frames up to 1528 bytes.Default is 200. The valid range is from 1 to 800. This parameter should not be set less than 80 on systems with high network traffic. Setting this parameter higher allows the NIC to buffer larger bursts of network traffic without dropping frames, especially on slower systems. Note that the driver may not be able to allocate the required amount of memory if this parameter is set too high.

- **rx_jumbo_desc_cnt**

Configures the number of receive descriptors for jumbo frames larger than 1528 bytes. Default is 128 and valid range is from 1 to 255. When jumbo frames larger than 1528 bytes are used, this parameter should not be set lower than 60 on systems with high network traffic. Setting this parameter higher allows the NIC to buffer larger bursts of jumbo traffic without dropping frames, especially on slower systems. Note that each descriptor requires a buffer the size of a maximum jumbo frame. On systems with insufficient memory, it may be necessary to reduce this parameter. When the maximum frame size is less than 1528 (MTU size less than 1514), this parameter is not used and is always 0.

- **rx_adaptive_coalesce**

Enables or disables adaptive adjustments to the receive interrupt coalescing parameters. Enabling it allows the driver to dynamically adjust the receive coalescing parameters to achieve high throughput during heavy traffic and low latency during light traffic. rx_std_desc_cnt (and rx_jumbo_desc_cnt if using jumbo frames) should not be set much lower than the default value when this parameter is enabled. The valid values are:

      ♦ 0 – disabled
      ♦ 1 – enabled (default)

- **rx_coalesce_ticks**

Configures the number of 1 usec ticks before the NIC generates receive interrupt after receiving a frame. This parameter works in conjunction with the rx_max_coalesce_frames parameter. Interrupt will be generated when either of these thresholds is exceeded. 0 means this parameter is ignored and interrupt will be generated when the rx_max_coalesce_frames threshold is reached. The valid range is from 0 to 500, and default is 100. This parameter is not used and will be adjusted automatically if rx_adaptive_coalesce is set to 1.

- **rx_max_coalesce_frames**

Configures the number of received frames before the NIC generates receive interrupt. The valid range is from 0 to 100, and default is 10. This parameter and rx_coalesce_ticks cannot be both 0, otherwise no receive interrupts will be generated. It should also be set significantly lower than rx_std_desc_cnt (and rx_jumbo_desc_cnt if using jumbo frames). This parameter is not used and will be adjusted automatically if rx_adaptive_coalesce is set to 1.

- **tx_coalesce_ticks**

Configures the number of 1 usec ticks before the NIC generates transmit interrupt after transmitting a frame. This parameter works in conjunction with the tx_max_coalesce_frames parameter. Interrupt will be generated when either of these thresholds is exceeded. 0 means this parameter is ignored and interrupt will be generated when the tx_max_coalesce_frames threshold is reached. The valid range is from 0 to 500, and default is 300.

- **tx_max_coalesce_frames**

Configures the number of transmitted frames before the NIC generates transmit interrupt. The valid range is from 0 to 100, and default is 42. This parameter and tx_coalesce_ticks cannot be both 0, otherwise no transmit completion interrupt will be generated. This parameter should always be set lower than tx_pkt_desc_cnt.

- **stats_coalesce_ticks**

Configures the number of 1 usec ticks between periodic statistics block DMAs. The valid range is from 0 to 3600000000, and default is 1000000 (1 sec.). Set to 0 to disable statistics updates. This parameter is not used and will be set to default if rx_adaptive_coalesce is set to 1.

- **enable_wol**

Enables or disables magic packet Wake–On–LAN when the system is shutdown. Note that not all systems support Wake–On–LAN. The valid values are:

  - ♦ 0 magic packet Wake–On–LAN disabled (default)
  - ♦ 1 magic packet Wake–On–LAN enabled

Driver Messages

The following are the most common sample messages that may be logged in the file /var/log/messages. Use dmesg –n <level> to control the level at which messages will appear on the console. Most systems are set to level 6 by default.

```
Broadcom Gigabit Ethernet Driver bcm5700 with Broadcom NIC
Extension (NICE) ver. 2.2.4 (02/26/02)
```

   Driver signon

```
eth#: Broadcom BCM5701 1000Base-T found at mem faff0000, IRQ
16, node addr 0010180402d8
eth#: Broadcom BCM5701 Integrated Copper transceiver found
eth#: Scatter-gather ON, 64-bit DMA ON, Tx Checksum ON, Rx
Checksum ON
```

   NIC detected

```
bcm5700: eth# NIC Link is Up, 1000 Mbps full duplex
```

   Link up and speed indication

```
bcm5700: eth# NIC Link is Down
```

Link down indication

Statistics

Detailed statistics and configuration information can be viewed in the file `/proc/net/nicinfo/eth#.info`.

BASP Driver for Linux

This section contains the following information:

BASP Overview

BASP is a kernel module designed for 2.4.x kernels that provides load−balancing, fault−tolerance, and VLAN features. These features are provided by creating teams that consist of multiple NIC interfaces. A team can consist of 1 to 8 NIC interfaces and each interface can be designated primary, or hot−standby (SLB team only). All primary NIC interfaces in a team will participate in Load−balancing operations by sending and receiving a portion of the total traffic. Hot−standby interfaces will take over in the event that all primary interfaces have lost their links. VLANs can be added to a team to allow multiple VLANs with different VLAN IDs. A virtual device is created for each VLAN added.

BASP supports Smart Load−balance (SLB™), Generic trunking and IEEE 802.3ad Link Aggregation. In SLB and 802.3ad mode, all the NIC drivers must support Broadcom NIC Extension (NICE). In this release, several NIC drivers patched with NICE are included.

- SLB mode works with all Ethernet switches without configuring the switch ports to any special trunking mode. Only IP traffic will be load−balanced in both inbound and outbound directions.
- Generic trunking mode does not require NICE and can work with any NIC, however, it requires the Ethernet switch to support the technology and be properly configured. This mode is protocol−independent and all traffic should be load−balanced and fault−tolerant.
- 802.3ad mode requires NICE drivers and Ethernet switches supporting IEEE 802.3ad Link Aggregation. This mode is protocol−independent and all traffic should be load−balanced and fault−tolerant. All the physical interfaces in the 802.3ad teams are defaulted to be LACP active. A 802.3ad team requires all the member NICs supporting NICE. All the member NICs, once in the 802.3ad team, will be set with the same MAC address.

BASP also provides remote management through the SNMP protocol, and this package is installed separately (see "BASP SNMP Agent for Linux").

BASP Limitations

BASP supports Red Hat 7.1, 7.2, and 7.3. The following installation procedures work with these distributions. BASP has also
been tested on SuSE 7.2 and 7.3, Caldera 3.1, Turbo Linux 7.0, and Mandrake 8.1. Minor modification to the makefile may be required if problems are experienced when compiling BASP on other i386 Linux distributions.

BASP also supports Red Hat Linux 7.1 and 7.2 for IA−64.

VLANs are only supported by Broadcom NetXtreme Gigabit Ethernet. As opposed to VLANs support in other platforms, e.g. Windows and Netware, VLANs are not supported by Alteon Acenic driver (acenic.c).

Installing BASP

For users of Redhat 7.1 and 7.2 (i386 and IA−64), follow instructions in "Installing BASP RPM Package" section.

For users of other Linux i386 and IA−64 distribution, follow instructions in "Installing BASP TAR Archive" section.

Installing BASP RPM Package

1. To install the RPM source package, run

   ```
   % rpm −i basplnx-{version}.src.{arch}.rpm
   ```
2. Change directory to the RPM path and build the binary driver for
   the kernel

   ```
   % cd /usr/src/redhat
   % rpm −bb SPECS/basplnx.spec
   ```

   Note that the RPM path is different for different Linux distributions.

3. Install the newly built package

   ```
   % rpm −i RPMS/i386/basplnx-{version}.{arch}.rpm
   ```

   The driver and other required files will be automatically installed.
4. To load the driver

   ```
   % insmod basp
   ```
5. Refer to "BASP Configuration for Red Hat Distribution" to set up the teams.

Installing BASP TAR Archive

BASP for Linux is shipped in mixed forms, where the platform and kernel specific files are in source code, and the core file is in object form. Three packages are shipped in this release: two tar archives and two RPM packages.

basplnx−{version}.i386.tgz is the tar archive for i386 platform, and *basplnx−{version}.ia64.tgz* is the tar archive for IA−64 platform.

To uncompress and expand the tar archive, run

   ```
   % tar xvfz basplnx-{version}.{arch}.tgz
   ```

The installation process involves the following steps:

1. To build kernel module, "basp.o":

   ```
   % make
   ```

> *NOTE – The Make process will automatically build the correct module for different kernel options, e.g. symbol versioning and SMP support. There is NO need to define −DMODVERSIONS in the Makefile.*

2. To create device file and to copy files:

   ```
   % make install
   ```
3. To update the module reference:

   ```
   % depmod −a
   ```
4. To load the driver:

   ```
   % insmod basp
   ```
5. Refer to "BASP Configuration and Startup for Other Linux Distribution" to set up the teams.

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BASP Files

Makefile	makefile
baspcfg	precompiled configuration utility
bcmtype.h	commonly used type header file
blf.c	BASP module entry points
blf.h	ioctl interface
blfcore.h	core interface
blfcore.o	precompiled core object
blfopt.h	automatically generated header file from Make
blfver.h	version header file
nicext.h	NICE header file
pal.c	platform abstraction implementation
pal.h	header for platform abstraction
release.txt	this file
nice−2.2.16	NICE enabled driver for 2.2 kernel
nice−2.4.16	NICE enabled driver for 2.4 kernel
scripts	contains sample scripts
scripts/basp	init script, goes to /etc/rc.d/init.d
scripts/baspteam	start/stop script, goes to /etc/basp
scripts/baspif	start/stop network, i/f, goes to /etc/basp
scripts/team−sample	sample script of SLB team with three NICs
scripts/team−gec	sample script of GEC team with three NICs

scripts/team−vlan	sample script of SLB team with 2 VLANs
basp.4	man page
baspcfg.8	man page for baspcfg utility

BASP Configuration for Red Hat Distribution

NOTE – To avoid failover problems when using BASP, make sure that the spanning tree is disabled on the switch to which the network adapter is connected.

NOTE – When adding 64 VLANs, the 64th VLAN must have a VLAN ID of 0 (63 VLANs are tagged and 1 VLAN is untagged).

The BASP distribution includes a utility program and several scripts for team configuration. Following steps for Red Hat Linux distributions only. Most of the steps are only required to be performed after the first time installation. Step 2 "Modify the configuration script" should be performed whenever there is any change to the team configuration.

Since Red Hat distributions do not automatically load drivers for network devices unless the device is configured with an IP address, users must manually configure a network−script file for all physical adapters that will be team members. Network script files are located under /etc/sysconfig/network−scripts. The file name must be prefixed with "ifcfg−" then the physical adapter alias. For interface eth0, you would create a file with the name ifcfg−eth0, then add the below content.

Example:

    DEVICE=eth0
    BOOTPROTO=static
    ONBOOT=yes

For users of other Linux distributions, follow instructions in the "baspcfg" section.

The configuration process involves the following steps:

1. Copy a configuration script from the "/etc/basp/samples" directory to the "/etc/basp" directory. Note that the configuration script name must be prefixed with "team−". Change file permissions to give the root user write access. Example: chmod 755 /etc/basp/team−vlan100.
2. Modify the configuration script to:
   (a) change the team type
   (b) add/delete the physical network interfaces
   (c) add/delete the virtual network interfaces
   (d) assign IP address to each virtual network interface.

The syntax of the configuration script can be found below. Note that when configuring Teaming, at least one Primary Adapter is required.

3. Manually start the team for the first time:

```
% /etc/init.d/basp start
```

NOTE – This step is only required for the first time installation. The team configuration will be automatically started on subsequent reboots.

Note that if not all the virtual network interfaces are configured with an IP address, there will be an error message in starting the BASP team. When this happens, repeat Step (2) to configure an IP address for all the virtual network interfaces.

NOTE 1 – Forming multiple teams is possible by copying the sample files into "/etc/basp/team–<name>" and modifying this file as described in the sample file.

NOTE 2 – To create more that one virtual interface (VLAN) for each team, refer to the respective description section in the sample files.

BASP Configuration for Suse Distribution

The BASP distribution includes an utility program and several scripts for team configuration. Following steps for Suse Linux distributions only. Most of the steps are only required to be performed after the first time installation. Step (2) "Modify the configuration script" should be performed whenever there is any change to the team configuration.

Since SuSE distributions do not automatically load drivers for network devices unless the device is configured with an IP address, users must manually configure /etc/rc.config to ensure the proper network drivers are loaded during init time. To do this, find the network configuration section in your /etc/rc.config file. Manually enter an IP address of 0.0.0.0 and other NIC alias information for all physical adapters that will be team members.

Example:

```
# IP Adresses
#
IPADDR_0="0.0.0.0"
IPADDR_1="0.0.0.0"
IPADDR_2="0.0.0.0"
IPADDR_3=""
IPADDR_4=""
IPADDR_5=""
```

```
#
# Network device names (e.g. "eth0")
#
NETDEV_0="eth0"
NETDEV_1="eth1"
NETDEV_2="eth2"
NETDEV_3=""
NETDEV_5=""


#
# Parameters for ifconfig, simply enter "bootp" or
"dhcpclient" to use the
# respective service for configuration.
# Sample entry for ethernet:
# IFCONFIG_0="192.168.81.38 broadcast 192.168.81.63 netmask
255.255.255.224"
#
IFCONFIG_0="0.0.0.0"
IFCONFIG_1="0.0.0.0"
IFCONFIG_2="0.0.0.0"
IFCONFIG_3=""
IFCONFIG_4=""
IFCONFIG_5=""
```

NOTE – It may also be necessary to add an alias entry in /etc/modules.conf mapping an alias name such as eth0 to the appropriate driver module.

For users of other Linux distributions, follow instructions in the "baspcfg" section.

The configuration process involves the following steps:

1. Copy a configuration script from the "/etc/basp/samples" directory to the "/etc/basp" directory. Note that the configuration script name must be prefixed with "team–". Change file permissions to give the root user write access. Example: chmod 755 /etc/basp/team–vlan100.
2. Modify the configuration script to:
   (a) change the team type
   (b) add/delete the physical network interfaces
   (c) add/delete the virtual network interfaces
   (d) assign IP address to each virtual network interface.

   The syntax of the configuration script can be found below. Note that when configuring Teaming, at least one Primary Adapter is required.

3. Manually start the team for the first time:

```
% /etc/init.d/basp start
```

NOTE – This step is only required for the first time installation. The team configuration will be automatically started on subsequent reboots.

Note that if not all the virtual network interfaces are configured with IP address, there will be an error message in starting the BASP team. When this happens, repeat Step (2) to configure IP address for all the virtual network interfaces.

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BASP Configuration and Startup for Other Linux Distribution

BASP Configuration (baspcfg) is a command line tool to configure the BASP teams, add/remove NICs, and add/remove virtual devices. This tool can be used in custom initialization scripts. Please read your distribution−specific documentation for more information on your distributors startup procedures.

Following is the usage of this tool:

baspcfg v3.0.8 − Broadcom Advanced Server Program Configuration Utility Copyright (c) 2000−2001 Broadcom Corporation. All rights reserved.

usage: `baspcfg <commands>`

commands:

addteam <tid> <type> <tname>	create a team
delteam <tid>	delete a team
addva <tid> <vlan_id> <vname> [macaddr]	add a virtual adapter to a team
delva <tid> <vlan_id>	del a virtual adapter from a team
bind <tid> <role> <device>	bind a physical adapter to a team
unbind <tid> <device>	unbind a physical adapter from a team
show [tid]	display team configurations

where:

tid	An unique ID for each team, starting from 0
type	Team type: 0=SLB, 1=FEC/GEC, 2=802.3ad
tname	ASCII string of the team
vlan_id	VLAN ID: from 1 to 4094, 0=untagged or no VLAN
vname	ASCII string of the virtual device
macaddr	MAC address (optional), e.g. 00:10:18:00:11:44
role	Role of the physical device: 0=primary, 1=hot−standby
device	ASCII string of the physical device, e.g. eth0

The following sample startup script should be used to start the BASP after the first time installation and configuration, or in the subsequent reboots.

```
#!/bin/bash
# load basp module
insmod basp

# create new team
baspcfg addteam 0 0 team−one

# bind physical interfaces / two primary one backup
baspcfg bind 0 0 eth0
baspcfg bind 0 0 eth1
baspcfg bind 0 1 eth2

# create the virtual interface
baspcfg addva 0 0 sw0

# bind ip address to virtual interface and initialize
ifconfig sw0 192.168.0.1 up
```

> *NOTE – Baspcfg can only be executed in Super User mode. Attempting to use baspcfg as a standard user will yield the error message, "Error in communicating to BASP Module. Is it loaded?".*

When configuring Teaming, at lease one Primary Adapter is required.

BASP Startup Scripts for Red Hat distributions

- **basp**

  This script is intended to be installed in /etc/rc.d/init.d directory. After copying the script, run "chkconfig −−add basp". This script will be executed at runlevel 2, 3, 4 and 5. When "basp" is run, it will search the /etc/basp directory to list all the files with "team−" prefix, and then it will invoke the "baspteam" script to add or delete the teams. It is normal that each "team−*" file in /etc/basp represents 1 team.

- **baspteam**

  This script is called by "basp" script to add or delete a team. To install, create "/etc/basp" directory and copy this script over.

  To manually add a team:

  ```
  % baspteam team-sample add
  ```

  To delete a team:

  ```
  % baspteam team-sample del
  ```

Note that "team−sample" is the configuration script.

- **team−sample**

  This script contains a SLB team configuration with 3 NICs: eth0, eth1 and eth2. The team name is "TeamSample". All 3 NICs are primary. One virtual interface is also created for this team and the name of the virtual interface is "sw0". "sw0" is the device that "ifconfig" should be run against to set up the IP address. VLANs are not enabled in this script.

  This script and "team−gec" are intended to be customized. Refer to the configuration scripts section for details. This script should be copiedto /etc/basp directory and retain the "team−" prefix.

- **team−gec**

  This configuration script creates a GEC team with 3 network interfaces, eth0, eth1 and eth2. The team name is "TeamGEC". All 3 NICs are primary. One virtual interface is added to the team with the name "sw0" and VLANs are not enabled.

  This script and "team−sample" are intended to be customized. Refer to the configuration scripts section for details. This script should be copied to /etc/basp directory and retain the "team−" prefix.

BASP Configuration Scripts for Redhat Distributions

Both *team−sample* and *team−gec* are configuration scripts that follow the same syntax, as follows:

TEAM_ID:	this number uniquely identifies a team
TEAM_TYPE:	0 = SLB, 1 = Generic Trunking/GEC/FEC, 2 = 802.3ad
TEAM_NAME:	ascii name of the team
TEAM_PAx_NAME:	ascii name of the physical interface x, where x can be 0 to 7
TEAM_PAx_ROLE:	role of the physical interface x 0 = Primary, 1 = Hot−standby. This field must be 0 for Generic Trunking/GEC/FEC team.
TEAM_VAx_NAME:	ascii name of the virtual interface x, where x can be 0 to 63
TEAM_VAx_VLAN:	802.1Q VLAN ID of the virtual interface x. For untagged virtual interface, i.e., without VLAN enable, set it to 0. The valid VLAN ID can be 0 to 4094.

NOTE – Teaming scripts are intended for Red Hat distributions ONLY. Use with other Linux distribution will cause an error.

Broadcom NICE Patches

Also included in this release are network device drivers patched with Broadcom NICE support. These drivers are originally taken from the Linux 2.4.16 kernel distribution. To install patched drivers:

1. Copy the Broadcom NICE header file, "nicext.h", to the appropriateLinux kernel include directory, e.g.

   ```
   % cp /usr/src/nice-2.4.16/nicext.h
   /usr/src/linux/include/linux
   ```

2. Rename the original network device driver under the Linux kernel source tree, "/usr/src/linux/drivers/net".
3. Copy the patched drivers to the Linux kernel network driver sourcedirectory, i.e. "/usr/src/linux/drivers/net".
4. Follow the kernel rebuild instructions to configure kernel support for these drivers.

   ```
   % cd /usr/src/linux
   % make config
   ```

5. If the patched drivers are configured into the kernel, goto step (7). If the patched drivers are configured as modules, goto step (6).
6. In the case of supporting only the module version of these drivers, it is possible to simply run the following to compile patched
   drivers and to install them into the proper module directory:

   ```
   % make modules
   % make modules_install
   ```

   There is no need to compile the complete kernel. Goto step (8).

7. Rebuild the kernel to compile these patched drivers

   ```
   % make clean
   % make dep
   % make
   ```

8. Either reboot the system or unload/load the patched modules. Run configuration scripts to test the patch.

Uninstalling the RPM Package

To uninstall RPM package,

```
% rpm -e basplnx
```

and to reboot the system,

```
% reboot
```

Removal of Physical Interface in Generic Trunking and 802.3ad Mode

In Generic Trunking and 802.3ad mode, all the physical and virtual interfaces belonging to a team have the same MAC address. This MAC address is the same address as that of the first physical interface bounded to the team. In the case that this first physical interface is removed dynamically from the team using "baspcfg" tool and bounded to the protocol directly, this could lead to a duplicate MAC address problem on the network. Note that if the removed physical interface does not participate in any traffic, there will not be any problem.

To properly remove a physical interface, follow the steps listed below:

1. Backup the original team configuration script

```
% cp /etc/basp/team-gec /etc/basp/backup-gec
```

 NOTE 1 – "team–gec" is the name of the configuration script.

 NOTE 2 – "backup–gec" is the name of the backup script. The name of the backup script must NOT be prefixed with "team–".

2. Modify the team configuration script to remove the physical interface
3. Stop the running team

```
% /etc/basp/baspif /etc/basp/backup-gec stop
% /etc/basp/baspteam /etc/basp/backup-gec del
```

4. Restart the team

```
% /etc/basp/baspteam /etc/basp/team-gec add
% /etc/basp/baspif /etc/basp/team-gec start
```

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BASP SNMP Agent for Linux

This SNMP agent is designed to support the configuration and statistics information pertaining to the Broadcom BASP driver. The BASP SNMP agent is available in two packaging formats: TAR archive and RPM. Both packages include the exact same script and MIB files.

Installing the TAR Archive

To uncompress and expand the tar archive, run

```
% tar xvfz baspsnmp-{version}.tar
```

The installation process involves the following steps:

1. Copy the getBaspInfo and genBaspTraps script files into /usr/bin directory.
2. Copy the BASP–Config–MIB.txt, BASP–Statistics–MIB.txt and Brcm–BSAPTrap–MIB.txt into the /usr/share/snmp/mibs directory.
3. Locate the snmpd.conf file. It is normally located at: /etc/snmp or /usr/lib/snmp or $HOME/.snmp and add the following lines to the snmpd.conf.

```
pass .1.3.6.1.4.1.4413.1.2.1 /usr/bin/getBaspInfo
pass .1.3.6.1.4.1.4413.1.2.2.1 /usr/bin/getBaspInfo
pass .1.3.6.1.4.1.4413.1.2.2.2 /usr/bin/getBaspInfo
pass .1.3.6.1.4.1.4413.1.2.2.3 /usr/bin/getBaspInfo
```
4. Stop the snmpd daemon and restart it again.

```
% /etc/init.d/snmpd stop
% /etc/init.d/snmpd start
```

5. Run the genBaspTraps script to allow monitoring of the BASP trap events:

```
% genBaspTraps
```

This script can be terminated by hitting Ctrl–C keys if BASP trap event monitoring is no longer needed.

6. The *snmpget* and *snmpgetnext* commands can be used to receive the BASP snmp objects such as:

% snmpget localhost public BASP−Config−MIB::btTeamNumber
% snmpgetnext localhost public BASP−Config−MIB::btTeamNumber

BASP SNMP objects are provided in the following text files:

♦ BASP−Config−MIB.txt
♦ BASP−Statistics−MIB.txt
♦ Brcm−BSAPTrap−MIB.txt

Installing the RPM Package

Complete the following steps to install BASP SNMP agent from the RPM package.

1. To install the RPM package, run

```
% rpm −i baspsnmp−{version}.i386.rpm
```

The BASP script and MIB files will be installed. The snmpd.conf configuration file will me modified to add support for the BASP SNMP agent.
2. Follow steps 4 – 6 in the "<u>Installing the TAR Archive</u>" section.

NOTE – The current RPM installation fails to append the additional directives needed to the snmpd.conf file to support Basp objects. Thus please follow the instruction (3) in the Install – TAR archive to modify the snmpd.conf file.

SNMP Files

genBaspTrap	script monitoring the BASP trap events
getBaspInfo	script to process SNMP get/getnext inquiries
BASP−Config−MIB.txt	SNMP MIB file for BASP configuration objects
BASP−Statistics−MIB.txt	SNMP MIB file for BASP statistics objects
Brcm−BSAPTrap−MIB.txt	SNMP MIB file for BASP trap objects
release.txt	this file

Uninstalling the RPM package

To uninstall RPM package, run:

```
% rpm −e baspsnmp−{version}.i386.rpm
```

and to reboot the system,

```
% reboot
```

Known Problems

1. 802.3ad team member links disconnect and reconnect continuously when connected to the HP2524 switch. This is a 3rd party issue. It is seen only when configuring an 802.3ad team with greater than 2 members on the server and connecting an HP2524 switch, with lacp enabled as passive or active. The HP switch will show an lacp channel being brought up successfully with only 2 members. All other member's links will disconnect and reconnect. This does not occur with a Cisco Catalyst 6500.

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Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

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Manageability: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

- CIM

- DMI

- SNMP

CIM

The Common Information Model (CIM) is an industry standard defined by the Distributed Management Task Force (DMTF). Microsoft implements CIM on Windows platforms such as Windows 2000. Broadcom will support CIM on the Windows 2000 platform.

Broadcom's implementation of CIM will provide various classes to provide information to users through CIM client applications. Please note that Broadcom CIM data provider will provide data only, and users can choose their preferred CIM client software to browse the information exposed by Broadcom CIM provider.

Broadcom CIM provider provides information through BRCM_NetworkAdapter and BRCM_ExtraCapacityGroup classes. BRCM_NetworkAdapter class provides network adapter information pertaining to a group of adapters including Broadcom and other vendors' controllers. BRCM_ExtraCapacityGroup class provides team configuration for the Broadcom Advanced Server Program. Current implementation will provide team information and information of physical network adapters in the team.

Broadcom Advanced Server Program provides events through event logs. Users can use the "Event Viewer" provided by Windows 2000, or use CIM to inspect or monitor these events. Broadcom CIM provider will also provide event information through CIM's generic event model. These events are __InstanceCreationEvent, __InstanceDeletionEvent and __InstanceModificationEvent, and are defined by CIM. CIM requires the client application to register the events from the client application, using queries as examples shown below in order to receive events properly.

SELECT * FROM __InstanceModificationEvent where TargetInstance ISA
"BRCM_NetworkAdapter"
SELECT * FROM __InstanceModificationEvent where TargetInstance ISA
"BRCM_ExtraCapacityGroup"
SELECT * FROM __InstanceCreationEvent where TargetInstance ISA "BRCM_NetworkAdapter"
SELECT * FROM __InstanceDeletionEvent where TargetInstance ISA "BRCM_NetworkAdapter"
SELECT * FROM __InstanceCreationEvent where TargetInstance ISA "BRCM_ActsAsSpare"
SELECT * FROM __InstanceDeletionEvent where TargetInstance ISA "BRCM_ActsAsSpare"

For detailed information about these events, please refer to CIM documentation.

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DMI

The Broadcom DMI PCI Hot Plug Service operates in conjunction with the DMI Service Provider software component. It provides hot−swap functionality for the Broadcom NetXtreme Gigabit Ethernet Adapter in a Windows NT 4.0 hot plug system. Users should consult the system documentation to determine the supported Hot Plug capabilities.

The hot−swap feature allows the user to replace a Broadcom adapter without bringing down the system. These capabilities reduce down time, which is critical to many servers operating in the Windows NT 4.0 environment.

To enable this feature, the PC system hardware has to be hot plug capable and operate on a Windows NT 4.0 operating system. A third party provided DMI 2.0 Service Provider software has to be installed prior to the installation of the Broadcom DMI PCI Hot Plug service software. This Service Provider software is available from either Intel Corporation, or Smart Technology Enabler Corporation. The system also requires the Hot Plug or Hot Swap application software from the system vendor to enable this feature. Users should consult the system documentation to determine the recommended installation instructions for the DMI software.

The hot−swap feature is available to the Broadcom adapter depending on the system vendor application software.

The user is limited to replace a Broadcom adapter with another Broadcom adapter of IDENTICAL hardware configuration.

SNMP

BASP Sub−agent

The BASP sub−agent, baspmgnt.dll, is designed for the Windows 2000 and Windows NT SNMP Service. It is required to install the SNMP service before installing BASP subagent

The BASP subagent allows an SNMP manager software to actively monitor the configurations and performance of the Broadcom Advanced Server features. The subagent also provides an alarm trap to an SNMP manager to inform the manager of any changes to the conditions of the BASP component.

The BASP subagent allows monitoring of the configurations and statistics for the BASP teams, the physical NIC adapters participating in a team, and the virtual NIC adapters created as the result of teaming. Non−teamed NIC adapters are not monitored at this time. The BASP configuration data includes information such as team IDs, physical/virtual/VLAN/team adapter IDs, physical/virtual/VLAN/team/ adapter descriptions, and MAC addresses of the adapters.

The statistics include detailed information such as data packets transmitted and received for the physical/virtual/VLAN/team adapters.

The alarm trap forwards information about the changes in configuration of the physical adapters participating in a team, such as physical adapter link up/down, and adapter installed/removed events.

To monitor this information, an SNMP manager needs to load the Broadcom BASP MIB database files to allow monitoring of the information described above. These files shown below, are included with the Broadcom installation CD:

> baspconfig.mib
> baspstat.mib
> basptrap.mib

BASP Extensible−agent

The Broadcom NetXtreme Adapter Extended Information SNMP extensible−agent, bcmif.dll is designed for Windows 2000 and Windows NT SNMP service. It is required Windows NT/Windows 2000 SNMP service is installed before installing the extensible−agent.

The extensible−agent allows the SNMP manager software to actively monitor the configurations of the Broadcom NetXtreme Network Interface Card. It is intended to supplement the information already provided by the standard SNMP Management
Network Interface information.

The extensible−agent provides in−depth information about a Broadcom NetXtreme adapter such as:

> its MAC address,
> its bound IP address,
> IP subnet mask,
> physical link status,
> adapter state,
> line speed,
> duplex mode,
> memory range,
> interrupt setting,
> bus number,
> device number,
> function number

To monitor these information, a SNMP manager needs to load the Broadcom Extended information MIB file to allow monitoring of the information described above. This file, bcmif.mib, is included with the Broadcom NetXtreme adapter installation CD.

The monitored workstation requires the installation of the Broadcom Extended Information SNMP extensible−agent, bcmif.dll, and requires the Microsoft Windows 2000 or Windows NT 4.0 SNMP service to be installed and loaded. Installation of this component will be described in following sections.

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NetWare Driver Software: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

● Netware Core Driver Software

● Broadcom Advanced Server Program for Netware

● SNMP

Netware Core Driver Software

This section contains the following information:

- Driver Installation

- Pre–Installation Requirements

- Installing Novell NetWare Server 5.x/6.0

- Verifying or Modifying Adapter Parameters

- Removing Drivers from Autoexec.ncf

Driver Installation

This section describes how to perform the following tasks:

- Verify that the required OS support files are installed on the server and the NetWare pre–installation parameters are correctly set.
- Install the driver software in the Novell NetWare environment.
- If necessary, reconfigure the driver software after installation.
- For an adapter installation with an existing NetWare server, NetWare will automatically detect the new adapter and attempt to load the appropriate driver. Ensure that your Broadcom CD ROM is loaded and select the BCM570x NetXtreme™ Gigabit Ethernet Driver.

A commonly used method to install a driver on a NetWare server running 5.x/6.0 and higher is through *NWCONFIG*, and on NetWare 4.x it is *INSTALL*.

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Pre–Installation Requirements

A network device driver must be installed before the Gigabit Ethernet Adapter can be used with your Novell NetWare system.

Before you can successfully install the adapter driver for Novell NetWare, the adapter card must be physically installed in the server and, typically, NetWare OS software must already be running on the server. Make sure that your server meets the hardware and operating system software requirements described in "Installing the Hardware."

To enable the Gigabit Ethernet Adapter to function correctly, you need to install the latest Novell NetWare support pack files. The NetWare support pack or patch file(s) needed for the operating system running on your server are indicated below:

Table 1. NetWare Support Files

NetWare OS	Support Pack or Patch	Files to be Installed
NetWare 5.1	Latest NetWare 5.1 Support Pack	The latest support pack can be found at: http://support.novell.com/misc/patlst.htm
NetWare 6.0	Latest NetWare 6.0	
NetWare 4.2	Support Pack *8.0 or later*	

> *NOTE – PCI–X Systems: For systems with PCI–X you must install driver version v2.10 and above. For new installs of Netware with the latest drivers, you must create a "c:\nwupdate" directory and copy the latest B57.LAN and B57.LDI files into this directory before installing the operating system.*

> *NOTE – NetWare 5.x/6.0: If you are installing NetWare 5.x/6.0 for the first time on a system, the process to install the adapter driver will occur during the OS installation procedure. Install the NetWare 5 support pack after you have successfully installed the operating system on the server.*

To obtain the latest support pack files, go to the Novell support website and click on the **Minimum Patch List** option in the navigation bar. Scroll down the page and, using Table 1 above as a guide, select and download the latest support pack or patch file(s) for the operating system running on your server.

> *NOTE – NetWare 4.2: The latest ODI LAN drivers are not automatically installed with the NetWare 4.2 Support Pack. Follow the support pack instructions for including the ODI LAN drivers during installation.*

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Installing Novell NetWare Server 5.x/6.0

Please ensure that the server has the latest support pack available installed. The latest support packs can be found at: http://support.novell.com/misc/patlst.htm. You may want to create an archive disk by copying all the files from the CDROM\Netware\Driver directory onto a floppy disk. If you choose to use the CDROM directly, ensure that the CDROM.NLM is loaded and that you are aware of the NetWare Volume name for the CD ROM that you just installed.

1. From the NetWare Server console, type `LOAD NWCONFIG` (or just NWCONFIG) and press **Enter**.
2. From the Configuration Options screen, select **Driver options** and press **Enter**.
3. Select the **Configure network drivers** option and press **Enter**.
4. Choose the **Load an additional driver** option and press **Enter**.
5. Insert the CD or driver disk created using the Broadcom MakeDisk utility, and select the **Install an unlisted driver** option, by pressing **Insert**.

6. If you are using the archive disk that you created, insert the disk into drive A: and press **Enter**. If you have the CD ROM mounted as a NetWare volume, press **F3** and enter <Volume Name>: Netware\Driver as the source path. Where <Volume Name> is the name of the NetWare Volume for the CD ROM and Netware\Driver is the directory of the specific files on the CD ROM needed for this installation.

7. The name of the driver displays.

8. Press **Enter** to select the highlighted driver.

9. A copy the driver prompt appears.

10. Select **Yes** and press **Enter**.

11. Select **Yes** and press **Enter** to copy the .LDI file. This is the installation script for the driver.

12. Follow the instructions for the installation.

13. Select **Save parameters and load driver** to continue.

14. Choose **Exit** to return to the server console prompt.

> *NOTE – If you are performing an initial installation of NetWare 5.x/6.0 and have more than two adapters installed, the install program will allow you to allocate the actual number of packet receive buffers needed by the adapter. During installation, the `RxBuffers` value should be set to 32, the minimum number of buffers the driver requires for each adapter. While this setting affects adapter performance, it allows installation of the operating system and up to eight adapters during initial install. Once installation is complete, you need to increase the number of buffers allocated to the driver, as described in Verifying or Modifying Adapter Parameters.*

15. After NetWare 5.x/6.0 has been successfully installed, set the minimum packet receive buffers parameter in the startup.ncf file to 1500 for each adapter in the system. Set the maximum packet receive buffers to three times the minimum packet receive buffers. Typically 4 MB of RAM is required per 1000 receive buffers. For more information, see *Verifying or Modifying Adapter Parameters*.

16. In the autoexec.ncf file, delete the packet receive buffers parameter (RxBuffers=32) in the load statement for this adapter. Deleting the receive buffers phrase from the load statement resets the receive buffers parameter to the default value of 200 for this adapter.

> *NOTE – The server needs to be restarted for the new configuration.*

Example: The default maximum number of receive buffers for the system is 500; the default minimum is 128. Edit the startup.ncf file to have the following entries. The actual numbers will be a function of the number of adapters in the system. The following is an example for a system with 8 adapters installed:

```
set maximum packet receive buffers = 36000
set minimum packet receive buffers = 12000
```

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Verifying or Modifying Adapter Parameters

When an adapter configuration is saved, the NetWare install program adds load and bind statements to the autoexec.ncf file. By accessing this file, you can verify the parameters configured for each adapter, modify them, or enter additional parameters.

> *NOTE – The Novell monitor program and the config command are also useful for verifying driver configuration. For information on how to use these programs, see the Utilities Reference in your Novell NetWare online documentation.*

The parameters that can be defined in the load statements are described below:

Configuration Parameters for B57.LAN driver:

TxDescriptors=
This is to initialize Descriptor resources on the adapter for transmits.
Min = 100
Max = 512
Default = 120

RxBuffers=
This is to pre–allocate receive ECBs & Receive adapter resources. This setting may be affected by the Netware server maximum/minimum packet receive buffer settings.
Min = 32
Max = 1000
Default = 200

Speed=
This keyword is to force the line speed of the adapter.
When this keyword is used, the switch to which the adapter cable is connected to must be forced. If not, the adapter and switch may run at different duplex modes. It is important to have the switch and adapter set properly. The best way to ensure good connectivity is to not set the speed keyword and
allow for automatic link setup (auto–negotiation).
Choices are:
AUTO, 10FD,10HD, 100FD, 100HD,
Default is Auto. Note that 1000 Mbps Speed is auto–detected at this time, and cannot be forced.

Link=
This keyword is set to "AUTO" to allow the adapter to auto–negotiate with a switch using the Speed keyword as an advertised speed upper limit.
It is best to allow for auto–negotiation of the card and switch by not setting this keyword or the Speed keyword.
Choices are:
AUTO, FORCE
Default is FORCE
Default value is FORCE because the speed keyword is usually used when a switch and the adapter speeds are both forced to a specific value.

RxTicks=
This is to enable the use of batching receives within a specific time period.
Min = 0, disabled
Max = 5000000, 5 seconds
Units are in micro seconds
Default value is 300

TxTicks=
This is to enable the use of a transmit "tick" threshold interrupt within a specific time period.
Min = 0, disabled
Max = 5000000, 5 seconds
Units are in micro seconds
Default is 200

TxPacketsPer=
This is to enable the use of allowing an interrupt to occur after a specific amount of packets are transmitted.
Min = 0, disabled
Max = 100
Default is 20

RxPacketsPer=
This is to enable the use of allowing an interrupt to occur after a specific amount of packets are received.
Min = 0, disabled
Max = 100
Default is 75

CheckSum=
This is to enable or disable the transmit & receive checksum off loading feature.
The checksum off loading support is only for TCP/IP packets, for that reason it is defaulted to OFF.
Choices are:
OFF, ON, TX, RX
Default value is ON.

TxFlow=
This keyword allows enabling/disabling of TxFlow control.
Choices are:
ON, OFF
Default value is OFF.

RxFlow=
This keyword allows enabling/disabling of RxFlow control.
Choices are:
ON, OFF
Default value is OFF.

PDriver=
Allows for the driver to operate in persistent driver mode.

Only use if adapter is placed in a Hot Plug PCI slot and only if required to swap with an exact same board.
Choices are:
OFF, ON
Default value is OFF.

NODE=

This is a Novell Netware keyword.
This keyword will allow an input Ethernet node address to replace the adapter factory programmed Ethernet node address until a subsequent reboot.
Choices are:
NODE=nnnnnnnnnnnn

FRAME=

This is a Novell Netware keyword.
String specifying the frame type.
Choices are:
ETHERNET_II
ETHERNET_802.3
ETHERNET_802.2
ETHERNET_SNAP
Default value is ETHERNET_802.2

SLOT=

This is a Novell Netware keyword.
System−wide unique Hardware Instance Number (HIN) that may be the physical slot number on a slot based bus such as PCI.
SLOT=n

Jumbo=

Keyword to enable Jumbo frame support. When enabled, jumbo packets of up to 9000 bytes are supported.
Choices are:
Jumbo=1536−9100
Default is no jumbo packets

NOTE – Jumbo frames are only supported on Netware 6.0 and above. Plus the first frame loaded must be ETHERNET_II.

NOTE – Jumbo frame support must have the following text in the Startup.ncf file: "Set maximum physical receive packet size = 18000".

P3=
This keyword is used when running perform3.exe tests and may increase performance on networks running with many ipx clients.
Set P3=1, when running the perform3 test back to back to a single client.
Set P3=2, when running the perform3 test with many clients.
Default: P3=0.

Spuriousfix=

When this keyword is set to 1(spurious fix is on), the spurious interrupts count that is sometimes displayed on the Netware console monitor, may be reduced. By setting this keyword to 0 (spurious fix is OFF), performance of the driver may be enhanced.

The Default is spurious fix = 1 (spurious fix is on).

Choices are:

Spuriousfix=0

Spuriousfix=1 (default).

Poll=

To disable interrupt driven mode in the driver set Poll=1 and the driver will not use interrupts, but will be polled by the Netware OS. This is a common feature supported in NW. The poll mode may increase driver performance in some environments.

Choices are:

Poll=1 (ON)

Poll=0 (OFF) (default).

WireSpeed=

This feature provides adapter link & data integrity even when attached to a questionable cable and/or switch.

For example; an adapter trying to run 1000 speed on a cat3 cable ordinarily would not link. With the WireSpeed=1, the link will occur at 100Mbs.

Choices are:

WireSpeed=1 (ON) (Default)

WireSpeed=0 (OFF).

Model=

This keyword is to allow the additon of a sub−system ID of a specific NIC so that the driver loads only on the first NIC found with a matching sub−system ID.

e.g., MODEl= 0x14e4

Default = 0

MagicP=

When the MagicP=1 the driver will enable the adapter to wake up the system when a magic packet is received after the system is shutdown. MagicP=0 is the default setting with the adapter having no wake up ability.

Choices are:

MagicP=0 (default)

MagicP=1

Fiber=

The driver has support for the 1000FD fiber adapter. The fiber autonegotiates link with a fiber switch eventhough it only supports 1000FD. In some cases the user may want to force the adapter to 1000FD.

Choices are:

Fiber=AUTO (default)

Fiber=FORCE

NOTE – If you modify any adapter parameters, you must reboot the system before the changes take effect. If you make changes and do not reboot, you may experience

configuration problems.

A valid autoexec.ncf file is shown below. One set of load and bind commands (in **bold**) is added for each frame type the adapter is configured to support.

```
Set Time Zone = PST8PDT
set Daylight Savings Time Offset = 1
set Start Of Daylight Savings Time = (APRIL SUNDAY FIRST 2:00:00 AM)
set End Of Daylight Savings Time = (OCTOBER SUNDAY LAST 2:00:00 AM)
set Default Time Server Type = SINGLE
set Bindery Context = O=LAN

# WARNING!!
file server name NOVELLSERVER51
# WARNING!!
# If you change the name of this server, you must update
# all the licenses that are assigned to this server. Using
# NWAdmin, double-click on a license object and click on
# the Certificate Assignments button. If the old name of
# this server appears, you must delete it and then add the
# new server name. Do this for all license objects.

ServerID 1C8EE2C
LOAD ODINEB.NLM
LOAD TCPIP
LOAD B57 SLOT=2 FRAME=Ethernet_802.2 NAME=B57_1_E82
BIND IPX B57_1_E82 NET=FAFD3D25
LOAD B57 SLOT=2 FRAME=Ethernet_802.3 NAME=B57_1_E83
BIND IPX B57_1_E83 NET=5A2D8D6D
LOAD B57 SLOT=2 FRAME=Ethernet_SNAP NAME=B57_1_ESP
BIND IPX B57_1_ESP NET=477A35BD
LOAD B57 SLOT=2 FRAME=Ethernet_II NAME=B57_1_EII
BIND IPX B57_1_EII NET=C3C8F2E4
BIND IP B57_1_EII ADDR=172.16.1.1 MASK=ff.ff.ff.0

mount all

SEARCH ADD SYS:\JAVA\BIN
SEARCH ADD SYS:\JAVA\NWGFX
```

NOTE – If you modify any adapter parameters, you must reboot the system before the changes will take effect. If you make changes and do not reboot, you may experience configuration problems.

Verifying or Modifying Adapter Parameters

Removing Drivers from Autoexec.ncf

To remove the drivers from the Autoexec.ncf, locate the Load and Bind command lines associated with the Broadcom driver and remark them out by inserting the # symbol at the beginning of each command line, or by deleting the statement.

Example:

```
# LOAD B57 SLOT=2 FRAME=Ethernet_802.2 NAME=B57_1_E82
# BIND IPX B57_1_E82 NET=FAFD3D25
# LOAD B57 SLOT=2 FRAME=Ethernet_802.3 NAME=B57_1_E83
# BIND IPX B57_1_E83 NET=5A2D8D6D
# LOAD B57 SLOT=2 FRAME=Ethernet_SNAP NAME=B57_1_ESP
# BIND IPX B57_1_ESP NET=477A35BD
# LOAD B57 SLOT=2 FRAME=Ethernet_II NAME=B57_1_EII
# BIND IPX B57_1_EII NET=C3C8F2E4
# BIND IP B57_1_EII ADDR=172.16.1.1 MASK=ff.ff.ff.0
```

> *NOTE – If you modify the Autoexec.ncf, you must reboot the system before the changes take effect.*

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BASP for Netware

This section contains the following information:

- <u>Introduction</u>
- <u>Balance Modes and Limitations</u>
- <u>NESL Compliance</u>
- <u>Installing Broadcom Advanced Server Program</u>
- <u>Balance Mode Selection</u>
- <u>Loading Frame Types</u>
- <u>Hot Standby</u>
- <u>Configuring VLANs</u>
- <u>Jumbo Frames</u>
- <u>Additional Command Line Keywords</u>
- <u>Editing the Autoexec.ncf File</u>

Introduction

BASP.LAN is Broadcom's virtual ethernet driver for Netware 4.x and 5.x that provides Load–balancing, fault–tolerance, and VLAN features. These features are provided by creating teams (virtual adapters) that consist of multiple NIC interfaces. A team can consist of one to six (eight on some systems) NIC interfaces and each interface can be designated primary or standby*. All primary interfaces in a team will participate in Load–balancing operations by sending and receiving a portion of the total traffic**. Standby interfaces will take over in the event that all primary interfaces have lost their links. VLANs can be added to a team to allow multiple VLANs with different VLAN IDs to share the virtual adapter.

Load–balancing and fault–tolerance features will work with any third party's NIC adapters. VLANs only work with Broadcom or Alteon NIC adapters.

*Standby can only be used in Smart Load–Balance mode (See below).

**In 802.3ad mode, the number of NIC interfaces aggregated is automatically determined through LACP (See below).

Balance Modes and Limitations

Smart Load–balance (SLB) is a protocol specific scheme and the level of support for IP, IPX, and other protocols are listed below.

	Load–balancing	Fault–tolerance

IP	Yes	Yes
IPX	Yes*	Yes**
Other protocols	No	Yes**

*Only outbound load–balancing for IPX (on NetWare only).
**Only for Broadcom NICs. Alteon's driver ALT.LAN must be version 2.05b or newer released by Broadcom.

Smart Load–balance (SLB) mode works with all ethernet switches without configuring the switch ports to any special trunking mode. Only IP traffic will be load–balanced in both inbound and outbound directions. IPX traffic will be load–balanced in outbound direction only. Other protocol packets will be sent and received through one primary NIC only. Fault–tolerance for non–IP traffic is only supported using Broadcom or Alteon NICs.

The Generic Trunking mode requires the ethernet switch to support some form of port trunking mode (e.g. Cisco's Gigabit EtherChannel or other switch vendor's link aggregation mode). Trunking mode must be statically configured on the switch ports that are connected to the team. This mode is protocol–independent and all traffic should be load–balanced and fault–tolerant.

802.3ad mode requires the ethernet switch to support 802.3ad with LACP (Link Aggregation Control Protocol). LACP will try to configure the maximum number of NICs in the team that are compatible for link aggregation. If LACP determines that some NICs are not able to aggregate (because of some restrictive limitations or configurations on the switch), the remaining NICs
that cannot aggregate will be idle. If LACP is completely disabled on the switch, then only one of the NICs in the team will be used. Some switches require the LACP ports to be in full–duplex mode for them to work. LACP can be configured active or passive on the team and most switches allow active or passive selections on a per port basis. At least one side of each connection must be active otherwise the connection will never be selected for aggregation. This mode is also protocol– independent and all traffic should be load–balanced and fault–tolerant.

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NESL Compliance

For optimum fault tolerance and recovery operations, BASP.LAN relies on the NIC drivers to generate NESL (Netware Event Sevice Layer) events during link changes and other failure events. NESL is an optional feature in the ODI driver specification and not all drivers support it. For NESL events to propagate properly to BASP.LAN, ODINEB.NLM must be loaded before the
NESL compliant ODI drivers.

Do the following to check if a NIC driver supports NESL events. Load BASP.LAN and create a team by binding the NIC adapter to the virtual slot (See instructions and examples below). In the "Virtual Adapter X Team Members" screen of the BASP.LAN's menu interface, the Link status of all bound NIC adapters are shown. Disconnect or connect the NIC adapter's cable and the link status shown on the screen should change immediately if the NIC driver supports NESL events.

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NESL Compliance 123

Installing Broadcom Advanced Server Program

1. Load BASP.LAN just like a standard LAN driver with all necessary frame types for the team. BASP.LAN requires a special VSLOT parameter to specify the virtual slot. The virtual slot can be viewed as team numbers 1 through 4, which supports up to eight adapters and up to four teams.

   > NOTE – Be sure to load BASP.LAN before loading your standard LAN driver.

   Example:
   LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_EII VSLOT=1
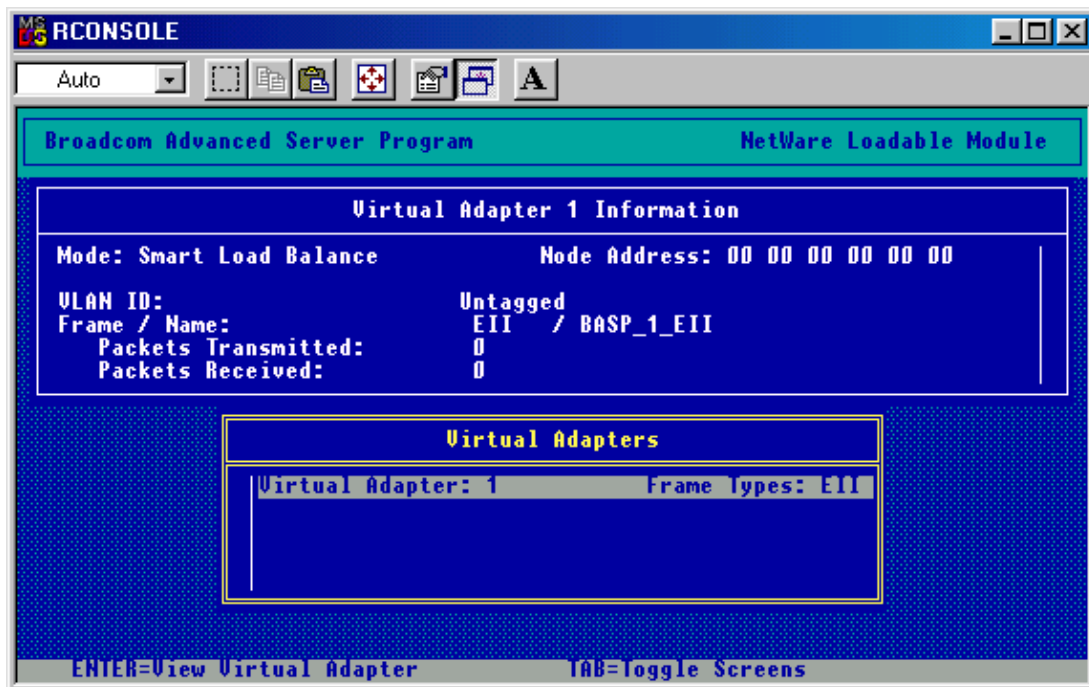
2. Load the network drivers for the NIC adapters that will be part of the team. The frame types loaded should be the same for all adapters in the team and same as those loaded for BASP.LAN in step 1. Do not bind protocols directly to these adapters. Be sure to load ODINEB.NLM (a Novell supplied NLM) before all network drivers.

   Example:
   LOAD ODINEB.NLM
   LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1
   LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2

   After BASP.LAN is successfully loaded, a new screen similar to the one above appears. This screen displays all virtual adapter settings and statistics. Press Alt+Esc to switch back to the console and continue with step 3.

3. Bind BASP.LAN to the NIC adapters in the team by using a custom BASP BIND command at the console.

   Example:
   BASP BIND BASP_1_EII B57_1_EII
   BASP BIND BASP_1_EII B57_2_EII
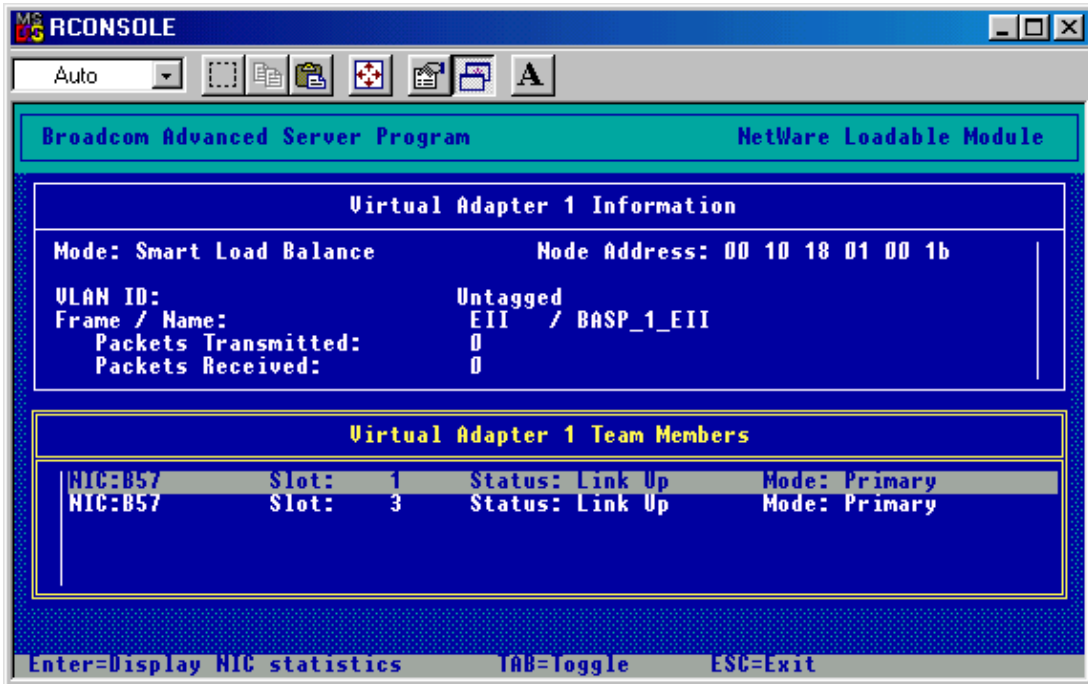
Note that if there are multiple frame types loaded on the virtual and the physical adapters, it is only necessary to bind one frame type on the virtual adapter to the same frame type on the physical adapter. The other frame types will be automatically bound.

4. Bind protocols to BASP.LAN.

   Example:
   BIND IP BASP_1_EII ADDR=x.x.x.x MASK=x.x.x.x

```
Broadcom Advanced Server Program            NetWare Loadable Module

                    Virtual Adapter 1 Information

 Mode: Smart Load Balance          Node Address: 00 10 18 01 00 1b

 VLAN ID:                          Untagged
 Frame / Name:                     EII    / BASP_1_EII
    Protocol / Address:            ARP
    Protocol / Address:            IP     / 172.16.3.50
    Packets Transmitted:          24,888
    Packets Received:             24,312




                  TAB=Toggle Windows        ESC=Exit
```

NOTE – Configuration of BASP.LAN should be performed manually by editing the AUTOEXEC.NCF file. NWCONFIG.NLM (or INSTALL.NLM) cannot completely configure BASP.LAN.

NOTE – The recommended sequence is to load BASP.LAN before the network drivers as outlined above. This allows BASP.LAN to determine the initial link state of the bound adapters without delay.

Uninstall BASP

To uninstall the Broadcom Advanced Server Program, uninstall the adapter and the BASP drivers.

For the adapter driver, at the Command Line Interface (CLI) enter the following command:

    UNLOAD B57

The response will be:

    Module B57.LAN unloaded

For the BASP driver, at the Command Line Interface (CLI) enter the following command:

    UNLOAD BASP

The response will be:

    Module BASP.LAN unloaded

NOTE – BASP can not be unloaded if one or more adapters are bound to BASP.

Balance Mode Selection

Use "MODE=SLB" for Smart Load−Balance mode, "MODE=TRUNK" for Generic Trunking mode, or "MODE=802.3AD" for 802.3ad mode. The default is SLB.

> **Example:**
> LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_EII VSLOT=1 MODE=TRUNK

NOTE – In SLB mode, IPX traffic is only load−balanced on the send side but not on the receive side.

In 802.3ad mode, untagged ethernet II frame type must be loaded before LACP frames can be transmitted and received. LACP will default to active for all NICs in the team. Use the parameter "LACP=PASSIVE" to change LACP to passive mode for all NICs in the team. Note that at least one side (server or switch) must be in LACP active mode for it to work.

> **Example:**
> LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_EII VSLOT=1 MODE=802.3AD LACP=PASSIVE

Loading Frame Types

After one or more NIC adapters are bound to a virtual adapter, additional frame types can only be loaded in the virtual adapter if the corresponding frame types are also loaded in the bound adapters. For example, ETHERNET_802.2 can be loaded in BASP VSLOT 1 if ETHERNET_802.2 is loaded for the B57 driver in SLOT 1 and 2 in the example below. Similarly, a virtual adapter can only be bound to a physical adapter if the physical adapter has all the frame types loaded in the virtual adapter.

> **Example:**
> LOAD ODINEB.NLM
> LOAD BASP.LAN FRAME=ETHERNET_802.2 NAME=BASP_1_E82 VSLOT=1
> LOAD B57.LAN FRAME=ETHERNET_802.2 NAME=B57_1_E82 SLOT=1
> LOAD B57.LAN FRAME=ETHERNET_802.2 NAME=B57_2_E82 SLOT=2

Hot Standby

In Smart Load–Balance (SLB) mode, one or more NIC adapters can be designated as hot standbys. Use the keyword "STANDBY" in the BASP BIND command to indicate binding a NIC adapter as a hot standby.

> **Example:**
> BASP BIND BASP_1_EII B57_1_EII
> BASP BIND BASP_1_EII B57_2_EII STANDBY
>
> In the above example, B57_1_EII and B57_2_EII are bound as primary and hot standby adapters respectively. Note that standby is only valid for Smart Load–Balance mode.
>
> *NOTE – No traffic runs on the standby until the primary fails.*

Configuring VLANs

> *NOTE – VLANs are not supported on non–Broadcom adapters. It is supported on the Alteon® adapters if the ALT.LAN provided by Broadcom is used. If a non–Broadcom adapter is a member of a failover team, VLANs will not be supported for that team.*

> *NOTE – To avoid failover problems when using BASP, make sure that the spanning tree is disabled on the switch that the network adapter is connected.*

To add VLANs to a team, do the following:

1. Load BASP.LAN with the all necessary frame types and specify the VLAN ID for each frame type. You can specify a maximum of 64 VLAN IDs and each VLAN ID can be loaded up to 4 times with 4 different frame types.

   Example: (VLAN ID 2 for Ethernet II)
   LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_V2_EII VSLOT=1 VLAN=2

   > *NOTE – When adding 64 VLANs, the 64th VLAN must have a VLAN ID of 0 (63 VLANs are ta and 1 VLAN is untagged).*

2. Load the network drivers for the NIC adapters in the team with all the frame types specified in step 1. Note that the one or more VLAN IDs specified in step 1 do not have to be specified

when loading the network drivers. And each frame type loaded in step 1 only needs to be loaded once for each network driver even if it is loaded multiple times with different VLAN IDs in step 1. Only Broadcom and Alteon® NIC adapters can be used. ALT.LAN must be version 2.05b or newer released by Broadcom and must include the keyword FORVLANS.

Example: (Broadcom adapters)
LOAD ODINEB.NLM
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2

Example: (Alteon adapters)
LOAD ODINEB.NLM
LOAD ALT.LAN FRAME=ETHERNET_II NAME=ALT_1_EII SLOT=1 FORVLANS
LOAD ALT.LAN FRAME=ETHERNET_II NAME=ALT_2_EII SLOT=2 FORVLANS

3. Bind BASP.LAN to the NIC adapters in the team for each protocol.

Example:
BASP BIND BASP_1_V2_EII B57_1_EII
BASP BIND BASP_1_V2_EII B57_2_EII

Note that if there are multiple VLANs (each with one or more frame types) loaded on the virtual adapter, it is only necessary to bind one frame type on one VLAN on the virtual adapter to the same frame type on the physical adapter. The other VLANs will be automatically bound.

4. Bind protocols to BASP.LAN.

Example:
BIND IP BASP_1_V2_EII ADDR=x.x.x.x MASK=x.x.x.x

This example creates a team with 2 adapters using VLAN ID 2. Outbound packets will be tagged with VLAN ID 2 and only similarly tagged packets will be received by the NIC adapters in the team. Additional VLANs with different VLAN IDs can be created in the same team. The Maximum number of VLANs per virtual slot is 64. The valid range of VLAN IDs is from 1 to 4094. VLAN=0 indicates the VLAN is untagged and is the default. Use decimal numbers to specify the VLAN ID.

The following are examples of multiple VLAN configurations:

LOAD BASP FRAME=ETHERNET_II NAME=BASP_1_V100_EII VSLOT=1 VLAN=100
LOAD BASP FRAME=ETHERNET_II NAME=BASP_1_V200_EII VSLOT=1 VLAN=200
LOAD BASP FRAME=ETHERNET_II NAME=BASP_1_V300_EII VSLOT=1 VLAN=300

LOAD ODINEB.NLM
LOAD B57 FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1
LOAD B57 FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2

BASP BIND BASP_1_V100_EII B57_1_EII
BASP BIND BASP_1_V100_EII B57_2_EII

BIND IP BASP_1_V100_EII ADDR=172.16.210.1 MASK=255.255.0.0
BIND IP BASP_1_V200_EII ADDR=172.17.210.1 MASK=255.255.0.0
BIND IP BASP_1_V300_EII ADDR=172.18.210.1 MASK=255.255.0.0

> NOTE – When BASP BIND BASP_1_V100_EII B57_1_EII is executed, the adapter B57_1_EII is bound to all three VLANs.

> NOTE – *If you are unable to login to the server after configuring BASP, add the following command lines before loading BASP.*

UNLOAD SLPTCP
LOAD SLPTCP

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Jumbo Frames

> NOTE – *5705 does not support jumbo frames. It can transmit jumbo packets by TCP segmentation, but the ethernet frame size is still limited to 1514 bytes. Receive frame size is also limited to 1514 bytes.*

Jumbo Frames are supported in all balance modes. The maximum frame size will be automatically set to the smallest maximum frame size of all NICs in the team. Use appropriate keywords to enable jumbo frames when loading the NIC drivers.

Example:
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_EII VSLOT=1
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1 JUMBO=9000
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2 JUMBO=9000
BASP BIND BASP_1_EII B57_1_EII
BASP BIND BASP_1_EII B57_2_EII

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Additional Command Line Keywords

CHECKSUM=ON

Enables BASP.LAN to offload TCP/UDP and IP checksums to the bound NIC adapters if supported by the OS. This will improve performance if some or all NIC adapters in the team support hardware checksums. Be sure to load the NIC drivers with hardware checksums enabled.

Example:
A team of two BCM5700 NICs with hardware checksums enabled.

LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_EII CHECKSUM=ON
VSLOT=1
LOAD ODINEB.NLM
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII CHECKSUM=ON
SLOT=1
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII CHECKSUM=ON
SLOT=2
BASP BIND BASP_1_EII B57_1_EII
BASP BIND BASP_1_EII B57_2_EII

NOSCREEN

Disables the menu−driven screen when BASP.LAN is loaded for the first time.

Example:
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_EII VSLOT=1
NOSCREEN

GVRP

Enables GVRP (Garp VLAN Registration Protocol) for the VLAN that is loaded. An untagged 802.2
frame type must be loaded in the virtual adapter and all bound physical adapters for GVRP to take
effect. This is necessary because GVRP uses untagged 802.2 frames to advertise VLAN
memberships. Use VLAN=0 FRAME=ETHERNET_802.2 in the LOAD command to specify
untagged 802.2 frame type.

Example:
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_V2_EII VSLOT=1
VLAN=2 GVRP
LOAD BASP.LAN FRAME=ETHERNET_802.2 NAME=BASP_1_E82 VSLOT=1
VLAN=0

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Editing the Autoexec.ncf File

When an adapter configuration is saved, the NetWare install program adds load and bind
statements to the autoexec.ncf file. By accessing this file, you can verify the parameters configured
for each adapter, add or delete parameters, or modify parameters.

Autoexec.ncf File Example: A valid autoexec.ncf file is shown below with various VLAN and
teaming examples.

Example 1

```
# Team of 2 NIC adapters with frame type Ethernet_II and one VLAN, number 2

#Load BASP.LAN with the frame types and VLAN ID(s) specified.

LOAD ODINEB.NLM
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_V2_EII VSLOT=1
VLAN=2

# Load the network drivers for the NIC adapters in the team with the same
# frames types .

LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2

# Bind BASP.LAN to the NIC adapters in the team for each protocol

BASP BIND BASP_1_V2_EII B57_1_EII
BASP BIND BASP_1_V2_EII B57_2_EII

#Bind protocols to BASP.LAN.

BIND IP BASP_1_V2_EII ADDR=192.168.2.200 MASK=255.255.255.0

#############################################################################
```

Example 2

```
# Team of 2 NIC adapters with frame type Ethernet_II and three VLANs, number 2,3,4

#Load BASP.LAN with the frame types and VLAN ID(s) specified.

LOAD ODINEB.NLM
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_V2_EII VSLOT=1
VLAN=2
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_V3_EII VSLOT=1
VLAN=3
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_V4_EII VSLOT=1
VLAN=4

# Load the network drivers for the NIC adapters in the team with the same
# frame types and VLANs specified.

LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2

# Bind BASP.LAN to the NIC adapters in the team for each protocol
# Note: BASP BIND is only used for the first VLAN all other VLANs are automatically
# bound to the virtual adapter (VSLOT=1).

BASP BIND BASP_1_V2_EII B57_1_EII
BASP BIND BASP_1_V2_EII B57_2_EII
```

#Bind protocols to BASP.LAN.

BIND IP BASP_1_V2_EII ADDR=192.168.2.200 MASK=255.255.255.0
BIND IP BASP_1_V3_EII ADDR=192.168.3.200 MASK=255.255.255.0
BIND IP BASP_1_V4_EII ADDR=192.168.4.200 MASK=255.255.255.0

mount all

NOTE – If you modify any adapter parameters, you must reboot the system before the changes takes effect. If you make changes and do not reboot, you may experience configuration problems.

Example of Multiple SLB TEAMs with Multiple Frame Types:

LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_EII VSLOT=1
LOAD BASP.LAN FRAME=ETHERNET_802.2 NAME=BASP_1_E82 VSLOT=1

LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_2_EII VSLOT=2
LOAD BASP.LAN FRAME=ETHERNET_802.3 NAME=BASP_2_E83 VSLOT=2

LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1
LOAD B57.LAN FRAME=ETHERNET_802.2 NAME=B57_1_E82 SLOT=1
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2
LOAD B57.LAN FRAME=ETHERNET_802.2 NAME=B57_2_E82 SLOT=2

LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_3_EII SLOT=3
LOAD B57.LAN FRAME=ETHERNET_802.3 NAME=B57_3_E83 SLOT=3
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_4_EII SLOT=4
LOAD B57.LAN FRAME=ETHERNET_802.3 NAME=B57_4_E83 SLOT=4

BASP BIND BASP_1_EII B57_1_EII
BASP BIND BASP_1_EII B57_2_EII
BASP BIND BASP_2_EII B57_3_EII
BASP BIND BASP_2_EII B57_4_EII

BIND IP BASP_1_EII ADDR=172.16.1.100 MASK=255.255.0.0
BIND IPX BASP_1_E82 NET=ABAB
BIND IP BASP_2_EII ADDR=172.18.1.100 MASK=255.255.0.0
BIND IPX BASP_2_E83 NET=BEEF

NOTE – When bind B57_1_EII to BASP_1_EII, B57_1_E82 is also bound to BASP_1_E82. IPX load balance only works with all Broadcom adapters or with all Alteon® adapters configuration. VLSOT range is from 1 to 4 (only four Teams can be configured).

Example of VLAN with BASP:

LOAD ODINEB.NLM
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_V100_EII VSLOT=1 VLAN=100
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_V200_EII VSLOT=1 VLAN=200
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_V300_EII VSLOT=1 VLAN=300

```
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2

BASP BIND BASP_1_V100_EII B57_1_EII
BASP BIND BASP_1_V100_EII B57_2_EII

BIND IP BASP_1_V100_EII ADDR=172.16.210.1 MASK=255.255.0.0
BIND IP BASP_1_V200_EII ADDR=172.17.220.1 MASK=255.255.0.0
BIND IP BASP_1_V200_EII ADDR=172.18.230.1 MASK=255.255.0.0
```

NOTE – When bind B57_1_V100_EII to B57_1_EII, B57_1_EII are also bound to the other VLANs on the same VSLOT. VLAN refer to VLAN ID, and valid VLAN ID ranges from 1 to 4094.

Example of TRUNKING with BASP:

```
LOAD ODINEB.NLM
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_EII VSLOT=1 MODE=TRUNK

LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2

BASP BIND BASP_1_EII B57_1_EII
BASP BIND BASP_1_EII B57_2_EII

BIND IP BASP_1_EII ADDR=172.16.210.1 MASK=255.255.0.0
```

NOTE – Switch ports must be configured for Trunking (for example: FEC or GEC for Cisco switches).

Example of GVRP with BASP:

```
LOAD ODINEB.NLM
LOAD BASP.LAN FRAME=ETHERNET_II NAME=BASP_1_EII VSLOT=1 VLAN=100 GVRP
LOAD BASP.LAN FRAME=ETHERNET_802.2 NAME=BASP_1_E82 VSLOT=1

LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_1_EII SLOT=1
LOAD B57.LAN FRAME=ETHERNET_802.2 NAME=B57_1_E82 SLOT=1
LOAD B57.LAN FRAME=ETHERNET_II NAME=B57_2_EII SLOT=2
LOAD B57.LAN FRAME=ETHERNET_802.2 NAME=B57_2_E82 SLOT=2

BASP BIND BASP_1_EII B57_1_EII
BASP BIND BASP_1_EII B57_2_EII

BIND IP BASP_1_EII ADDR=172.16.210.1 MASK=255.255.0.0
```

NOTE – In this example, VLAN 100 will be advertised to the switch using GVRP. Notice that untagged 802.2 frame must be loaded to allow sending and receiving GVRP frames.

NOTE – Switch ports must be configured with GVRP enabled.

SNMP Agent for Netware

This SNMP agent is designed to support the configuration information pertaining to the Broadcom BASP driver for Netware.

Installation

When installed from NWCONFIG or NWINSTALL, the basp.ldi will automatically copy the basp.lan, bmapi.nlm, and bsnmp.nlm files into the server.

After configuring and running the BASP then binding the BASP to network adapters load the Broadcom SNMP Instrumentation Agent (BSNMP) with the following steps.

From the Netware Server console command line interface type:

```
load bmapi.nlm
load bsnmp.nlm
```

SNMP Objects

BASP SNMP objects are provided in the BASP−Config.MIB file. snmpget and snmpgetnext command can be used to receive the BASP snmp objects such as:

```
snmpget localhost public BASP-Config-MIB::btTeamNumber
snmpgetnext localhost public BASP-Config-MIB::btTeamNumber
```

Files

```
basp.lan
bmapi.nlm
bsnmp.nlm
BASP−CONFIG.MIB
```

Please read all restrictions and disclaimers.

Preface: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

- How This Manual is Organized

- Operating System Commands

- Typographic Conventions

How This Manual is Organized

This manual describes how to install and use your Gigabit Ethernet Adapter in a Microsoft Windows 2000, Windows .NET, Windows NT, Novell NetWare, and Linux operating environment. The procedures in this manual assume that you are a system or network administrator experienced in installing similar hardware.

This manual is organized as follows:

"Introduction" describes the features of the Gigabit Ethernet Adapter. This chapter also describes the adapter faceplate and LED indicators.

"Installing the Hardware" lists the hardware and software requirements for adapter installation and use, and provides instructions to physically install the adapter in your system.

"Installing the Software" provides a link to each software supported by the Gigabit Ethernet Adapter.

> "Windows 2000 Driver Software" explains how to install the Gigabit Ethernet Adapter software, and describes adapter teaming and VLANs under Microsoft Windows 2000.

> "Windows NT Driver Software" explains how to install the Gigabit Ethernet Adapter software, and describes adapter teaming and VLANs under Microsoft Windows NT.

> "Windows .NET Driver Software" explains how to install the Gigabit Ethernet Adapter software, and describes adapter teaming and VLANs under Microsoft Windows .NET.

> "NetWare Driver Software" explains how to install the Gigabit Ethernet Adapter software, and describes adapter teaming and VLANs under Novell NetWare.

> "Linux Driver Software" describes the Linux driver for the Broadcom NetXtreme™ Gigabit Ethernet Adapter, including its limitations, packaging, installation, module parameters, adapter teaming, and VLANs.

> "UNIX Driver Software" explains how to install the SCO OpenServer and UnixWare 7 drivers for the Broadcom NetXtreme™ Gigabit Ethernet Adapter.

> "Solaris Driver Software" explains how to install the Solaris 8 driver for the Broadcom NetXtreme™ Gigabit Ethernet Adapter.

Broadcom Advanced Control Suite: Broadcom Gigabit Ethernet Adapter User's Guide

"Broadcom Boot Agent Driver Software" describes the Multi−Boot Agent driver for the Broadcom NetXtreme™ Gigabit Ethernet Adapter, including its client and server setups.

"Broadcom Advanced Control Suite" explains how to install the Broadcom Advanced Control Suite (BASCS) software, how to view vital adapter information, how to perform diagnostics, how to detect various cable conditions, and how to configure Teams and VLANs.

"Key Protocols and Interfaces" provides an overview of Adapter Teaming, Failover Teaming, and VLAN configuration.

"Specifications" provides adapter hardware specifications.

"Regulatory" provides information on the adapter's regulatory compliance.

"Troubleshooting" provides information for troubleshooting the Gigabit Ethernet Adapter hardware and software.

"Manageability" provides information on the Common Information Model, the Broadcom DMI PCI Hot Plug Service, and the SNMP Service.

"BCM570x Diagnostic User's Guide" provides the information on configuration file specification, command line options and user diagnostic commands on Broadcom 570x Gigabit Integrated Controller, in particular to check out the functionality of the BCM570x and its related components.

Operating System Commands

This manual may not include all necessary hardware procedures or software commands. Instead, it may name specific tasks and refer you to operating system documentation or the hardware handbook that was shipped with your system.

You might need to use supplemental documentation for the following types of information:

- Shutting down the system
- Getting access to the system's PCI slots
- Booting the system
- Configuring devices
- Other basic software procedures

Typographic Conventions

The following table describes the typographic styles used in this manual.

Table 1. Typographic Conventions

Typeface or Symbol	Meaning	Example
AaBbCc123	This type is used for names of commands, files, and directories used within the text.	View the readme.txt file.
	It also depicts on–screen computer output and prompts.	Main#
AaBbCc123	This bold type appears in command examples. It shows text that must be typed in exactly as shown.	Main# **sys**
AaBbCc123	This italicized type appears in command examples as a parameter place holder. Replace the indicated text with the appropriate real name or value when using the command.	To establish a Telnet session, enter: host# **telnet** *IP–address*
	This also shows book titles, special terms, or words to be emphasized.	Read your *User's Guide* thoroughly.
[ ]	Command items shown inside brackets are optional and can be used or excluded as the situation demands. Do not type the brackets.	host# **ls [–a]**

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Key Protocols and Interfaces: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

● Adapter Teaming

● Failover Teaming

● VLANs Overview

Adapter Teaming

Teaming provides traffic load balancing and redundant adapter operation in the event that a network connection fails. When multiple Gigabit Ethernet Adapters are installed in the same server, they can be grouped into teams. Each team with up to 8 ports or 8 adapters can be configured on the server. If traffic is not identified on any of the adapter team members connections due to failure of the adapter, cable, switch port, or switch (where the teamed adapters are attached to separate switches), the load distribution is reevaluated and reassigned among the remaining team members. In the event all the primary adapters are down, the hot standby adapter becomes active. Existing sessions are maintained, causing no user impact.

BASP supports three schemes of load balancing: Smart Load Balancing, Link Aggregation (802.3ad), and Generic Link Aggregation (Trunking).

> *NOTE – Broadcom NetXtreme™ Gigabit Ethernet Adapters can be grouped into teams with an Intel® 82559 LOM.*

Smart Load Balancing (SLB)™

Broadcom implementation of load balancing based on IP flow. This feature supports balancing IP traffic across multiple adapters (i.e., team members) in a bi–directional manner. In this mode, all adapters in the team have separate MAC addresses. It provides automatic fault detection and dynamic failover to other team member or to a hot standby member; this is done independently of layer 3 protocol (IP, IPX, Net Beui). It works with existing layer 2 and 3 switches.

Link Aggregation (802.3ad)

This mode supports Link Aggregation through static configuration and conforms to the IEEE 802.3ad specification. Configuration software allows you to statically configure which adapters they want to participate in a given team. Future releases will support LACP. If the link partner is not correctly configured for 802.3ad link configuration, errors are detected and noted. With this mode, all adapters in the team are configured to receive packets for the same MAC address. The outbound load–balancing scheme is determined by our BASP driver. The team's link partner determines the load–balancing scheme for inbound packets.

Generic Link Aggregation (Trunking)

This mode is very similar to 802.3ad in that all adapters in the team need to be configured to receive packets for the same MAC address. However, this mode does not provide LACP or marker protocol

support. This mode supports a variety of environments where the NICs' link partners are statically configured to support a proprietary trunking mechanism. For instance, this mode could be used to support Lucent's "OpenTrunk" or Cisco's Fast EtherChannel (FEC). Basically, this mode is a "light" version of the 802.3ad link aggregation. This approach is much simpler in that there is not a formalized link aggregation control protocol. As with the other modes, the creation of teams, and the allocation of physical adapters to various teams, is done statically via user configuration software.

Trunking supports load balancing and failover for both outbound and inbound traffic.

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Failover Teaming

Failover Teaming provides redundant adapter operation in the event that a network connection fails. When multiple Gigabit Ethernet Adapters are installed in the same server, they can be paired into Teams. Each team must have at least one adapter, but can support up to eight adapters. The number of teams is limited by the number of adapters that are installed.

If the primary adapter in a team is disconnected because of failure of the adapter, cable, or switch port, the secondary team member becomes active, redirecting both inbound and outbound traffic originally assigned to the primary adapter. Sessions will be maintained, causing no impact to the user.

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VLANs Overview

VLANs allow you to split your physical LAN into logical subparts, to create logical segmentation of workgroups and to enforce security policies among each logical segment. Each defined VLAN behaves as its own separate network, with its traffic and broadcasts isolated from the others, increasing bandwidth efficiency within each logical group. Up to 64 VLANs can be defined for each Broadcom adapter on your server, depending on the amount of memory available in your system.

Although VLANs are commonly used to create individual broadcast domains and/or separate IP subnets, it is sometimes useful for a server to have a presence on more than one VLAN simultaneously. Broadcom adapters support multiple VLANs on a per–port or per–interface basis, allowing very flexible network configurations.
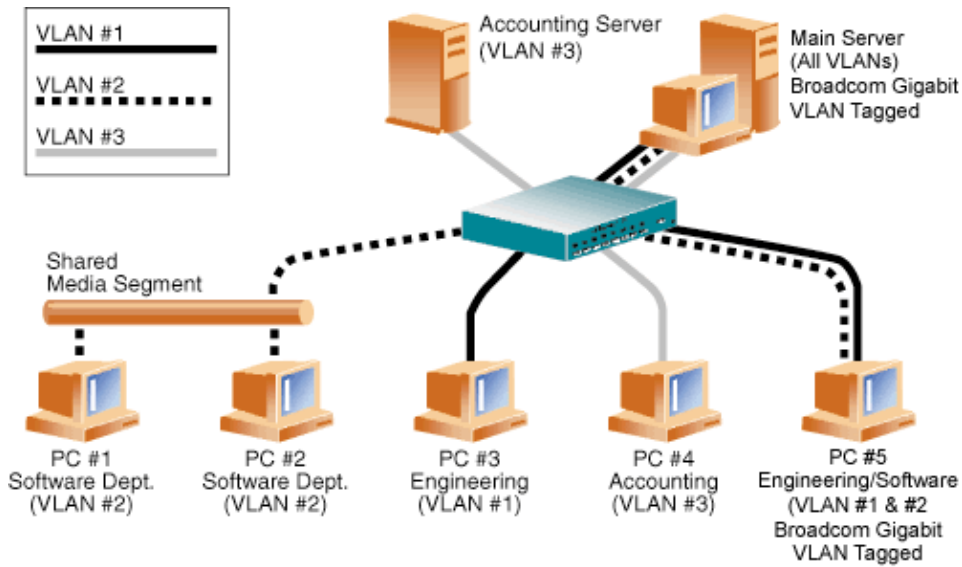
Figure 1. Example of Servers Supporting Multiple VLANs with Tagging

The figure above shows an example network that uses VLANs. In this example network, the physical LAN consists of a switch, two servers, and five clients. The LAN is logically organized into three different VLANs, each representing a different IP subnet. The features of this network are described in the following table:

Table 1. Example VLAN Network Topology

Component	Description
VLAN #1	An IP subnet consisting of the Main Server, PC #3, and PC #5. This subnet represents an engineering group.
VLAN #2	Includes the Main Server, PCs #1 and #2 via shared media segment, and PC #5. This VLAN is a software development group.
VLAN #3	Includes the Main Server, the Accounting Server and PC #4. This VLAN is an accounting group.
Main Server	A high−use server that needs to be accessed from all VLANs and IP subnets. The Main Server has a Broadcom adapter installed. All three IP subnets are accessed via the single physical adapter interface. The server is attached to one of the switch ports, which is configured for VLANs #1, #2, and #3. Both the adapter and the connected switch port have tagging turned on. Because of the tagging VLAN capabilities of both devices, the server is able to communicate on all three IP subnets in this network, but continues to maintain broadcast separation between all of them.
Accounting Server	Available to VLAN #3 only. The Accounting Server is isolated from all traffic on VLANs #1 and #2. The switch port connected to the server has tagging turned off.
PCs #1 and #2	Attached to a shared media hub that is then connected to the switch. PCs #1 and #2 belong to VLAN #2 only, and are logically in the same IP subnet as

	the Main Server and PC #5. The switch port connected to this segment has tagging turned off.
PC #3	A member of VLAN #1, PC #3 can communicate only with the Main Server and PC #5. Tagging is not enabled on PC #3's switch port.
PC #4	A member of VLAN #3, PC #4 can only communicate with the servers. Tagging is not enabled on PC #4's switch port.
PC #5	A member of both VLANs #1 and #2, PC #5 has an Broadcom adapter installed. It is connected to switch port #10. Both the adapter and the switch port are configured for VLANs #1 and #2 and have tagging enabled.

> *NOTE – VLAN tagging is only required to be enabled on switch ports that create trunk links to other switches, or on ports connected to tag–capable end–stations, such as servers or workstations with Broadcom adapters.*

VLANs Support

Virtual Local Area Networks (VLANs) are commonly used to split up groups of network users into manageable broadcast domains, to create logical segmentation of workgroups, and to enforce security policies among logical segments.

Each Team supports up to 64 VLANs. Note that only Broadcom adapters and Alteon® AceNIC adapters can be part of a team with VLANs. With multiple VLANs on an adapter, a server with a single adapter can have a logical presence on multiple IP subnets. With multiple VLANs in a team, a server can have a logical presence on multiple IP subnets and benefit from load balancing and failover.

> *NOTE – Adapters that are members of a failover team can also be configured to support VLANs. Since VLANs are not supported for an Intel® LOM if an LOM is a member of a failover team, VLANs cannot be configured for that team.*

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.

Dual DMA Channels

The PCI interface on the Gigabit Ethernet Adapter contains two independent DMA channels for simultaneous read and write operations.

32–bit or 64–bit PCI Bus Master

Compliant with PCI Local Bus Rev 2.2, the PCI interface on the Gigabit Ethernet Adapter is compatible with both 32–bit and 64–bit PCI buses. As a bus master, the adapter requests access to

the PCI bus, instead of waiting to be polled.

ASIC with Embedded RISC Processor

The core control for the Gigabit Ethernet Adapter resides in a tightly integrated, high−performance ASIC. The ASIC includes dual RISC processors. This provides the flexibility to add new features to the card and adapt it to future network requirements via software download. This 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.

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Broadcom® Boot Agent Driver Software: Broadcom 570x Gigabit Integrated Controller User's Guide

This section describes the Boot Agent driver for the Broadcom NetXtreme™ Gigabit Ethernet Adapter and contains the following information:

● Overview

● Client Setup

● Server Setup

Overview

The Broadcom NetXtreme™ Gigabit Ethernet Adapter has PXE (Preboot Execution Environment) and RPL (Remote Program Load) support. Multi–Boot Agent (MBA) is a software module that allows your networked 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 on different environments where the motherboard may or may not have built-in base–code.

MBA 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. Broadcom MBA implementation has been tested successfully in the following environments:

- Linux Red Hat PXE server. Broadcom PXE clients are able to remote–boot and utilize network resources (NFS mount, etc…) and to do Linux installation. In the case of a remote boot, the Linux universal driver binds seamlessly with the Broadcom UNDI (Universal Network Driver Interface) and provides a network interface in the Linux remote–booted client environment.
- Microsoft Windows 2000. Remote Installation Services (RIS). Broadcom PXE clients are able to install Windows 2000 Professional from the network.
- Intel APITEST. The Broadcom PXE driver passes all API compliance test suites.
- DOS UNDI. Universal NDIS seamlessly binds with Broadcom UNDI to provide NDIS2 interface to the upper–layer protocol stack. This allows computers to connect to network resources in a DOS environment.
- 3Com® boot server.
- Microsoft Windows NT 4.0 Remote Boot Sever.

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Client Setup

Setting up MBA client for Broadcom NetXtreme™ Gigabit Ethernet Adapter involves the following steps:

1. Enable/disable the MBA driver with the provided Broadcom DOS utility.
2. Setup the BIOS for the boot order.

Enable/Disable

To enable MBA, boot up into DOS.

```
d:\DOS\utility
```

b57udiag –mba [0–disable | 1–enable] –c <devnum>

where:

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

MBA Protocol

To specify the MBA protocol, boot up into DOS.

```
d:\DOS\utility
```

b57udiag –mbap [0–pxe | 1–rpl | 2–bootp] –c <devnum>

where:

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

MBA Speed

MBA can be forced to a specific speed. To do this, place the Broadcom software CD in the CD drive (i.e., drive D) and boot up into DOS.

```
d:\DOS\utility
```

```
b57udiag -mbas [ 0-Auto | 1-10HD | 2-10FD | 3-100H | 4-100F ]
```

where:

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

Setup BIOS

To boot from the network with MBA, make MBA the first bootable device under BIOS. This procedure depends on server BIOS implementation. Please refer to the server's user manual.

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Server Setup

Windows 2000

The current version of Windows 2000 does not include a network driver for the Broadcom NetXtreme™ Gigabit Ethernet Adapter. To do remote installation with PXE, include a network driver for the Broadcom NetXtreme™ Gigabit Ethernet Adapter as a part of the client's installation image on the server. Please refer to Microsoft Article ID Q246184 – "How to Add Third–Party OEM Network Adapters to RIS Installations."

DOS UNDI/APITEST

To boot in DOS and connect to a network for the DOS environment, download the Intel® PXE PDK from the Intel Web site. This PXE PDK comes with a TFTP/ProxyDHCP/Boot server. The PXE PDK can be downloaded from Intel at http://www.intel.com/support/network/adapter/pro100/bootagent/30619.htm.

Windows NT 4.0 Remoteboot Server

For instructions on setting up the Windows NT 4.0 Remoteboot Server, refer to Remoteboot (Chapter 15) from the Microsoft TechNet website.

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Regulatory: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

● FCC Class B Notice

● VCCI Class B Notice

● CE Notice

● Canadian Regulatory Information (Canada Only)

● MIC Notice (Republic of Korea Only)

FCC Class B Notice

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

The equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The equipment generates, uses and can radiate radio–frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

Do not make mechanical or electrical modifications to the equipment.

⚠️ **Caution** — If the device is changed or modified without permission of Broadcom, the user may void his or her authority to operate the equipment.

VCCI Class B Notice

The equipment is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction

Broadcom Advanced Control Suite: Broadcom Gigabit Ethernet Adapter User's Guide manual.

⚠️ **Warning** — The potential exists for this equipment to become impaired in the presence of conducted radio frequency energy between the frequency range of 59–66 MHz. Normal operation will return upon removal of the RF energy source.

CE Notice

The CE mark on this equipment indicates that this equipment meets or exceeds the following technical standards: EN55022:1998, EN55024:1998, and EN60950:1992.

Canadian Regulatory Information (Canada Only)

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. Note that Canadian Department of Communications (DOC) regulations provide, that changes or modifications not expressly approved by Broadcom Corporation could void your authority to operate this equipment. This Class B digital apparatus meets all requirements of the Canadian Interference–Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

MIC Notice (Republic of Korea Only)

B CLASS Device

기종별	사용자 안내문
B급 기기 (가정용 정보통신기기)	이 기기는 가정용으로 전자파적합등록을 한 기기로서 주거지역에서는 물론 모든 지역에서 사용할 수 있습니다.

MIC
1. 기기의 명칭(모델명) :
2. 인증번호 :
3. 인증받은 자의 상호 : (B)
4. 제조년월일:
5. 제조자/제조국가 :

Note that this device has been approved for non–business purposes and may be used in any environment, including residential areas.

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Solaris Driver Software: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This section contains installation and configuration procedures for the Broadcom NetXtreme™ Gigabit Ethernet Adapter driver for Solaris x86 and Solaris Sparc.

- Driver Formats

- Installing the Driver

- Uninstalling the Driver

- Driver Update (DU) Diskette Instruction (Intel Platform Only)

- Customizing the Driver Configuration

- Customizing the Driver Configuration using the "ndd" Command

Driver Formats

The driver for Solaris 8.0 is released in three formats:

1. `BRCMbcme.pkg` : Datastream format
2. `BRCMbcme.tar.Z` : Compressed and TAR file system format
3. `bcmedu.img` : Driver Update (DU) binary image which is used to create DU diskette.

Installing the Driver

1. Change directory to where `BRCMbcme.pkg` resides
2. `pkgadd -d BRCMbcme.pkg`

   or

   Copy `BRCMbcme.tar.Z` to `/tmp`
   `cd /tmp`
   uncompress `BRCMbcme.tar.Z`
   `tar xvf BRCMbcme.tar`
   `pkgadd -d /tmp`
3. Execute `prtconf` to determine instance number of the NIC.
4. `ifconfig bcme[instance_number] plumb`
5. `ifconfig bcme[instance_number] ip_address netmask....`

To make these changes permanent, follow these steps:

1. Use a text editor (e.g., vi) and create a file named `hostname.bcme[instance_number]` in the `/etc` directory. Add the IP address of the interface to this file, then save and exit.
2. Add a proper subnet mask to the file /etc/netmasks.

In Solaris 7.0 (Intel platform), the operating system only allocates 36 pages of 4K physically contiguous memory. The driver needs about 130K of physically contiguous memory per NIC. In order to use more than one NIC the O/S has to allocate more memory. This can be done by setting an O/S system variable "lomempages" in /etc/system. For instance, when 4 NICs are installed in a Solaris 7 system, the physically contiguous memory is calculated as follows:

4 NICs * 130K = 520 K ==> 130 pages of 4K is required.

Since this memory might be used by other driver in the system, 200 of 4K of memory is allocated. Add the following line in file /etc/system:

set lomempages=200

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Uninstalling the Driver

1. `ifconfig bcme[instance_number] down`
2. `ifconfig bcme[instance_number] unplumb`
3. `pkgrm BRCMbcme`

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Driver Update (DU) Diskette Instruction (Intel platform only)

This area contains the Solaris diskette image files(s) and the instructions to create diskettes from these image file(s).

1. Insert a blank diskette into your machine's diskette drive and type one of the following commands to format it:

   - If you are using DOS, type:

     `format A:`

   - If you are using the Solaris operating environment, type:

     `fdformat -Ud`

2. Check to see if Volume Management is running:

   - If you are using DOS, type:

     `dd filename A:`
   - If you are using the Solaris operating environment, type:

     ```
     volcheck
     ls -l /vol/dev/aliases/floppy0
     ```
   - If you see a message similar to this:

```
lrwxrwxrwx 1 root 34 Jan 21 17:28
/vol/dev/aliases/floppy0 ->
/vol/dev/rdiskette0/unnamed_floppy
```

Type:

```
dd if=bcmedu.img of=/vol/dev/aliases/floppy0
bs=36k eject floppy0
```

- If you see this message:

```
/vol/dev/aliases/floppy0 not found
```

Type:

```
dd if=bcmedu.img of=/dev/rdiskette bs=36k
```

Installing Solaris DU Diskette(s)

You can use Solaris DU diskettes in one of two ways:

- To use new drivers to install or upgrade the Solaris operating environment on a machine with new hardware
- To add new drivers to support new hardware on an already installed and booted system

Installing Solaris Using DU Diskette(s)

To install Solaris (Intel Platform Edition) using drivers on the DU diskette:

1. Insert the appropriate Configuration Assistant diskette, made from the included file bcmedu.img into your machine's diskette drive. Also, insert the Solaris Installation CD−ROM, or for network installation, verify with your system administrator that the Solaris network installation image is available on your network.
2. Turn your machine on.
3. When the Configuration Assistant screen is displayed, choose the F4 option (on 2.6, this is labelled F4_Driver Update; on Solaris 7, F4_Add Driver).

   The message "Enumerating buses ... " is displayed. Then the Install Driver Update screen is displayed.
4. Remove the Configuration Assistant diskette from the diskette drive and insert the first Solaris DU diskette you want.
5. Press F2_Continue.

   The Select Solaris System Version screen is displayed.
6. Select the appropriate Solaris OS and press F2_Continue.

   The Loading Driver Update Software screen is displayed, along with a progress bar that shows the percentage of drivers that have been extracted from the diskette. Drivers are read into memory and survive long enough for the system to successfully boot to its installation program. When all the new drivers on the diskette have been processed, the Continue Driver Update Installation screen is displayed.

7. Remove the DU diskette from the diskette drive and insert the next DU diskette you want, if any.
8. Press F2_Continue.

   Again, the Loading Driver Update Software screen is displayed, along with a progress bar that shows the percentage of drivers that have been extracted from the diskette. Drivers are read into memory and survive long enough for the system to successfully boot to its installation program. When all the new drivers on the diskette have been processed, the Continue Driver Update Installation screen is displayed.
9. Repeat Steps 7 and 8 until all the DU diskettes you want are installed.
10. When all the drivers are processed, remove the DU diskette from the diskette drive and reinsert the Configuration Assistant diskette.

   NOTE – Do not remove the Configuration Assistant diskette from the diskette drive until you see the following message displayed in a dialog box.

   If you want to bypass the device configuration and boot screens when the system reboots, eject the Device Configuration Assistant/Boot diskette now.

11. Press F2_Continue.

   The Solaris Device Configuration Assistant screen is displayed.
12. Press F2_Continue.

   The message "Enumerating buses ..." is displayed.

   Then the Scanning Devices screen is displayed. System devices are scanned. When scanning is complete, the Identified Devices screen is displayed.
13. Press F2_Continue.

   The message "Loading driver ..." is displayed followed by messages about the drivers that are required to boot your system. After a few seconds, the Boot Solaris screen is displayed.
14. At the Boot Solaris screen, select the device controller attached to the device that contains your install medium.
15. Press F2_Continue.

   Drivers for the device controller you selected are displayed. Your system boots to run the install program. The install program starts and your machine begins booting the complete Solaris operating environment. Then, after some time, the following messages are displayed, prompting you to insert each of the Solaris DU diskettes required to install your machine:

   ```
   Installing unbundled device driver support
   Extracting driver list from tree..
   <DU diskette name> driver-name...
   ```

   Please insert the Driver Update diskette labeled <DU diskette name>
   Press <ENTER> when ready.
16. Remove the Configuration Assistant diskette and reinsert the first DU diskette you inserted earlier into the diskette drive.
17. Press Enter.

Packages, patches, or both that contain the new drivers are installed from the diskette onto your machine. Messages about each installation are displayed.

- If drivers on other DU diskettes are required for your machine, this prompt is displayed:

  Please insert the Driver Update diskette labeled <DU diskette name>
  Press <ENTER> when ready.

- Otherwise, this prompt is displayed:

  If you have additional Update diskettes to install (such as video), please insert diskette now.
  Additional Update diskettes to install? (y/n) [y]

18. If drivers on other DU diskettes are required, remove the DU diskette from the diskette drive, insert the next DU diskette you are prompted to insert, press Enter, and repeat until all drivers you need are installed.
19. Press Enter.

    When installation is complete, the message "Installation complete" is displayed.
20. Remove the diskette from the diskette drive.
21. Reboot your machine.

When the Solaris operating environment is finished booting and running, the new devices whose drivers you installed are available for use.

Adding a DU Diskette to an Existing Solaris System

Before adding new or updated drivers, the newly supported hardware devices should be installed and configured according to the instructions in the corresponding Device Reference Page, if any. See the Solaris (Intel Platform Edition) Device Configuration Guide.

When the Solaris (Intel Platform Edition) software is already installed, the simplest way to add new or updated drivers is to install the DU diskettes as patches on your system, as follows:

1. Become superuser on your system.
2. Check to see if Volume Management is running on the machine you are updating:

   ```
   ps -ef | grep vold
   ```

   For more information about managing diskettes and drives, see the System Administration Guide.
3. If Volume Management is running, temporarily stop it by typing:

   ```
   # /etc/init.d/volmgt stop
   ```
4. Insert the DU diskette into the diskette drive.
5. Mount the DU diskette at the /mnt mount point:

   ```
   # mount -F pcfs /dev/diskette /mnt
   ```

   NOTE – *At this point, you must mount the DU diskette in the file structure to update your system successfully.*

6. Execute the install script on the diskette, using the appropriate Solaris release directory (currently sol_26 for Solaris 2.6, sol_27 for Solaris 7, and so on). For example:

```
# /mnt/DU/sol_27/i86pc/Tools/install.sh -i
```

The install.sh script searches for all new or updated drivers on the diskette. When a new or updated driver is found, the following prompt is displayed:

Unconditionally installing DUs <DU driver names>
Install patch driver–name? [y]

7. If the driver is the one you want to install, at the prompt, type y for yes or press Enter. If the driver is not the one you want to install, type n for no.

If you type y, the install.sh script installs the driver you indicated as well as the bootmod and bootbin patches.

8. When you're done and the install.sh script exits, unmount the diskette:

```
# cd /
# umount /mnt
```

9. Remove the DU diskette from the diskette drive.
10. Reboot your machine.

```
# touch /reconfigure
# reboot
```

11. If you haven't already, turn your system off, add the new hardware, and then turn your system on again.
12. When the autoboot sequence prompt is displayed, quickly press Escape.

The autoboot sequence is interrupted. The Configuration Assistant screen is displayed.
13. Press F2_Continue.

The message "Enumerating buses ..." is displayed. The Scanning Devices screen is then displayed. System devices are scanned. When scanning is complete, the Identified Devices screen is displayed.
14. Press F2_Continue.

The message "Loading driver com.bef ..." is displayed. The Boot Solaris screen is then displayed.
15. On the Boot Solaris screen, select the device controller attached to the device that contains your install medium, in this case the main system disk.

```
The /etc/bootrc script is displayed.
```
16. At the prompt, type:

```
b -r
```

Your machine boots. You can now use your new hardware.

Customizing the Driver Configuration

To customize the driver, edit `/kernel/drv/bcme.conf` and update the respective parameters in this file. These parameters are described below:

ForceSpeedDuplex Parameter

ForceSpeedDuplex configures link (or instance) to a certain Speed and Duplex. By default, all instances are set to AutoNegotiate (0). The Default instance settings then are:

```
ForceSpeedDuplex=0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0;
```

These settings are based on the following values:

Value	Description
0	AutoNegotiate
1	10 Mbps speed and Half Duplex mode
2	10 Mbps speed and Full Duplex mode
3	100 Mbps speed and half Duplex mode
4	100 Mbps speed and Full Duplex mode
5	Force 1000 Mbps Full Duplex mode.
6	AutoNegotiate only 1000 Mbps Full Duplex mode.
7	AutoNegotiate only 1000 Mbps Half Duplex mode.
8	AutoNegotiate only 100 Mbps Full Duplex mode.
9	AutoNegotiate only 100 Mbps Half Duplex mode.
10	AutoNegotiate only 10 Mbps Full Duplex mode.
11	AutoNegotiate only 10 Mbps Half Duplex mode.

Example: To configure adapters of instance #0 and instance #3 to 100 Mbps Full Duplex and instance #3 to 10 Mbps Half Duplex, set the ForceSpeedDuplex parameter as follows:

```
ForceSpeedDuplex=2,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0;
```

FlowControl Parameter

FlowControl configures flow control parameters of a link. By default, all instances are set to disable both Tx and Rx flow control (0). As a result, the default instance settings are:

```
FlowControl=0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0;.
```

These settings are based on the following values:

Value	Description
0	Both Tx and Rx flow control are disabled.
1	Tx flow control is enabled. Pause frames will be sent if resource is low. But device will not process Rx Pause Frame.
2	Rx flow control is enabled. If the device receives a Pause Frame, it will stop sending. However, the device will not send a Pause Frame if resource is low.
3	Both Rx and TX flow control are enabled. Pause frames will be sent if resource is low. If the device receives a Pause Frame, it will stop sending.
4	Advertise both Rx and TX Flow Control being enabled and negotiate with the link partner. If link AutoNegotiate is not enabled, then both Tx and Rx Flow Control are disabled.

MaxJumboFrameSize Parameter

MaxJumboFrameSize configures the Jumbo Frame feature of a link. The valid range of values for this parameter is 0 to 9000. If the value configured is less than 1500, then the Jumbo Frame feature is disabled. Once this is configured, the `ifconfig` command is used to configure the desired MTU size. The default instant setting is 0 (MaxJumboFrameSize=0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0;)

> **Example:** To configure instance 2 to support a Jumbo Frame of up to 9000 bytes, set the MaxJumboFrameSize parameter as follows:

```
MaxJumboFrameSize=0,0,9000,0,0,0,0,0,0,0,0,0,0,0,0,0;
ifconfig bcme2 mtu 9000
```

TxPacketDescCnt Parameter

TxPacketDescCnt configures the number of Tx packet descriptors. The valid range of values for this parameter is 32 to 512. More system memory resource will be used for a larger number of Tx Packet Descriptors. The default value is 200:

```
TxPacketDescCnt=200;
```

RxStdDescCnt Parameter

RxStdDescCnt configures the number of Rx packet descriptors. The valid range of values for this parameter is 32 to 512. More system memory resources will be used for a larger number of Rx Packet descriptors. The default value is 500.

```
RxStdDescCnt=500;
```

RxJumboDescCnt Parameter

RxJumboDescCnt configures the number of Rx Jumbo packet descriptors. The valid range of values is 32 to 256. More system memory resource will be used for larger number of Rx Jumbo packet descriptors. This parameter is only used if the Jumbo Frame feature is enabled. The default value is 50.

```
RxJumboDescCnt=50;
```

RxCoalescingTicks Parameter

RxCoalescingTicks configures the number of Rx Host Coalescing Ticks in microseconds. This determines the upper–bound of time interval in which the device will generate an interrupt if one or more frames are received. The default value is 150.

```
RxCoalescingTicks=150;
```

RxMaxCoalescedFrames Parameter

RxMaxCoalescedFrames configures the number of Rx Maximum Coalesced Frames parameters. This determines the maximum number of Rx buffer descriptors that the device processes before it will generate an interrupt. The default value is 10.

```
RxMaxCoalescedFrames=10;
```

TxCoalescingTicks Parameter

TxCoalescingTicks configures number of Tx Host Coalescing Ticks in microseconds. This determines upper–bound of time interval that the device will generates interrupt if one or more frames are sent. The default value is 500.

```
TxCoalescingTicks=500;
```

TxMaxCoalescedFrames Parameter

TxMaxCoalescedFrames configures the number of Tx Maximum Coalesced Frames parameters. This determines upper–bound of the maximum number of Tx buffer descriptors that the device processes before it will generate an interrupt. The default value is 80.

```
TxMaxCoalescedFrames=80;
```

RxCoalescingTicksDuringInt Parameter

RxCoalescingTicksDuringInt: configures number of Rx Host Coalescing Ticks in microseconds during interrupt. This determines upper–bound of time interval that the device will generates interrupt if one or more frames are received during interrupt handling. The default value is 75.

```
RxCoalescingTicksDuringInt=75;
```

TxCoalescingTicksDuringInt Parameter

TxCoalescingTicksDuringInt: configures number of Tx Host Coalescing Ticks in microseconds during interrupt. This etermines upper–bound of time interval that the device will generates interrupt if one or more frames are received during interrupt handling. The default value is 75.

```
TxCoalescingTicksDuringInt=75;
```

RxMaxCoalescedFramesDuringInt Parameter

RxMaxCoalescedFramesDuringInt: configures number of Rx Maximum Coalesced Frames parameters during interrupt andling. This determines upper–bound of maximum number of Rx buffer descriptors that device processes before it will generate an interrupt during interrupt handling. The default value is 10.

```
RxMaxCoalescedFramesDuringInt=10;
```

TxMaxCoalescedFramesDuringInt Parameter

TxMaxCoalescedFramesDuringInt configures the number of Tx Maximum Coalesced Frames parameters during interrupt handling. This determines the upper–bound of maximum number of Tx buffer descriptors that the device processes before it will generate an interrupt during interrupt handling. The default value is 10.

```
TxMaxCoalescedFramesDuringInt=10;
```

StatsCoalescingTicks Parameter

StatsCoalescingTicks configures how often adapter statistics are DMAed to the host memory in microseconds. The default value is 1000000.

```
StatsCoalescingTicks=1000000;
```

DoubleCopyTxBufferSize Parameter

DoubleCopyTxBufferSize configures a double copy Tx buffer size. If the packet to be transmitted is less than this parameter and spans more than 1 fragment, the fragments of this packet will be combined into one fragment. The default value is 64.

```
DoubleCopyTxBufferSize=64;
```

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Customizing the Driver Configuration using the "ndd" Command

Driver configurations can also be temporarily changed with the Solaris ndd command. Any changes made with ndd command are temporary and will be lost when you reboot the system. To make configuration changes survive after reboot, modify **bcme.conf** instead.

NOTE – Refer to the parameter descriptions as required in Customizing the Driver Configuration above.

To display parameters that are configurable using `ndd`:

```
ndd /dev/bcme '?'
```

The system should return the following:

```
?                               (read only)
Instance                        (read and write)
ForceSpeedDuplex                (read and write)
FlowControl                     (read and write)
TxPacketDescCnt                 (read and write)
RxStdDescCnt                    (read and write)
RxCoalescingTicks               (read and write)
RxMaxCoalescedFrames            (read and write)
TxCoalescingTicks               (read and write)
TxMaxCoalescedFrames            (read and write)
RxCoalescingTicksDuringInt      (read and write)
RxMaxCoalescedFramesDuringInt   (read and write)
TxCoalescingTicksDuringInt      (read and write)
TxMaxCoalescedFramesDuringInt   (read and write)
StatsCoalescingTicks            (read and write)
DoubleCopyTxBufferSize          (read and write)
BlinkLeds                       (write only)
```

Configuring a NIC

To configure a particular NIC, the parameter "instance" must be properly set.

Examples:

To force a NIC of instance 1 to 100Mbps Full Duplex:

- ♦ ndd –set /dev/bcme Instance 1
- ♦ ndd –set /dev/bcme ForceSpeedDuplex 3

To query the current configuration of Flow Control of instance 3:

- ♦ ndd –set /dev/bcme Instance 3
- ♦ ndd –get /dev/bcme FlowControl

To blink all LEDs for 10 seconds of NIC of instance 5:

- ♦ ndd –set /dev/bcme Instance 5
- ♦ ndd –set /dev/bcme BlinkLeds 10

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Specifications: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

- 10/100/1000BASE−T Cable Specifications

- Performance Specifications

- Physical Characteristics

- Power Requirements

- Environmental Specifications

10/100/1000BASE−T Cable Specifications

Port Type	Connector	Media	Maximum Distance
10BASE−T	RJ−45	Cat. 3, 4, or 5 UTP	100 meters (328 feet)
100/1000BASE−T	RJ−45	Cat. 5 UTP	100 meters (328 feet)

NOTE − 1000BASE−T signaling requires four twisted pairs of Category 5 balanced cabling, as specified in ISO/IEC 11801:1995 and ANSI/EIA/TIA−568−A (1995) and tested for additional performance using testing procedures defined in TIA/EIA TSB95.

Performance Specifications

This following table lists specifications for single−port BCM5700/5701:

Feature	Specification
PCI clock	66 MHz max
PCI−X clock	133 MHz
PCI/PCI−X Data/Address	32−bit and 64−bit
PCI data burst transfer rate	132 MB/second (32−bit bus) 264 MB/second (64−bit bus) 528 MB/second (64−bit bus at 66 MHz)
PCI−X data burst transfer rate	400 MB/second (32−bit bus at 100 MHz) 800 MB/second (64−bit bus at 100 MHz) 600 MB/second (32−bit bus at 100 MHz) − 5701 only 1024 MB/second (64−bit bus at 100 MHz) − 5701 only

PCI modes	Master/slave
10/100/1000BASE−T	10/100/1000 Mbps (full duplex)

Physical Characteristics

Dimension	Measurement
Length	16.6 cm (6.6 in.)
Width	6.45 cm (2.54 in.)

Power Requirements

Specification	Measurement
5700, 5701, and 5702	
Operating voltage	+5 V ± 5%
Power consumption	10 Watts 2A @ +5VDC
5703	
Operating voltage	+3.3V +/−10% for BCM95703A30 and BCM95703SA31 +5V +/− 5% for BCM95703A30U and BCM95703SA31U
Power consumption	4 Watts 1.2A@ +3.3V for BCM95703A30

Environmental Specifications

Condition	Operating Specification	Storage Specification
Temperature	0°C to 55°C (+32°F to +131°F)	−40°C to +85°C (−40°F to +185°F)
Relative humidity	5% to 85% (non−condensing) 40°C, 16 hour dwells at extremes	5% to 95% (non−condensing) 10°C/hour
Altitude	Up to 10,000 ft.	Up to 35,000 ft.
Shock	10g, 1/2 sine wave, 11 msec	60g, 1/2 sine wave, 11 msec
Vibration, peak to peak displacement	0.005 in. max (5 to 32 Hz)	0.1 in. max (5 to 17 Hz)
Vibration, peak acceleration		

	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)

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Installing the Software: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

- Windows .NET Driver Software
- Windows 2000 Driver Software
- Windows NT Driver Software
- NetWare Driver Software
- Linux Driver Software
- UNIX Driver Software
- Solaris Driver Software
- Broadcom Boot Agent Driver Software

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Troubleshooting: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

● Hardware Diagnostics

● Checking Port LEDs

● Troubleshooting Checklist

● Checking if Proper Drivers are Loaded

● Running Cable Diagnostics

● Testing Network Connectivity

● Software Problems and Solutions

Hardware Diagnostics

Loopback diagnostic tests are available for testing the adapter hardware under Windows. These tests provide access to the adapter's internal/external diagnostics, where packet information is transmitted across the physical link (refer to "Diagnostics", in the Broadcom Advanced Control Suite chapter).

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Checking Port LEDs

The adapter has four LEDs, one for each port speed option (10 Mbps, 100 Mbps, and 1 Gbps), and one for Activity. The three port speed LEDs indicate active links, and the Activity LED indicates data transfer status. Once the driver is loaded and the cables are connected properly, the appropriate speed LED is lit and the data LED is on if data traffic is present.

Before the port LEDs can provide troubleshooting information, the adapter must be connected to the network (see "Installing the Hardware"), and the network drivers for your particular operating system must be installed.

1. Verify that the adapter driver software has been installed and that the adapter is connected to a network.

2. Check to see that the adapter status LEDs operate as described in the following table:

Table 2. Gigabit Ethernet Port LED Activity

LED	State	Description

1000	On	Good Gigabit Ethernet link.
	Off	No 1000 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.
100	On	Good 100 Mbps Fast Ethernet link.
	Off	No 100 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.
10	On	Good 10 Mbps Fast Ethernet link.
	Off	No 10 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.
ACT	Blinking	Brief bursts of data detected on the port.
	On	Streams of data detected on the port.
	Off	No data detected on the port.

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Troubleshooting Checklist

⚠ **WARNING — Before opening the cabinet of your system for removing or inserting the adapter, please review all precautions outlined under "Safety Precautions."**

The following checklist provides recommended actions to take to resolve problems installing the Gigabit Ethernet Adapter or running it in your system.

- Inspect all cables and connections. Verify that the cable connections at the Gigabit Ethernet Adapter and the switch are attached properly. Make sure that the cable length and rating are compliant with the requirements listed in "Connecting the Network Cables."
- Check the adapter installation by reviewing "Installing the Hardware." Make sure that the adapter board is properly seated in a PCI 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.
- Make sure that your system 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.

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Checking if Proper Drivers are Loaded

The following section describes how to check if the proper drivers are loaded for Windows, NetWare, and Linux.

Windows

The Broadcom Advanced Control Suite, Vital Sign screen allows you to view vital adapter information, network status, and network connectivity. Active adapters are listed.

1. From the Vital Sign screen, select the Broadcom adapter to be tested.
2. Press **Refresh** to display the driver status of the selected adapter.

> *NOTE – Information for non–Broadcom adapters is less comprehensive than information listed for Broadcom adapters.*
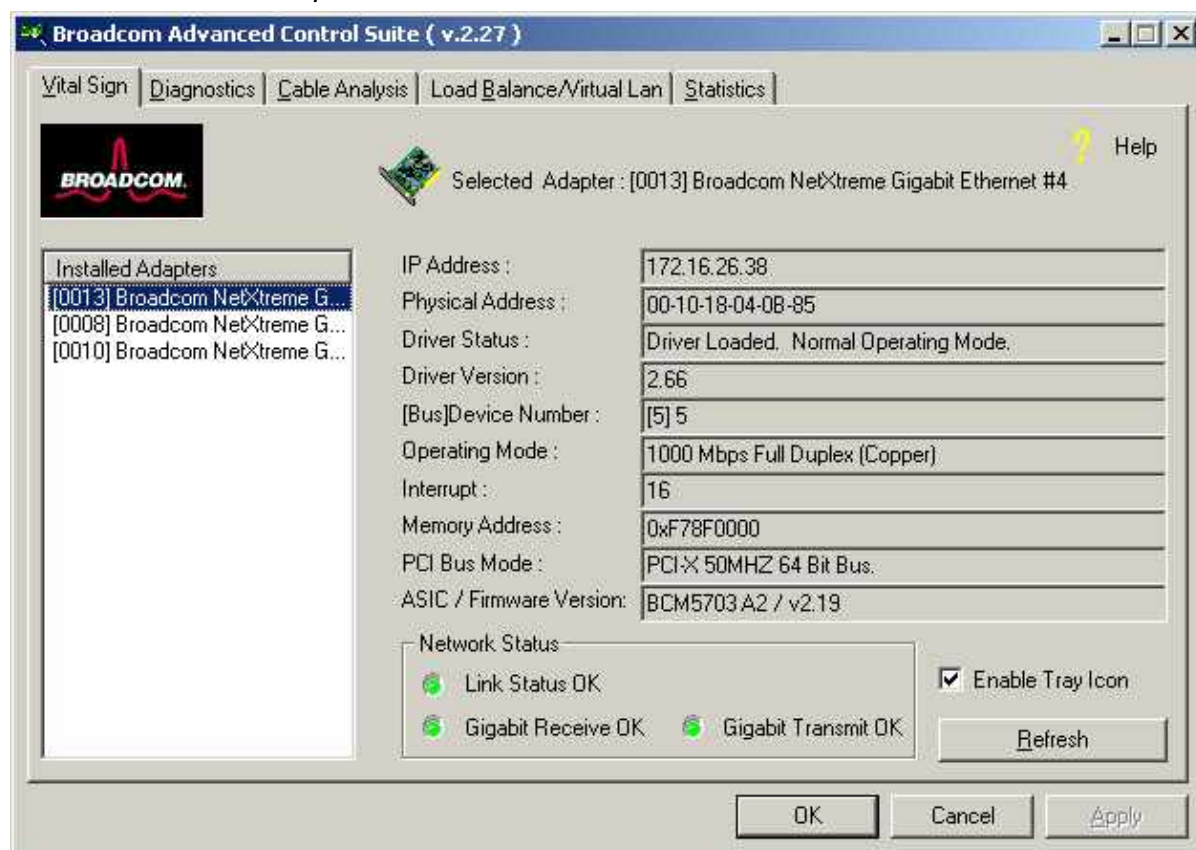
NetWare

To verify that the driver is loaded properly, type

```
LOAD B57.LAN FRAME_ETHERNET_II NAME=B57_1_EII
```

This command automatically verifies if the link is active, and if so displays `"Link is up"`.

From the command line, type **config** then press **Enter**. The following status information is

displayed:

```
Broadcom NetXtreme™ Gigabit Ethernet Adapter

Version:
Hardware Setting:
Mode Address:
Frame Type:
Board Name:
Lan Protocol: ARP (see note)
LAN Protocol: IP Addr: (see note)
```

> *NOTE – The LAN protocol status appears after assigning an IP address to the adapter (i.e., bind).*

Linux

To verify that the bcm5700.o driver is loaded properly, run

```
lsmod
```

If the driver is loaded, a line similar to the one below appears, where *<size>* is the size of the driver in bytes, and *<n>* is the number of adapters configured.

Module	Size	Used by
BCM5700	*<size>*	*<n>*

Solaris

To verify that the `bcme` driver is loaded properly, run

```
modinfo | grep bcme
```

A line appears showing that the driver is loaded.

Running Cable Diagnostics

The following section describes how to run the cable diagnostics from the Broadcom Advanced Control Suite. Refer to "Broadcom Advanced Control Suite," for setups and initialization.

> *NOTE – This test is designed to work for a 1 gigabit copper link (1000BASE–T) only.*

Cable Analysis

From the Cable Analysis screen the user can monitor conditions of an Ethernet CAT5 cable connection within a cable plant in an Ethernet network.

> *NOTE – The network connection will be lost when running these tests.*

Length

The Length sub tab allows you to verify cable length and determine whether your configuration has the appropriate cable, which are calculated by a Return Loss algorithm. This utility allows you to determine whether the problem is with the adapter or in the cable plant.

1. From the Cable Analysis/Length screen, select the Broadcom adapter to be tested.
2. Click **Initialize**, then click **Test** to display the status of the selected adapter.

Interface components for the BACS Cable Analysis/Channel Pairs window are described below:

- Distance: This field presents the estimated cable length in meters by averaging all four channels using Return Loss algorithms.
- Margin: Margin yields the minimum distance between the measured cable pair and the maximum IEEE 802.3ab limits. The unit is in dB.
- Frequency Margin: This measures the minimum distance between the measured cable pair and the maximum IEEE 802.3ab limits in the frequency domain. The unit is in MHz.

Frequency

Each channel's frequency response is displayed based the computation by the cable algorithms. The two graphs represent the values calculated by the Cable Loss and Return Loss algorithms. The vertical axis represents the gain in dB and the horizontal axis represents the operating frequency. The blue graph is the IEEE 802.3ab limit and the red graph is the actual computed values for a particular twisted pair. The minimum Margin and Frequency Margin fields in the Cable Length display are derived from these graphs.

NOTE – Network connection will be lost when running this test.

1. From the Cable Analysis/Frequency screen, select the Broadcom adapter and channel to be tested.
2. Press **Initialize**, then press **Test** to display the status of the selected adapter.
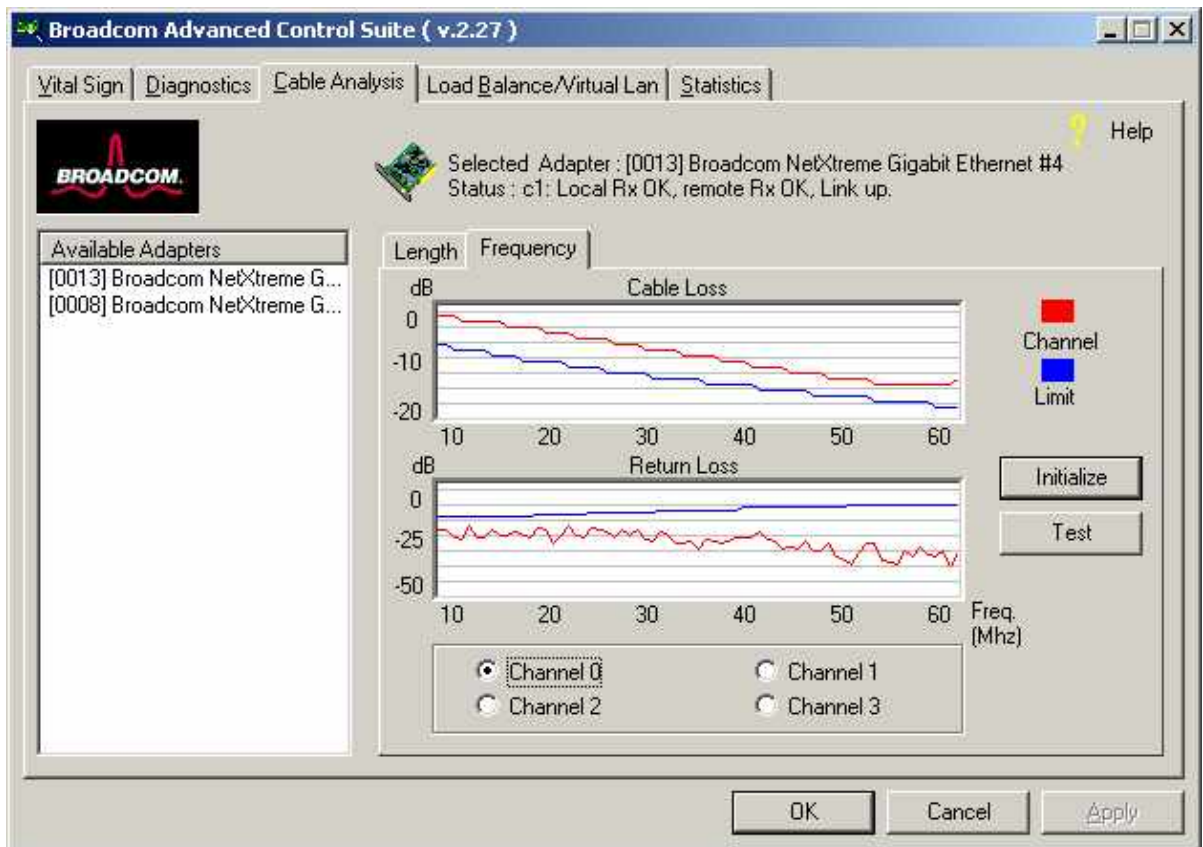
Cable Diagnostics Display

The combination of the cable length and the cable status reveal the state of the cable connection between the local adapter and the far end node (hub/switch/routers). The cable status will display possible problems associated with the cable if the cable is not in working order. In this case, displayed cable length is meaningless since the correct cable length cannot be calculated properly with a broken cable. The status window displays various error messages that diagnose possible problems associated with the cable.

Testing Network Connectivity

The following section describes how to test network connectivity for Windows, NetWare, and Linux.

Windows

Use the ping command to determine if network connectivity is working.

1. Select **Run** from the Windows Control Panel, this displays the Run command window.
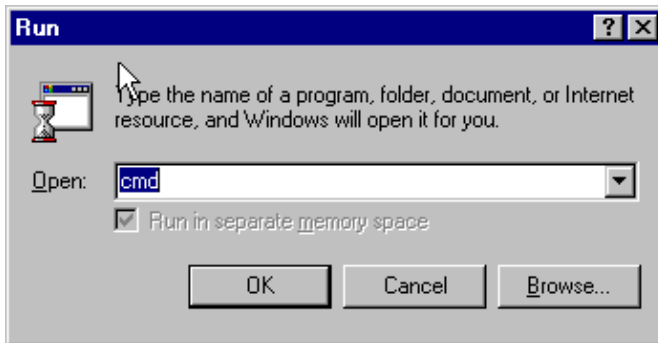
2. Type **cmd** (Windows 2000 and Windows .NET) or type **command** (Windows 98) and click **OK**.
3. Type **ipconfig /all** to display the command window.
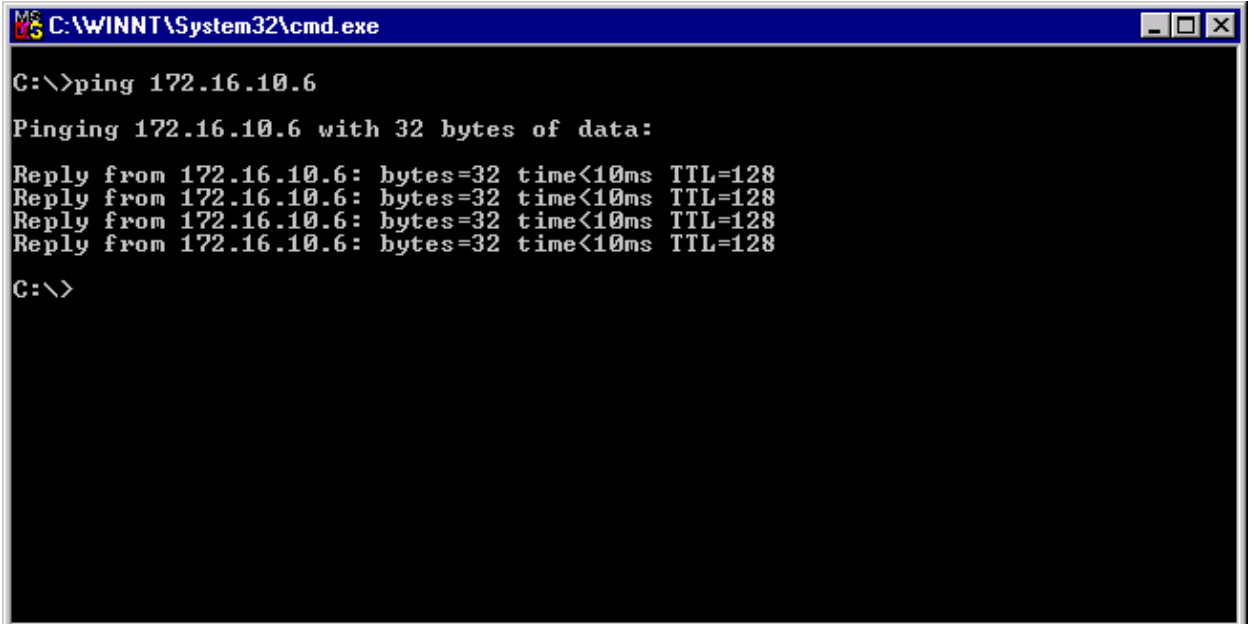
4. Type **ping <IP address>** from the command line, then press **Enter**.
   This displays the network connectivity information.

```
C:\WINNT\System32\cmd.exe                                          _ □ X

C:\>ping 172.16.10.6

Pinging 172.16.10.6 with 32 bytes of data:

Reply from 172.16.10.6: bytes=32 time<10ms TTL=128
Reply from 172.16.10.6: bytes=32 time<10ms TTL=128
Reply from 172.16.10.6: bytes=32 time<10ms TTL=128
Reply from 172.16.10.6: bytes=32 time<10ms TTL=128

C:\>
```

NetWare

Ping an IP host on the network to verify connection has been established:

>From the command line, type **ping <IP address>,** then press **Enter**.
>This will display the packet send/receive status.

Linux/SCO OpenServer/UnixWare/Solaris

To verify that the Ethernet interface is up and running, run 'ifconfig' to check the status of the Ethernet interface. 'netstat –i' can also be used to check the statistics on the Ethernet interface. Consult manual pages for more information on 'ifconfig' and 'netstat'.

Software Problems and Solutions

This section provides a list of known software problems and solutions for the operating systems below.

Windows 2000

The following table lists know problems and solutions using Windows 2000:

Problem: Able to create Broadcom LAC connections icons having same name under network properties menu.	**Solution**: In Windows 2000, each network adapter installed properly will have an icon in Network Properties window. The name of the icon is usually in the form of "Local Area Connection ##" and where ## is a number starting from 1. The names of icon can be changed by right clicking the icon and selecting rename. The name of the icon is only meaningful to the Network Properties window. Sometimes the system administrators will rename these icons to easily differentiate the network connections. When BASP is configured, BASP will create additional adapter icons and rename the icons. The naming convention is to allow end users to quickly identify the adapter with corresponding team and VLAN. The names of the icons created by BASP therefore are not recommended to be changed.
Problem: Uninstalling the BASP software and user is prompted to reboot early	**Solution**: In Windows 2000, after configuring BASP team, the system may sometimes prompt user to reboot. This is because Plug and Play on W2k may fail to commit any change in the network protocol binding. Users can choose not to reboot and continue configuring intermediate driver without having any side effect. When user has finished all the configuration, it is required to reboot.
Problem: Cannot enable VLAN after it is disabled	**Solution**: In Windows 2000, BASP creates additional network connections in "Network Connection and Dail–up" Window. Similar to physical network connections, these virtual connections can be disabled via the context menu. However, if these virtual connections are re–enabled, the system will report error as "connection failed!". This is known problem with Windows 2000. When this happens, reboot the system will enable the virtual connection again.
Problem: Able to configure Internet Connection Sharing (ICS) when there aren't any unassigned adapters.	**Solution**: Windows 2000 networking is shipped with the Internet Connection Sharing (ICS), which is designed to allow multiple computers accessing the Internet via a Windows 2000 system. To configure ICS, a user would need to select a network connection as "outside" connection, and another network connection as "inside" connection. Broadcom has observed that ICS allow any available network connection to be "outside" and "inside" connection, regardless of the BASP team configuration. Broadcom recommends that the user not select any network connection that is part of the BASP team to be "outside" and "inside."
Problem: Team configuration is not retained when user goes back to edit.	**Solution**: In configuring BASP team configuration, the actual changes of the configuration is not committed until the user click "OK" in "Network Properties" window. If a user chooses not click OK and instead goes back to the BASP team configuration window, all the previous uncommitted changes will be lost and user will need to reenter the configurations. As a workaround, the user should always click "OK" in "Network Properties" window after making changes.
Problem: IP address is configurable on a member of the team.	**Solution**: When a team is created, the TCP/IP properties for the adapters are unselected. The user can manually select and configure TCP/IP properties of the adapters and configure an IP address. This is a limitation of the Windows 2000 network installation paradigm, where this invalid configuration is still allowed.

Problem: When creating 64 VLANs, all virtual adapters show disconnected or one of the 64 VLANs show disabled.	**Solution**: The maximum VLAN configurations are 63 tagged and one untagged VLAN ID 0. If 64 tagged VLANs are created, they are disconnected. A reboot is required and only 63 tagged VLANs show links, while a 64th is disabled.

Linux

The following table lists known problems and solutions using Linux:

Linux–Basp	
Problem: When obtaining the IP for a SLB's virtual interface via DHCP, the IP–gets lost under heavy traffic.	**Solution**: Always set a static IP for all the virtual interfaces in a SLB team.
Problem: Make install fails on Turbo Linux 7.0 IA64.	**Solution**: The symbolic link under /lib/modules/<kernel–version>/build points to an empty directory. To successfully install BASP using `make install`, re–link /lib/modules/<kernel–version>/build to point to /usr/src/<kernel–version>/.
Linux–Core	
Problem: Compiling the driver fails under SuSE's 7.x.	**Solution**: If compiling the driver under SuSE's 7.x distributions and errors are reported, follow the general guidelines below to rebuild the kernel source tree: ```\ncd /usr/src/linux-<kernel_version>.SuSE\ncp /boot/vmlinuz.config .config\ncp /boot/vmlinuz.version.h\ninclude/linux/version.h\ncp /boot/vmlinuz.autoconf.h\ninclude/linux/autoconf.h\nmake oldconfig\nmake dep\n``` where `<kernel_version>` is the actual kernel version used in the SuSE distribution. Example: `/usr/src/linux-2.4.4.SuSE` Now you will need to rebuild the bcm5700 module. You may need to `make clean` if you attempted to build the driver before the previous steps.

```
                            make clean
                            make
                            make install
```

Problem: Zero copy performance is low on Red Hat 7.1.	**Solution**: Red Hat 7.1 loads the ipchains module by default. IPCHAINS is not compatible with Zero Copy. Remove the IPCHAINS module and disable IPCHAINS from the system run level.
	
	Example:
	
	`    rmmod ipchains`
	`    chkconfig ipchains off`

Broadcom Boot Agent

The following table lists known Broadcom Boot Agent problems and solutions:

Problem: Unable to obtain network settings through DHCP using PXE.	**Solution**: For proper operation make sure that the STP (spanning tree protocol) is disabled or portfast mode (for Cisco) is enabled on the port to which the PXE client is connected. For instance, set spantree portfast 4/12 enable.

Broadcom Advanced Server Program (BASP)

The following table lists known BASP problems and solutions:

Problem: 802.3ad team member links disconnect and reconnect continuously.	**Solution**: This is a 3rd party issue. It is seen only when configuring an 802.3ad team with greater than 2 members on the server and connecting an HP2524 switch, with lacp enabled as passive or active. The HP switch will show an lacp channel being brought up successfully with only 2 members. All other member's links will disconnect and reconnect. This does not occur with a Cisco Catalyst 6500.
Problem: When members of a team consist of other vender's adapters, the team fails to failover and load balance theIPX traffic	**Solution**: IPX failover and load balance is only supported when all members of the team consists of Broadcom Gigabit Ethernet adapters.
	Solution: Disable ASF

Problem: When enabling ASF, the BASP stops functioning.	BASP consist of following functions:
	
	    • Link Aggregation or Teaming
	    • VLAN
	    • Fail−over, fail−back
	
	The Link Aggregation (Teaming) and the VLAN functions utilize virtual address(s), physical Ethernet address and/or IP address. In order for ASF to function correctly, it needs to know a fixed local address (as specified in the ASF specification). With BASP function enabled, the use of virtualized addresses became incompatible with the address used by the ASF therefore; the ASF function should be disabled when BASP is enabled.
	
	The Fail−over (and fail−back) is a system function that monitors multiple NIC ports for any failed ports, and performs traffic re−direction to working ports. If the ASF firmware is installed on the port that fails, the ASF function will not work.

UnixWare

The following table lists known UnixWare problems and solutions:

Problem: In some instances with a Broadcom LOM, when you try to add the LAN adapter, multiple devices may show up.	**Solution**: Login as root and run "/sbin/resmgr |more"
	
	Search for 0x14e4 "/0x14e4"
	
	You should see the following:
	
	    KEY MODNAME UNIT IPL ITYPE IRQ IOADDR MEMADDR DMAC BINDCPU
	    BRDBUSTYPE BRDID
	    SCLASSID SLOT ENTRYTYPE BUSNUM
	
	    71 bcme 8 6 4 10 − − fcf00000 fcf0ffff − − 4 0x14E41644 0x0002 0 2 1
	
	1. Write down the Slot Number and BusNUM. ie. Slot 0, Bus 1.
	2. Run "netcfg"
	3. Select Hardware −−> Add new LAN adapter
	4. Select the Broadcom device that has the same SLOT and BUSNUM that you wrote down.
	5. Configure the network setting according to the Unixware manual.

Miscellaneous

The following table lists known miscellaneous problems and solutions:

Problem: When the bus on the system is operating at PCI mode, Broadcom NetXtreme Gigabit Ethernet will perform at PCI mode if it is added by Hot Plug.	**Solution**: When the system is booted up without any adapter, the bus will operate at the lowest mode which is PCI. This problem can be overcome by rebooting the system.
Problem: The Broadcom NetXtreme Gigabit Ethernet adapter may not perform at optimal level when it is added by Hot Plug on some system.	**Solution**: This is because the system BIOS in some system does not set the cache line size and the latency timer, after the adapter is added by Hot Plug. This problem can be overcome by rebooting the system.
Problem: The Broadcom NetXtreme Gigabit Ethernet adapter can not be seen on the PCI BUS.	**Solution**: This is because some of the older servers are advertising themselves as PCI–X capable systems. This causes the NetXtreme network adapter to operate in PCI–X mode; therefore; not to be seen by the PCI bus. This problem can be overcome by configuring the firmware to operate in forced pci mode. Refere to b57diag for configuration instructions.

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UNIX Driver Software: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This section contains procedures for installing Broadcom NetXtreme™ Gigabit Ethernet Adapter drivers for SCO OpenServer 5.0.6 and UnixWare 7 and includes the following information:

🔵 SCO Open Server

🔵 UnixWare/OpenUnix 8

SCO OpenServer 5.0.6

Overview

This procedure describes the installation of the SCO OpenServer driver. This driver is released as a media image file containing the driver package. The media image file can be copied to the target machine directly for installation, or from an installation diskette that you can create.

Creating a Diskette

1. Copy the file `VOL.000.000` to an SCO system.
2. Create a diskette using: `dd if =VOL.000.000 of=/dev/rfd0135ds18.`

Installing the Driver

1. Use `custom` or `scoadmin software` to install the SCO OpenServer driver from the media image or from the floppy created above.
2. After the package is installed, use `netconfig` to add the new network adapter.
3. Once added, modify the hardware configuration in Advanced Options to change the Line Speed and Flow Control if desired. The settings for these parameters are listed below:

Line Speed

- AutoNegotiate (default) (all speeds advertised)
- Fixed HalfDuplex10
- Auto HalfDuplex10 (only 10 Mbps half duplex advertised)
- Fixed FullDuplex10
- Auto FullDuplex10 (only 10 Mbps full duplex advertised)
- Fixed HalfDuplex100
- Auto HalfDuplex100 (only 100 Mbps half duplex advertised)
- Fixed FullDuplex100
- Auto FullDuplex100 (only 100 Mbps full duplex advertised)
- Auto HalfDuplex1000 (only 1000 Mbps half duplex advertised)
- Fixed FullDuplex1000 (Note 1)
- Auto FullDuplex1000 (only 1000 Mbps full duplex advertised)

NOTE 1 – 1000 Mbps (1 Gbps) full duplex fixed speed is only valid for fiber connections. For copper, twisted–pair connections, 1 Gbps can only be set through

autonegotiation with a 1 Gbps partner.

Flow Control

- Off (default)
- AutoNegotiate (Symmetric Pause advertised) (Note 2)
- RxPause
- TxPause
- RxPause/TxPause

NOTE 2 – Autonegotiation of Flow Control is only valid when the Line Speed is set to AutoNegotiate (all speeds advertised or single speed advertised).

NOTE 3 – A kernel relink and reboot is required before the new configuration will take effect.

Jumbo Frames and Other Advanced Parameters

Jumbo MTU sizes and other advanced, tunable parameters for the BCM5700 controller are located in the file `space.c` in the directory `/etc/conf/pack.d/bcme`. A description for each parameter is contained in `space.c`. Modify the desired parameter in `space.c`, rebuild the kernel by doing `/etc/conf/bin/idbuild` and rebooting the system. Note that the MTU sizes can be individually set for each adapter in the system, whereas all other parameters apply globally to all adapters.

NOTE – 5705 does not support jumbo frames. It can transmit jumbo packets by TCP segmentation, but the ethernet frame size is still limited to 1514 bytes. Receive frame size is also limited to 1514 bytes.

UnixWare/OpenUnix 8

Overview

This procedure describes the installation procedure for the UnixWare driver. The driver is released as an installable package in datastream format.

Installing the Driver

1. Do the following to install the bcme package on the Unixware system:
   `pkgadd -d <install-path>`.
   Where `<install-path>` is the full path name of the installable package
   `bcme-<version>.pkg`.
2. After the package is installed, use `netcfg` or `scoadmin network` to add the new network adapter.
3. When prompted, select the Line Speed and then select Advanced Option for Flow Control, MAC Address , and Jumbo MTU Size settings, if desired. The settings for these parameters are listed below:

Line Speed

- AutoNegotiate (default) (all speeds advertised)
- 10 Mbps HalfDuplex Fixed
- 10 Mbps HalfDuplex Auto (only 10 Mbps half duplex advertised)
- 10 Mbps FullDuplex Fixed
- 10 Mbps FullDuplex Auto (only 10 Mbps full duplex advertised)
- 100 Mbps HalfDuplex Fixed
- 100 Mbps HalfDuplex Auto (only 100 Mbps half duplex advertised)
- 100 Mbps FullDuplex Fixed
- 100 Mbps FullDuplex Auto (only 100 Mbps full duplex advertised)
- 1000 Mbps HalfDuplex Auto (only 1000 Mbps half duplex advertised)
- 1000 Mbps FullDuplex Fixed (Note 1)
- 1000 Mbps FullDuplex Auto (only 1000 Mbps full duplex advertised)

NOTE 1 – 1000 Mbps (1 Gbps) full duplex, fixed speed is only valid for fiber connections. For copper, twisted–pair connections, 1 Gbps can only be set through autonegotiation with a 1 Gbps link partner.

Flow Control

- Disabled (default)
- Auto Negotiation (Symmetric Pause advertised) (Note 2)
- Receive Pause
- Transmit Pause
- Receive & Transmit Pause

NOTE 2 – Autonegotiation of Flow Control is only valid when the Line Speed is set to Auto Negotiation (all speeds advertised or single speed advertised).

MAC Address

- No Override (default) – a user–administered MAC address entered with a colon separating each hexadecimal byte (e.g., `12:34:56:78:9a:bc`).

Jumbo MTU Size

- 1500 – 9000 (default is 1500)

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Windows® 2000 Driver Software: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

● Installing the Driver Software

● Modifying Configuration Parameters

● Removing the Driver Software

● Installing Broadcom Advanced Server Program

● Uninstalling Broadcom Advanced Server Program

● Configuring Teaming

● Configuring VLANs

● Save and Restore Configuration

Installing the Driver Software

NOTE – The Broadcom NetXtreme™ Gigabit Ethernet Adapter must be physically installed in your system prior to installing the driver software. See Installing the Hardware for details.

When the Windows 2000 system first boots up after installing a new hardware device, such as a Gigabit Ethernet Adapter, the system automatically detects the new hardware and prompts you to install the driver software for that device.

A network device driver must be installed before the Gigabit Ethernet Adapter can be used with your Windows 2000 system.

Installing the Adapter Software

To install the adapter software for Windows 2000, do the following

NOTE – Before beginning this procedure, verify that the Windows 2000 system has been upgraded to the latest version with the latest service pack applied.

1. Start your Windows 2000 system and log in. You must have System Administrator privileges to install the driver software.

   When you boot up the Windows 2000 system after installing the adapter card, a series of *Found New Hardware Wizard* windows are displayed.

2. In the Install Hardware Device Drivers window, click **Search for a suitable driver for my device (recommended)**, then click **Next**.

3. In the Locate Driver Files window, select the applicable search location check boxes.
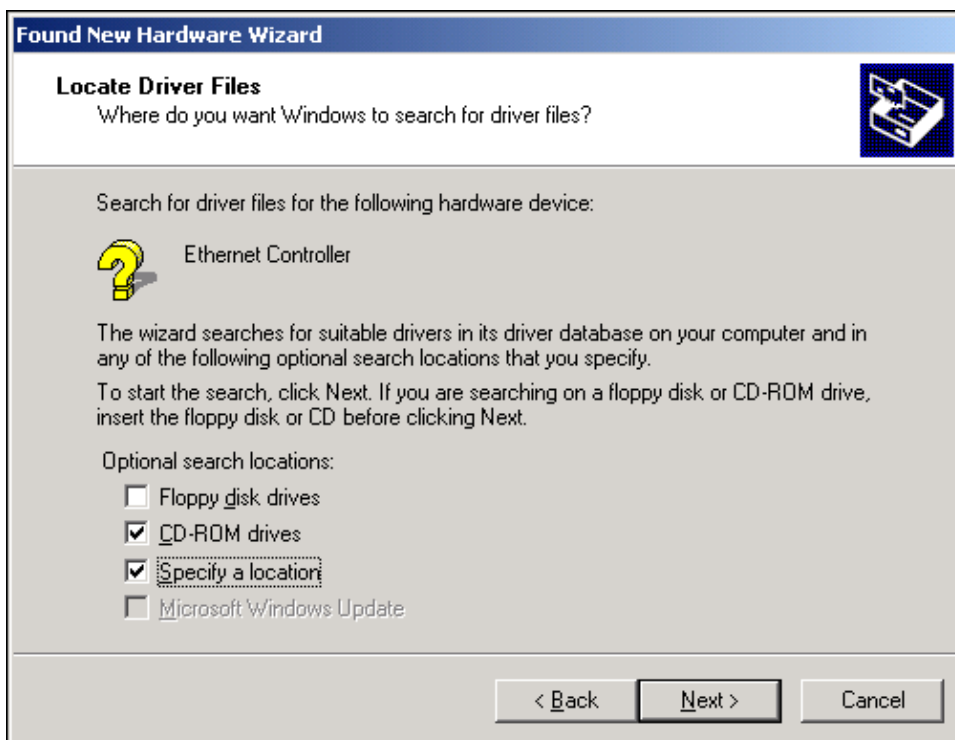
4. When prompted, insert the media to be searched into your CD–ROM drive, type the path to the driver, and select **OK**.

   Example: e:

Where "*e:*" is the designation of the CD–ROM drive on your system.

5. In the Driver Files Search Results window, verify that the correct path to the driver software is shown, then click **Next**.
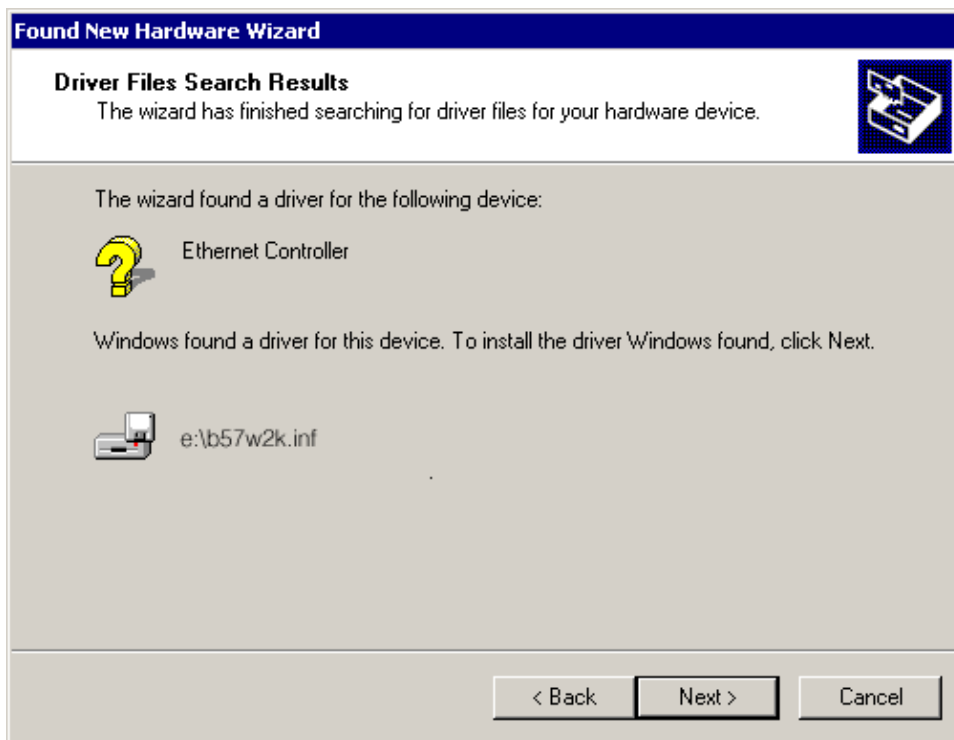
 *NOTE – If the Insert Disk window appears, **do not insert the Windows 2000 disk**:*

Broadcom Advanced Control Suite: Broadcom Gigabit Ethernet Adapter User's Guide
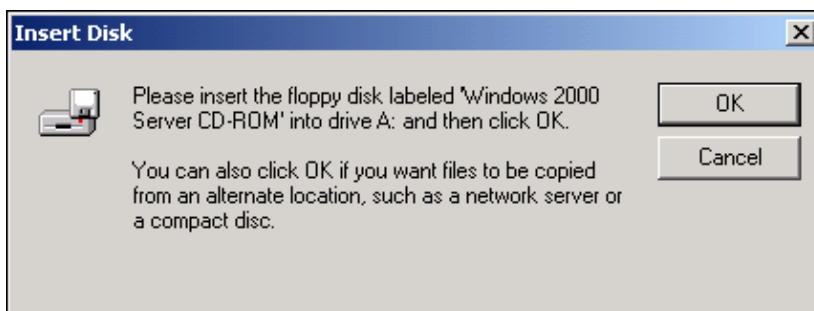
Some early versions of Windows 2000 may display a spurious message requesting you to insert the Windows 2000 disk. If this occurs, leave the driver installation media in the drive and click **OK**. If asked to specify the location of the Windows 2000 CD−ROM instead, click **Browse** (don't use the text entry field) and locate the path to the Gigabit Ethernet drivers that was specified above.

Once installation of the driver software is complete, you are ready to modify configuration parameters.

Modifying Configuration Parameters

Although the default values should be appropriate in most cases, you may change any of the available options to meet the requirements of your specific system. Once the adapter driver software has been installed, you can use this procedure to verify or change the following adapter properties:

- 802.1p QOS
- Checksum Offload
- Ethernet@WireSpeed™
- Flow Control
- Jumbo Mtu
- Speed & Duplex
- Wake Up Capabilities
- WOL Speed

Driver Properties Advanced Tab

To configure the adapter parameters, bring up the **Driver Properties Advanced** tab as follows:

1. On the Desktop, right−click the **My Computer** icon and select the **Properties** option from the pop−up menu. The System Properties window displays.
2. Click the **Hardware** tab and then click **Device Manager**. The Device Manager window displays.
3. Scroll down the list of hardware devices to *Network Adapters*. Click the plus (+) to the left of the icon to display the list of adapters currently configured.
4. Double−click the Gigabit Ethernet Adapter you want to configure. The Gigabit Ethernet Properties window displays, showing the **General** tab.
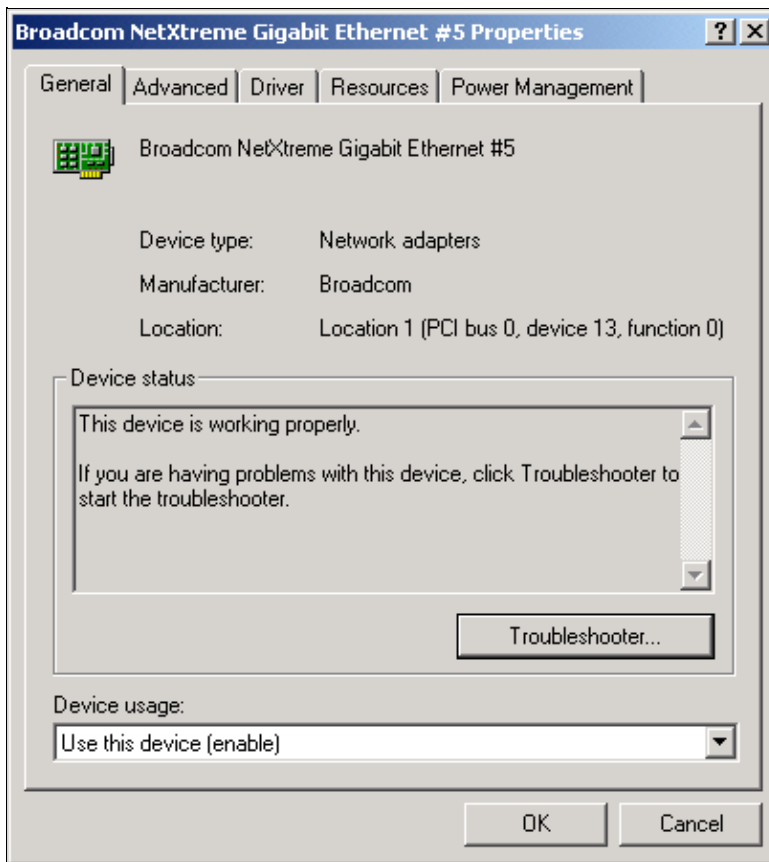
5. Click the **Advanced** tab. A window showing the list of configurable properties (and default values) for the adapter displays.

6. Change the operating parameters as desired. To change adapter operating parameters listed under the **Advanced** tab, click on the options listed under *Properties* and then use the pull–down window under *Value* to change the default or assigned value.

802.1p QOS Parameter

The **802.1p QOS** parameter is a standard that enables Quality of Service. Disabled by default, select **Enable** from the Value drop–down menu to enable this parameter. Once enabled, select **Disable** from the **Advanced** tab "Value" drop–down menu to disable this parameter.

Checksum Offload Parameter

Normally the **Checksum Offload** function is computed by the protocol stack. By selecting one of the **Checksum Offload** parameters, the checksum can be computed by the Gigabit Ethernet Adapter. To enable one of the **Checksum Offload** parameters, select the parameter from the **Advanced** tab "Value" drop–down menu. These parameters described and shown below:

- **Rx TCP/IP Checksum** – Enables receive TCP, IP, and UDP checksum offloading
- **Tx TCP/IP Checksum** (default) – Enables transmit TCP, IP, and UDP checksum offloading
- **Tx/Rx TCP/IP Checksum** – Enables transmit and receive TCP, IP, and UDP checksum offloading

Ethernet@WireSpeed™ Parameter

The **Ethernet@WireSpeed** parameter enables a 1000BASE−T Ethernet adapter to establish a link at a lower speed when only 2 pairs of wires are available in the cable plant. By default, the adapter is set to **Enable**. To disable the Ethernet@WireSpeed™ parameter, select **Disable** from the "Value" drop−down menu as shown below:

- **Disable** – Disables Ethernet@WireSpeed
- **Enable** (default) – Enables Ethernet@WireSpeed

Flow Control Parameter

The Flow Control parameter allows the user to enable or disable the receipt or transmission of PAUSE frames. PAUSE frames enable the adapter and the switch to control the transmit rate. The side that is receiving the PAUSE frame will momentarily stop transmitting. The recommended selection is **Disable**, which will configure the adapter to ignore PAUSE frames. Disabled by default, to enable Flow Control to receive, transmit, or receive and transmit PAUSE frames, select the appropriate parameter from the **Advanced** tab "Value" drop−down menu described and shown below.

- **Auto –** PAUSE frame receipt and transmission is optimized
- **Disable –** (default) PAUSE frame receipt and transmission is disabled (recommended)
- **Rx PAUSE –** PAUSE frame receipt is enabled
- **Rx/Tx PAUSE –** PAUSE frame receipt and transmission is enabled
- **Tx PAUSE –** PAUSE frame transmission is enabled

Jumbo Mtu Parameter

The **Jumbo Mtu** parameter allows the adapter to transmit and receive oversized Ethernet frames that are greater than 1514 but less than 9000 bytes in length. Note that this parameter will require a switch that is able to process large frames.

Set at **1500** bytes by default, to increase the size of the received frames, increment the byte quantity in 500–byte increments from the **Advanced** tab "Value" counter, shown below.

NOTE – 5705 does not support jumbo frames. It can transmit jumbo packets by TCP segmentation, but the ethernet frame size is still limited to 1514 bytes. Receive frame size is also limited to 1514 bytes.

Speed & Duplex Parameter

The **Speed & Duplex** parameter allows the user to set the connection speed and duplex mode of the network. Note that Duplex Mode allows the adapter to transmit and receive network data simultaneously. The adapter is set to **Auto** (optimum connection) by default. Set the speed and mode as described and shown below:

- **10 Mb Full** – Sets the speed at 10Mbps and mode to Full Duplex
- **10 Mb Half –** Sets the speed at 10Mbps and mode to Half Duplex
- **100 Mb Full –** Sets the speed at 100Mbps and mode to Full Duplex
- **100 Mb Half –** Sets the speed at 100Mbps and mode to Half Duplex
- **Auto –** (Default) Sets the speed and mode for optimum network connection (recommended)

*NOTE – 1Gbps speed is enabled by selecting **Auto**.*

*NOTES – **Auto** is the recommended selection. This selection allows the adapter to dynamically detect the line speed and duplex mode of the network. Whenever the network capability changes, the adapter will automatically detect and adjust to the new line speed and duplex mode. You must ensure that the link partner is also set to Auto.*

Wake Up Capabilities Parameter

The **Wake Up Capabilities** parameter allows the user to set the adapter to wake up from a low power mode when it receives a network wake up frame. Two wake up frames are possible: **Magic Packet** and **Wake Up Frame**. By default, the adapter is set to **Both**. To choose the type of frame the adapter will wake up from, select the appropriate **Advanced** tab parameter from the "Value" drop–down menu as described and shown below:

- **Both** (both) – Selects both **Magic Packet** and **Wake Up Frame** as wake up frames
- **Magic Packet** – Select **Magic Packet** as the wake up frame
- **None** – Selects no wake up frame
- **Wake Up Frame** – Selects **Wake Up Frame** as the wake up frame
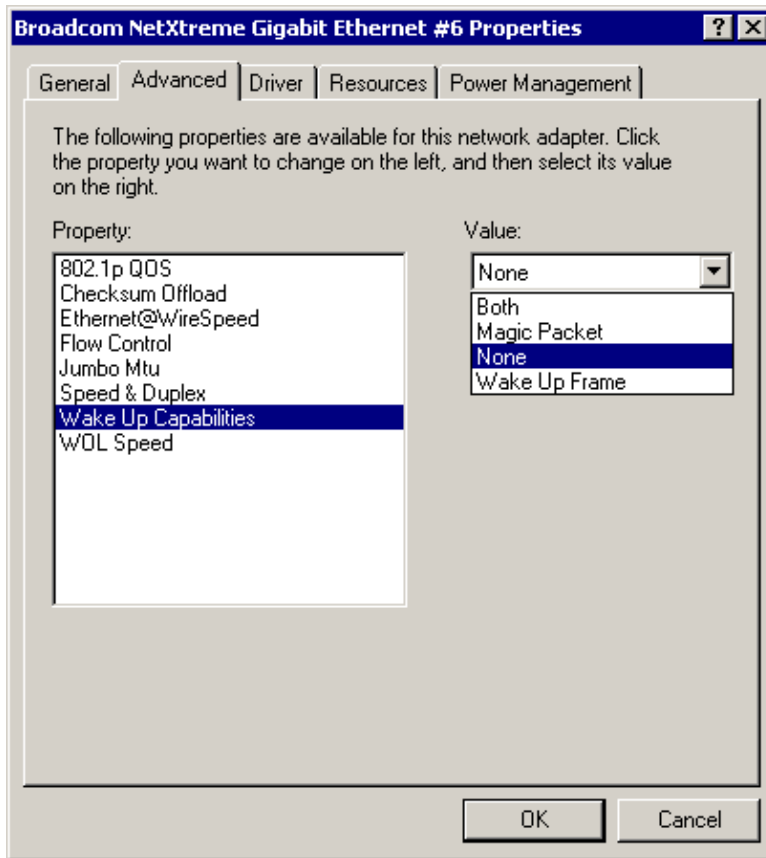
WOL Speed Parameter

The **WOL Speed** parameter allows the user to select the speed at which the adapter connects to the network during Wake–on–LAN mode. By default, the adapter is set to **Auto**. Set the speed as described and shown below:

NOTE – WOL Speed at 100 Mb is only supported on the 5701 and 5703.

- **10 Mb** – Sets the speed at 10 Mb
- **100 Mb** – Sets the speed at 100 Mb
- **Auto** (default) – Sets the speed for optimum network connection

Save Settings

1. When the adapter parameter configuration is complete, click **OK** at the Gigabit Ethernet Controller Properties screen to accept the settings.
2. If prompted to restart your computer, click **Yes**. Note that, while it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.
3. Verify that the adapter port LEDs operate as described in Table 1 in the *Introduction*.

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Power Management

Power management specifies whether the operating system turns off the selected device if that device is able to be turned off. If the device is busy doing something, however, (servicing a call, for example), the operating system will not shut down the device. The operating system will try to shut down every possible device only when it is hibernating. Some devices must stay on at all times. If you need the device to stay on at all times, do not check this box.

NOTE – To enable the Wake–on LAN in standby mode for the Broadcom NetXtreme™ Gigabit Ethernet adapter you must select the "Allow the device to bring the computer out of standby" checkbox.

Removing the Driver Software

Before physically removing an adapter from your system, first remove the adapter driver software.

1. Start your Windows 2000 system and log in. You must have System Administrator privileges to remove the driver software.
2. Open the Control Panel and double–click the System icon.
3. At the System Properties screen, click the **Hardware** tab.

4. Click **Device Manager** to display the Computer Management window.

5. Expand **Network adapters** (click the **+** sign). All network adapters will display.
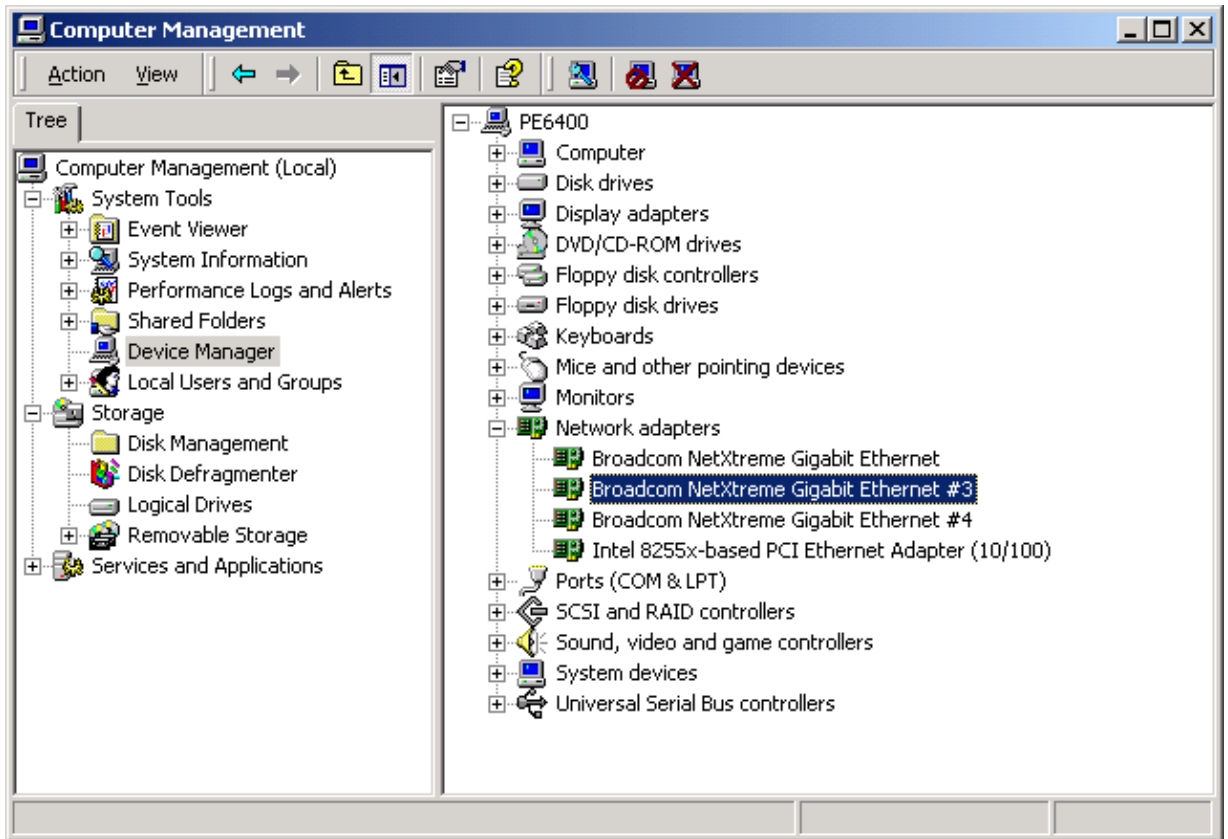
6. Right–click on the adapter to be removed and select **Uninstall**.
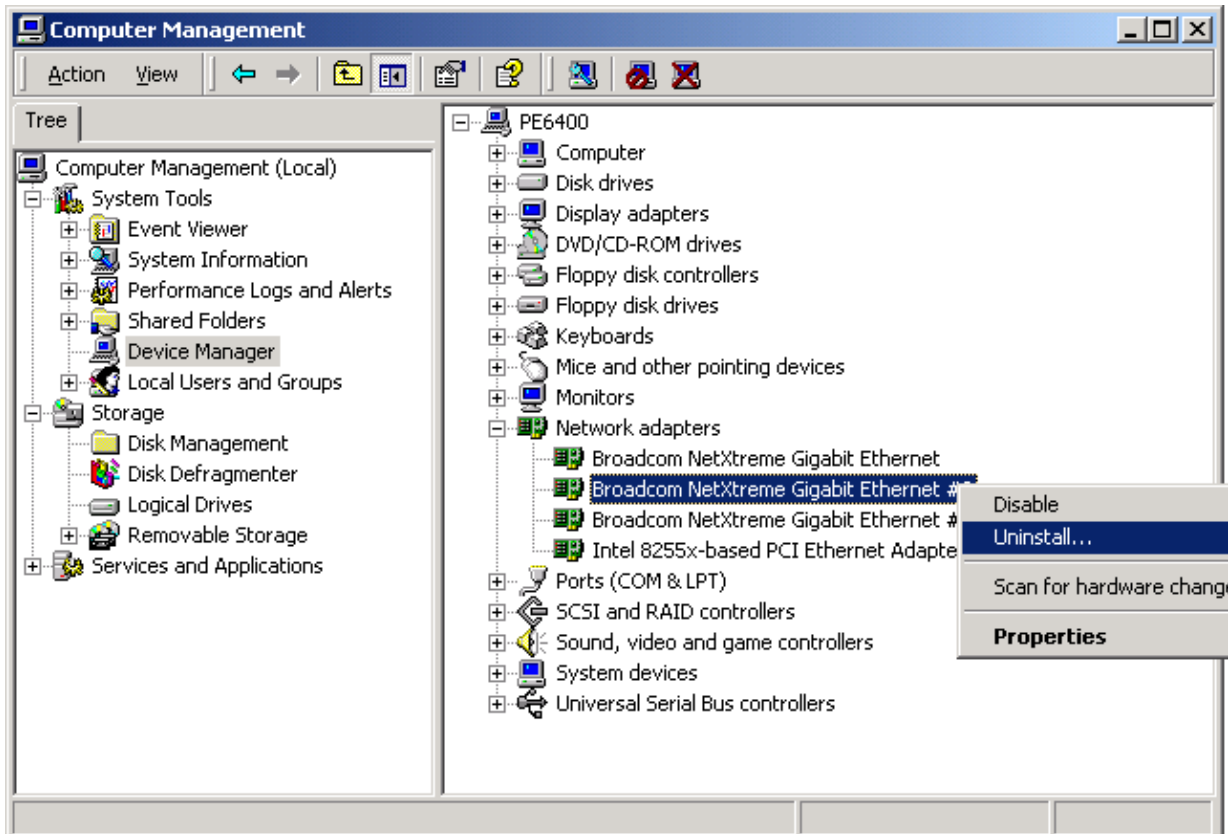
NOTE – Not all driver files are removed as part of this procedure. Note that the driver and adapter can be removed via Hot Plug, if supported.

Installing Broadcom Advanced Server Program

NOTE – The following procedure only applies if BASP was not installed during the Broadcom Advanced Control Suite installation. BASP is typically loaded when you install the Broadcom Advanced Control Suite (BASC).

To install the Broadcom Advanced Server Program Driver Properties (BASP), do the following:

NOTE – Before installing BASP on Windows 2000 Advanced Server with Terminal Services, the command "change user /install" must be issued, otherwise a "User Mode" error will occur. By default, Terminal Services is set to "User Mode" from which applications can not be installed.This command changes the terminal from "User Mode" to "Installation Mode" from which applications can be installed.

1. Insert the Broadcom CD into the computer's CD–ROM drive.
2. Browse the CD to this path: Windows2000\BcmServ, and double–click on **baspinst.exe**. This will install the BASP software and display the following window.
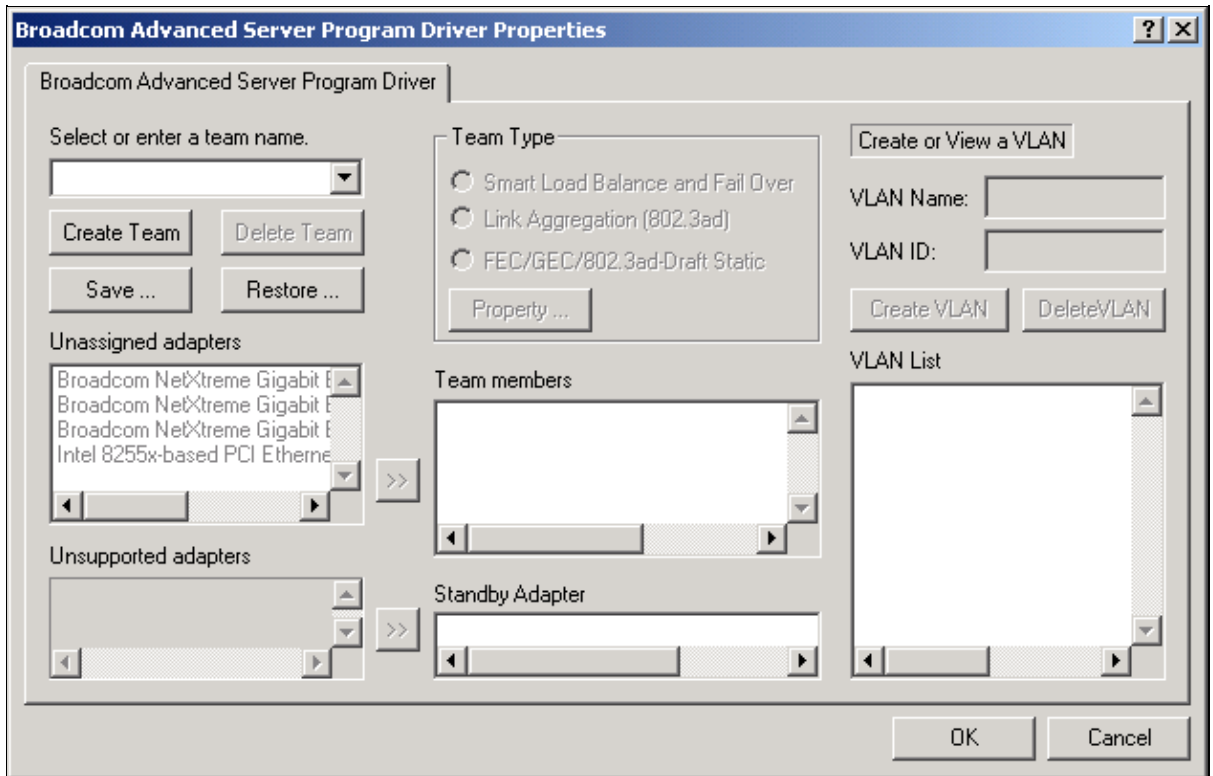
From this menu, you can create a team, see "Creating a Team and Assigning Adapters", or click **OK** to complete the installation.

Uninstalling Broadcom Advanced Server Program

To uninstall the Broadcom Advanced Server Program Driver Properties (BASP), do the following:

1. Select **Start**>**Settings**>**Network and Dial–up Connections.** The following screen appears.
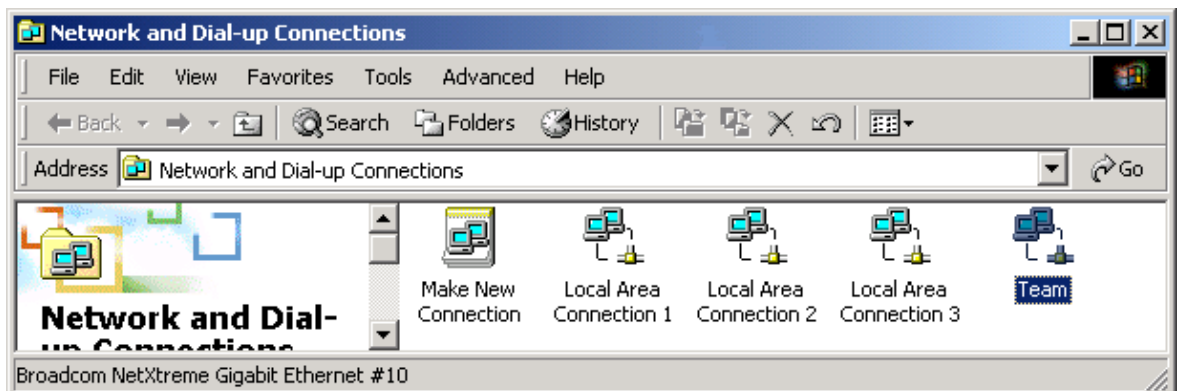
2. When the Network and Dial–up Connections window opens, right–click on any network adapter. This displays the Local Area Connection Properties window.
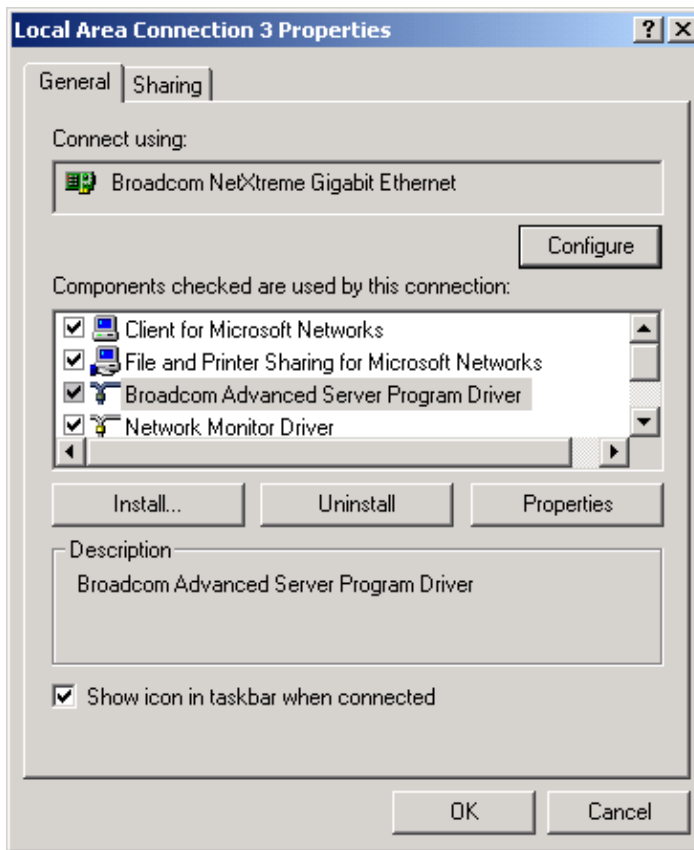
3. Highlight the Broadcom Advanced Server Program Driver, and select **Uninstall**. The following screen appears.
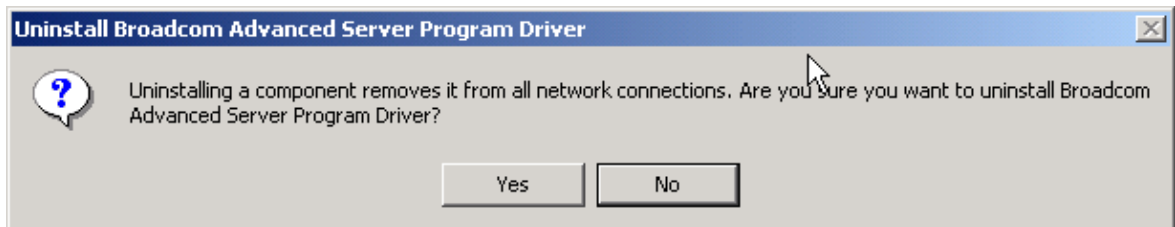
4. Select **Yes**. The following screen appears.
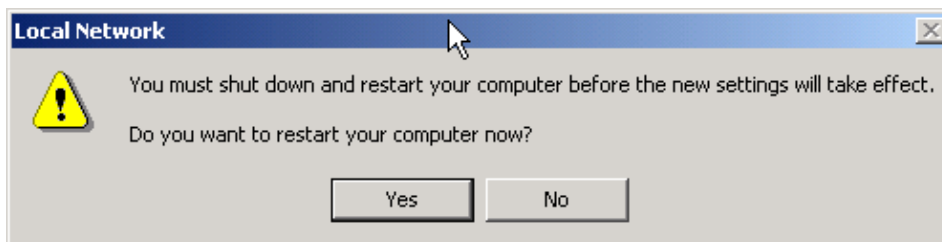
5. Select **Yes** to restart your computer. This completes the uninstall procedure.

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Configuring Teaming

> *NOTE – All teaming configurations are performed using the Broadcom Advanced Control Suite (BACS). Refer to "Broadcom Advanced Control Suite" for additional information.*

> *NOTE – To avoid failover problems when using BASP, make sure that the spanning tree protocol is disabled on the switch to which the network adapter is connected.*

Any available adapter can be configured as part of a team. Teaming is a method of grouping multiple adapters to a virtual adapter (bundling multiple adapters to look like a single adapter). The benefit of this approach is load balancing and redundancy, see the "Teaming Overview".

A team is created by selecting the desired adapter(s) from the Unassigned adapters window and moving it to the Team members window. To the outside world this appears to be one adapter. Each member in the Load Balance Member list shares the traffic burden of all members.

The Standby Adapter field is used to permit the selection of one of the team members to handle traffic, should all members in the Team Member list fail. The selected Standby Member will not handle any traffic unless all Load Balance Members fail. When one Team Member (or more) is restored (fail–back), traffic will then be handled by the restored team member(s).

- Configuring Teaming consists of the following tasks:
  - ♦ Accessing the Broadcom Advanced Server Program Driver Properties (BASP) interface
  - ♦ Creating teams
  - ♦ Adding adapters to the teams
  - ♦ Assigning an IP address to the teams

Each of these tasks are described below, along with procedures on how to delete adapters from a team and to delete a teams.

Accessing the BASP Driver Interface

Use this procedure to access the adapter properties for Teaming Configuration:

1. Right–click on the **My Network Places** icon and select **Properties**.
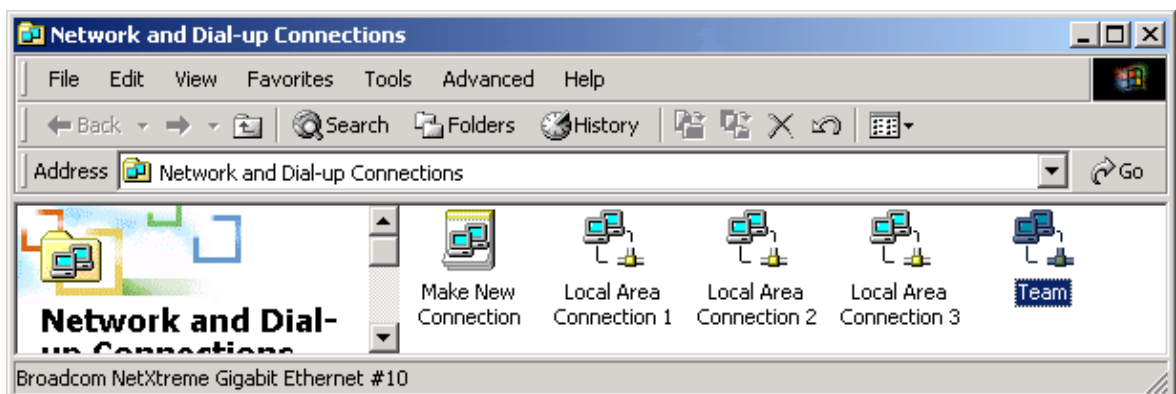
2. When the Network and Dial–up Connections window opens, right–click on any network adapter. This displays the Local Area Connection Properties window.
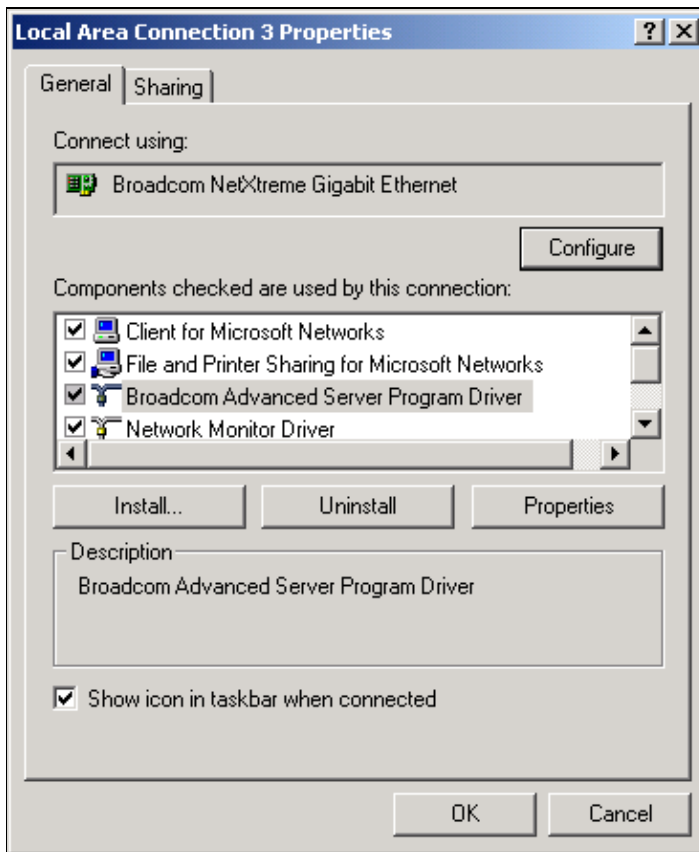
3. Select Broadcom Advanced Server Program Driver and click the **Properties** button. The BASP window is displayed.
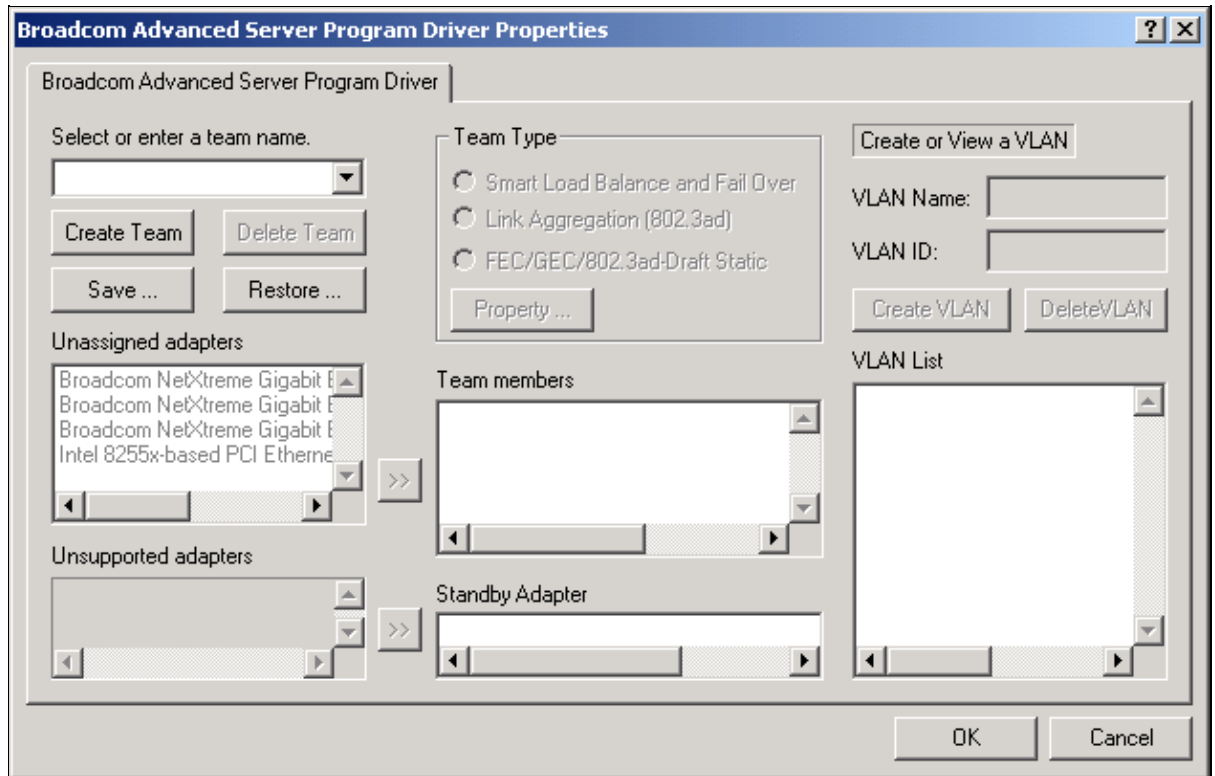
Interface components of the BASP driver properties window are described below:

- Select or enter a team name – This entry field is used to select or enter a team name.
- Unassigned adapters – This list displays all of the Ethernet adapters that are available to be added to a team. Since each adapter can be added to only one team, the adapter is removed from this list once it has been assigned to a team.
- Team Type – Smart Load Balance and Failover: This specifies a switched independent team for Load balancing and Failover.
  FEC/GEC: Also known as general trunking. No standby adapter is allowed when this option is selected.
- Team members – This list displays all adapters that belong to a selected team.
- Standby Adapter – This list displays the standby adapter selected for belonging to a selected team.
- VLAN List – This list displays all the VLANs that have been created for the selected team.

Creating a Team and Assigning Adapters

A team is comprised of at least one primary adapter (a standby adapter is optional). Each adapter can belong to only one team. To configure a new team, access the Broadcom Advanced Server Program Driver Properties window and perform the following steps:
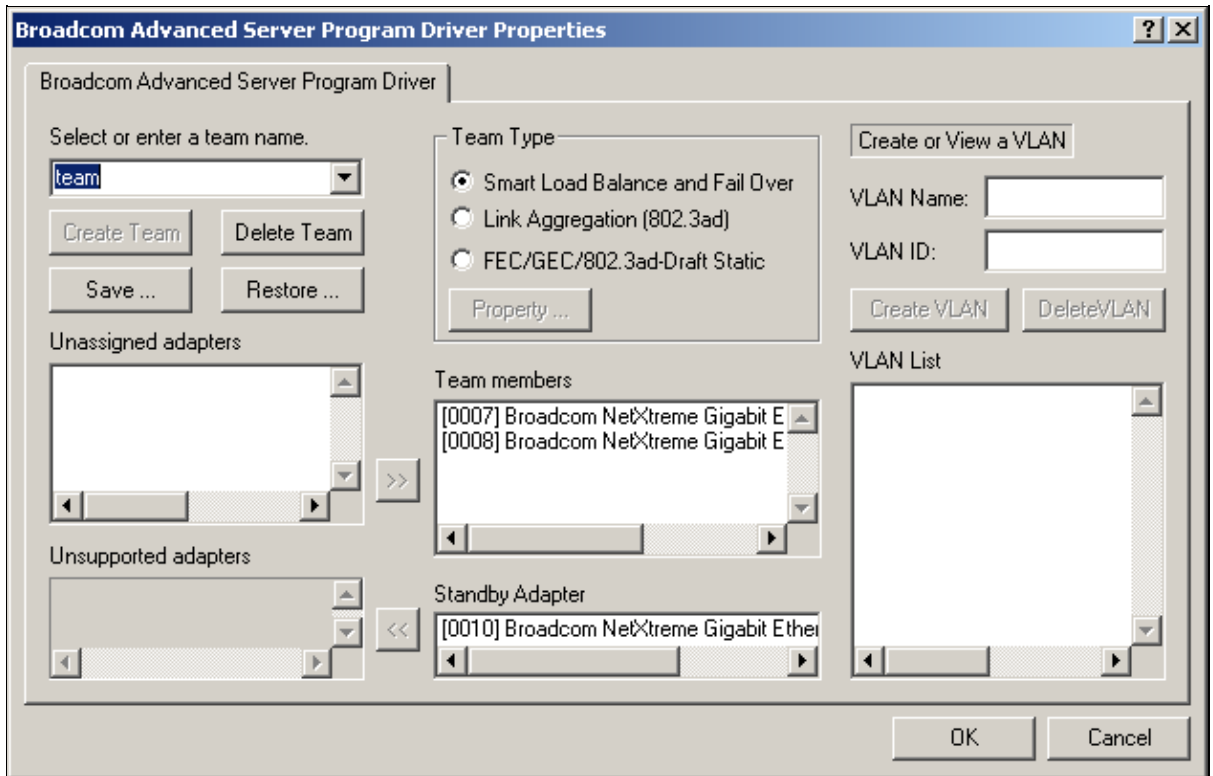
1. Enter a team name in the "Select or enter a team name" entry field.
2. Click **Create Team**.
3. Place an adapter into the team.
4. In the Unassigned adapters list, select the adapter(s) that you want to add to the team created in the previous step. Move the selected adapters to the Team members list box using the double arrows.
5. When you are finished configuring teams, click **OK** to accept the changes.

     NOTE – At least one adapter must be displayed in the Team Members list box.

6. If a team has no adapters assigned, you will be prompted to add an adapter or delete the team.
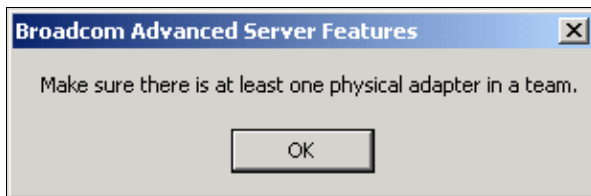
7. Click **OK**. When team configuration has been correctly performed, one Virtual Team adapter instance will be created for each configured team and will appear along with the other adapters in the Network and Dial–up Connections window.

8. Configure the Team IP address if necessary. If other adapters in your system use TCP/IP bindings, the TCP/IP Properties window will open. Configure the IP address and any other necessary TCP/IP configuration for the team.
9. Click **OK** when finished.

Removing Adapters from a Team

To remove an adapter from its assigned team, select the adapter in the Team Members list and press the **Delete** key or the double−left arrow. The adapter will be removed from the team list and will reappear in the Unassigned adapters list.

Deleting a Team

To delete a configured team and release its assigned adapters, select the team in the team list and click the **Delete Team** button. The team and all its assigned adapters will be removed from the team list. The released adapters will reappear in the Unassigned adapters list.

NOTE – Adapters that are part of a team inherit all the basic configuration properties of the team, including VLANs associated with the team. If you delete a Team, any VLANs configured for that team will also be deleted.

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Configuring VLANs

VLAN Configuration is optional. Before configuring VLANs, see the "VLAN Overview."

NOTE – Adapters that are members of a Team can also be configured to support VLANs. However, VLANs cannot be configured for a team that includes non−Broadcom adapters.

By default, Ethernet adapters are configured with VLAN support disabled. Up to 64 VLANs can be defined for each team on your server. Configuring VLANs consists of the following tasks:

- Accessing the VLAN configuration interface.
- Adding VLAN(s) to the team(s). This includes assigning a unique identifier and name to each new VLAN.

NOTE – When adding 64 VLANs, the 64th VLAN must have a VLAN ID of 0 (63 VLANs are tagged and 1 VLAN is untagged).

Each of these tasks is described below, along with procedures describing how to delete VLANs or modify the properties of a configured VLAN.

Accessing the Adapter VLAN Configuration Interface

Use this procedure to access the adapter properties for VLAN Configuration:

1. Open the system Control Panel and double–click Network and Dial–up Connections icon.
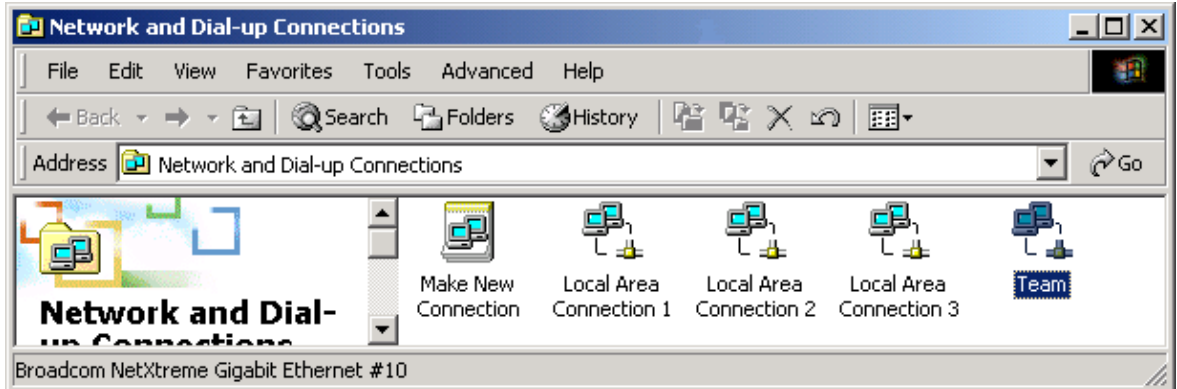
2. Double–click any Local Area Connection icon and click BASP properties. The BASP driver properties window will display:
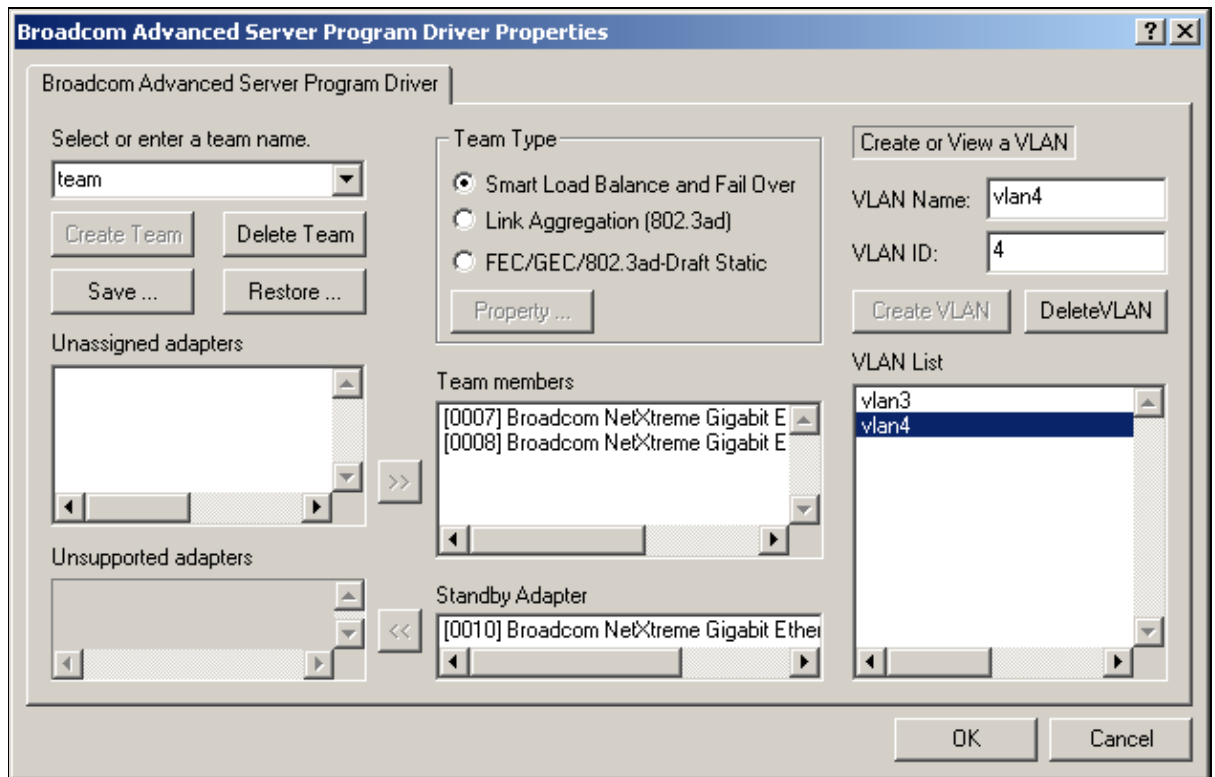
The BASP driver properties window lists the installed adapters and the VLANs configured for each Team. Each VLAN is identified with a unique identifier number and name that will only appear in this window. Interface components of the VLAN Configuration window are described in detail below:

- VLAN List – This list displays all of the VLANs that have been configured.
- Control Buttons – There are two control buttons: Create VLAN, and Delete VLAN. These buttons are used for creating and deleting VLANs.

Adding a VLAN

You can define up to 64 VLANs per team. To configure a new VLAN, perform the following steps:

1. From the BASP window, select the team to which you want to add a VLAN.
2. Enter a VLAN Name and VLAN ID, then click the **Create VLAN** button.
3. When you are finished adding VLANs to this team, click **OK**. A new virtual adapter is created for each VLAN.

> *NOTE – To maintain optimum adapter performance, your system should have 64 MB of system memory for each eight VLANs created per adapter. When adding VLANs to a single adapter, a one–adapter team must be created.*

Deleting a VLAN

> *NOTE – Adapters that are part of a team inherit all the basic configuration properties of the team, including VLANs associated with the team. If you delete a team, any VLANs configured for that team will also be deleted.*

To delete a configured VLAN, perform the following steps:

1. From the BASP window, select the VLAN you want to delete and click the **Delete VLAN** button. The selected VLAN will be deleted from the VLAN list window.
2. When you are finished deleting VLANs, click the **OK** button to accept the changes.

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Save and Restore Configuration

This feature is used to save the current configuration in case of a system crash. The restore feature allows the user to apply the previous configuration. Save and restore VLAN and Adapter configurations as shown below:

Save a VLAN Configuration

To save a configuration:

1. Click **Save** at the Broadcom Advanced Server Program Driver Properties screen.
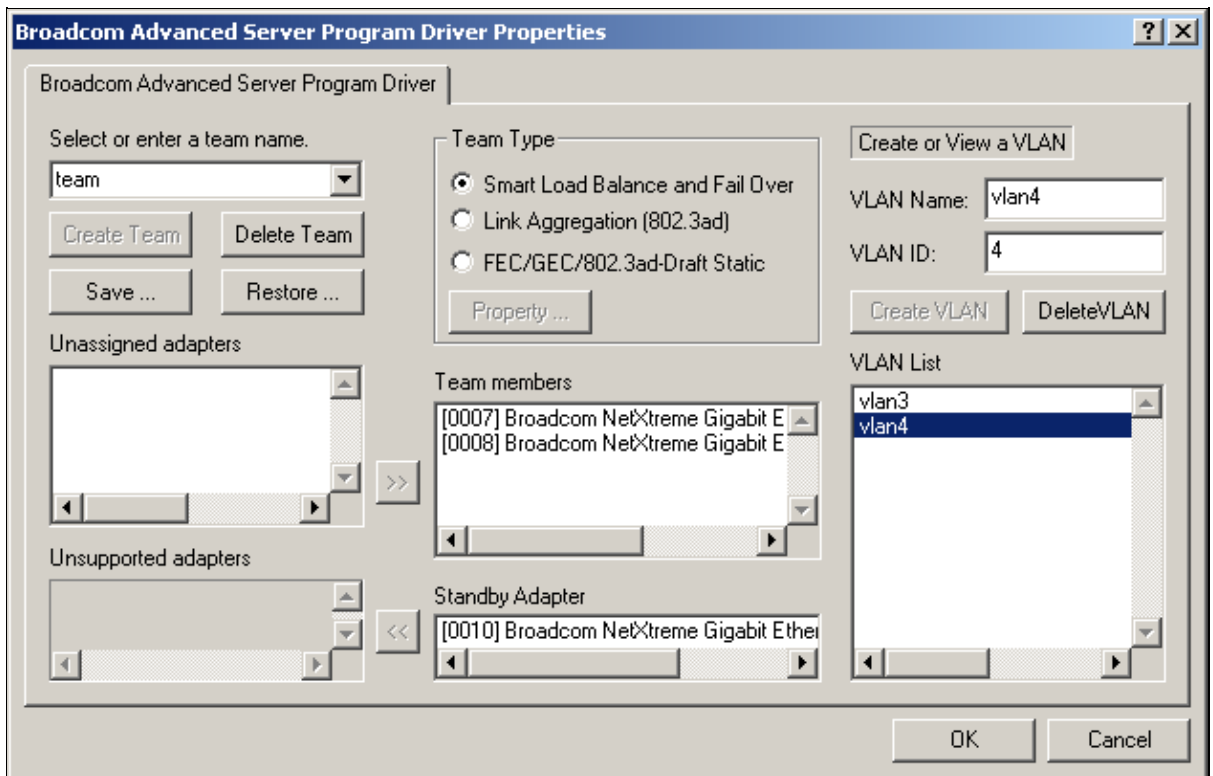
2. At the Save Configuration screen, enter the path and filename of the configuration to be saved (e.g., C:\temp\teamconfig.bcg).
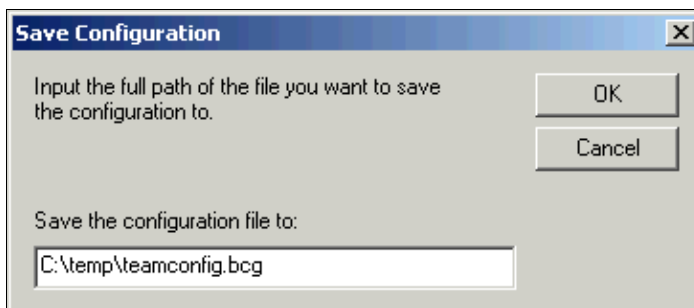
The resulting file will be a text file that can be viewed with a text editor as shown below. Note that only the team configuration information is shown.

```
teamconfig.bcg - Notepad
File  Edit  Search  Help

Installed Network Adapters
 Adapter : Broadcom NetXtreme Gigabit Ethernet #3
  IP Address :
  Mac Address : 00-10-18-01-0A-4D
  Driver Status : Driver Loaded.  Normal Operating Mode.
  Driver Version : 2.14
  [BUS]Device Number : [0] 4
  Interrupt : 17
  Memory Address : 0xFE010000
  PCI Bus Mode : PCI  33MHZ 32 Bit Bus.
  Link Status :
    Link Pass
    Local Receive OK
    Remote Receive OK

 Adapter : Broadcom NetXtreme Gigabit Ethernet #2
  IP Address : 172.16.7.122
  Mac Address : 00-00-00-00-00-00
  Driver Status : Driver Loaded.  Normal Operating Mode.
  Driver Version : 2.14
  [BUS]Device Number : [0] 8
  Interrupt : 22
  Memory Address : 0xFE000000
  PCI Bus Mode : PCI  33MHZ 32 Bit Bus.
  Link Status :
    Link Fail
    Local Receive OK
    Remote Receive OK
```

Restore a VLAN Configuration

1. To restore a configuration, click **Restore** at the Broadcom Advanced Server Program Driver Properties screen.
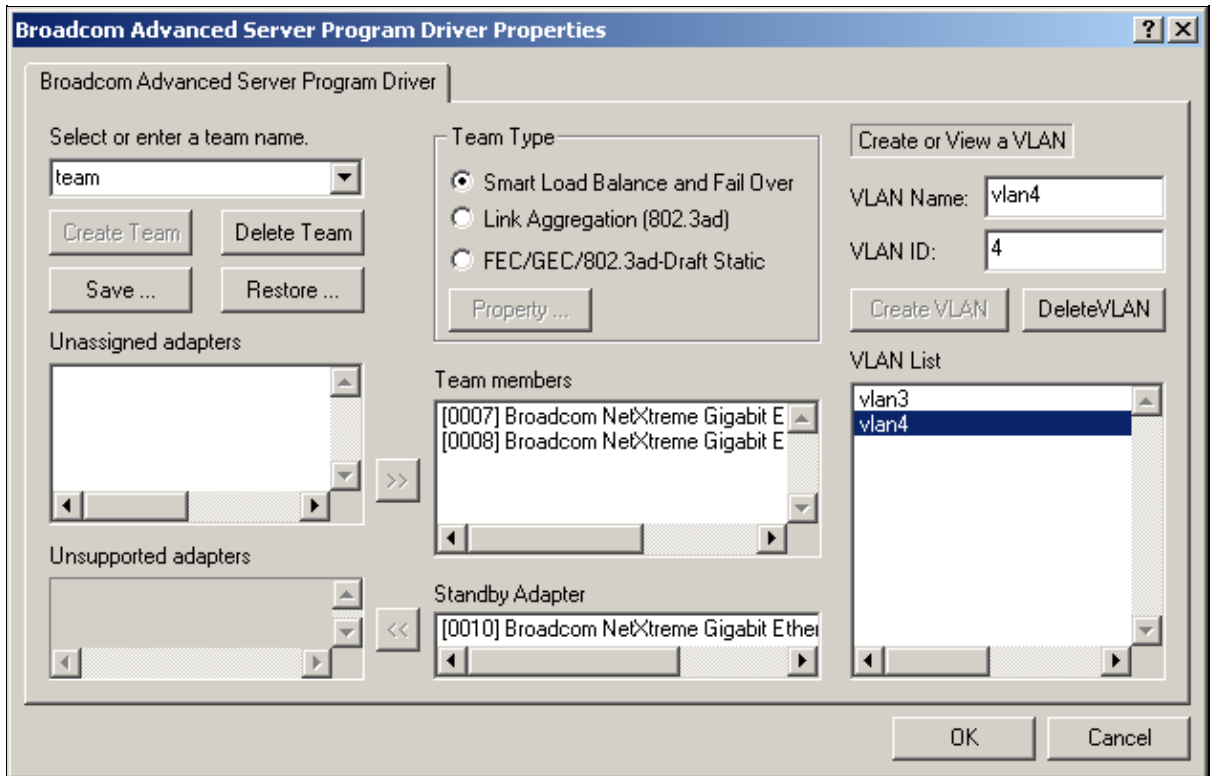
2. At the information screen, click **Yes** to erase the current configuration and replace it with a saved configuration. Note that if the current configuration has not been saved, it will be lost.
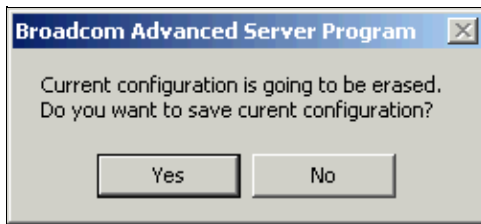
3. At the Restore Configuration screen, enter the path and filename of the configuration to be restored in the "Restore the configuration file window" and click **OK**.
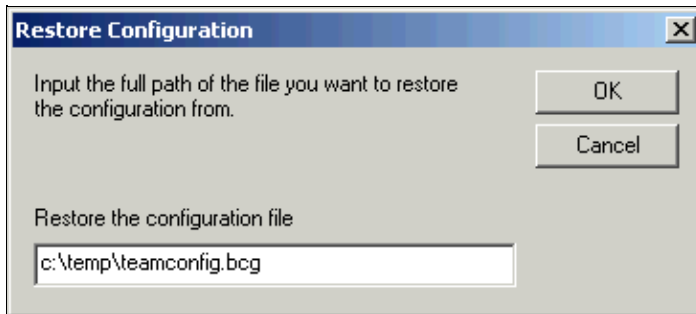
The saved configuration will be restored.

Please read all restrictions and disclaimers.

Restore a VLAN Configuration   212

Windows® .NET Advanced Server Driver Software: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

🔵Installing the Driver Software

🔵Modifying Configuration Parameters

🔵Removing the Driver Software

Installing the Driver Software

> *NOTE – The Gigabit Ethernet Adapter must be physically installed in your system prior to installing the driver software. See Installing the Hardware for details.*

When the Windows .NET system first boots up after installing a new hardware device, such as a Gigabit Ethernet Adapter, the system automatically detects &the new hardware and prompts you to install the driver software for that device.

A network device driver must be installed before the Gigabit Ethernet Adapter can be used with your Windows .NET system.

Installing the Adapter Software

To install the adapter software for Windows .NET, do the following

> *NOTE – Before beginning this procedure, verify that the Windows .NET system has been upgraded to the latest version with the latest service pack applied. The following instructions are based on the latest beta versions of .NET 64 and .NET 32.*

1. Start your Windows .NET system and log in. You must have Network Administrator privileges to install the driver software.

   When you boot up the Windows .NET system after installing the adapter card, a series of *Found New Hardware* windows are displayed.
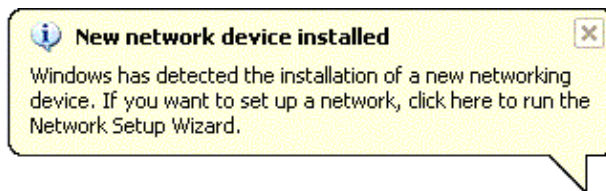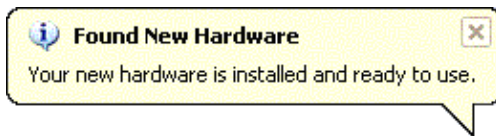
Updating the Adapter Software

To update the adapter software for Windows .NET, do the following

1. Start your Windows .NET system and log in. You must have Network Administrator privileges to update the driver software.

2. From the Start menu, right click **My Computer** and select **System Properties** to display the following menu.
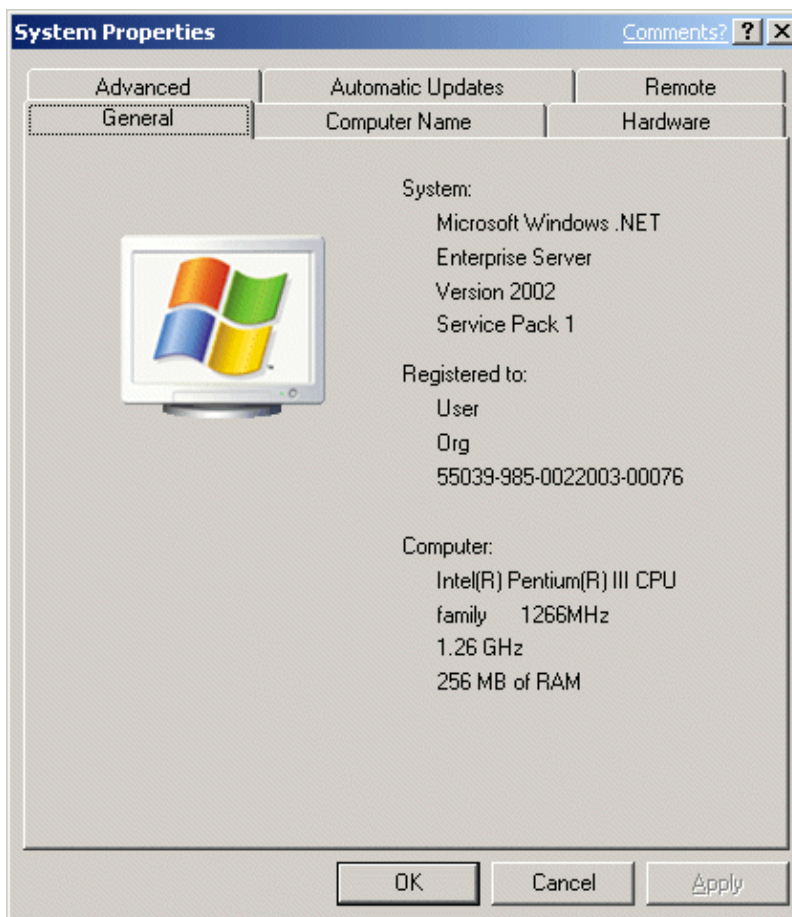
3. When the System Properties window opens, click the **Hardware** tab to display the following menu.
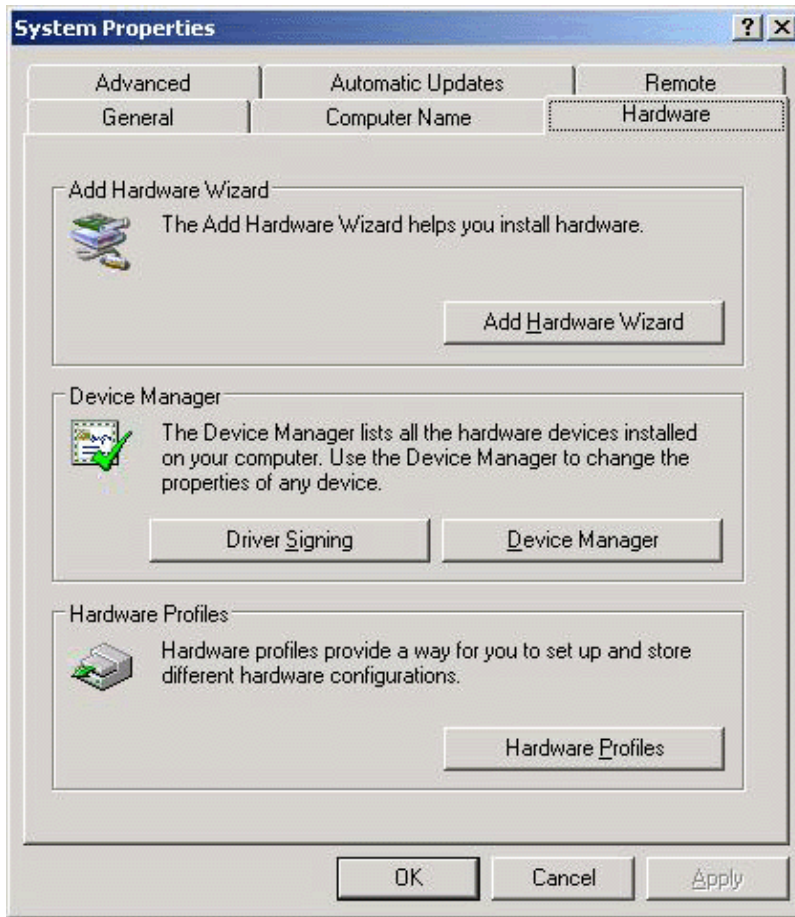
4. When the Device Manager window opens, right–click on the Broadcom NetXtreme™ Gigabit Ethernet adapter and select **Update Driver**.
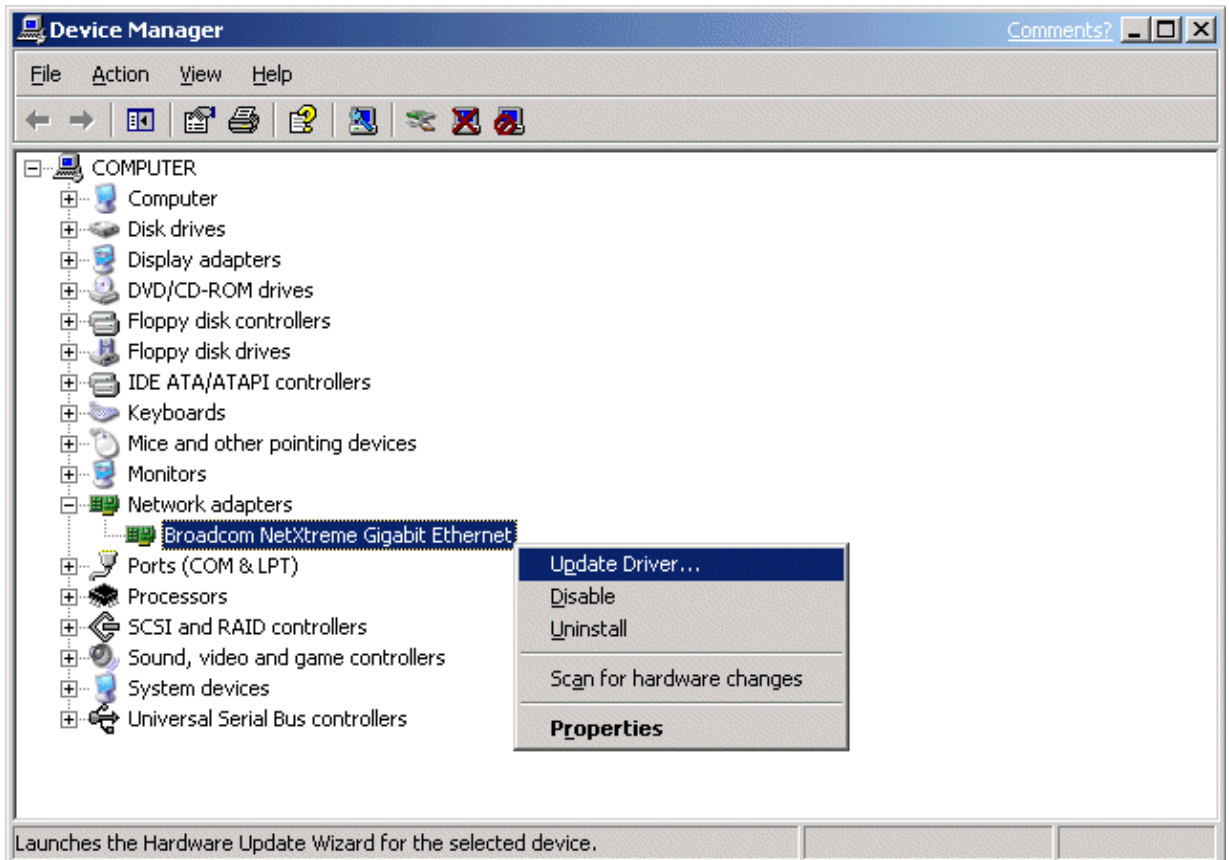
5. In the Hardware Update Wizard window, select *Install the software automatically (Recommended)*, then click **Next**.
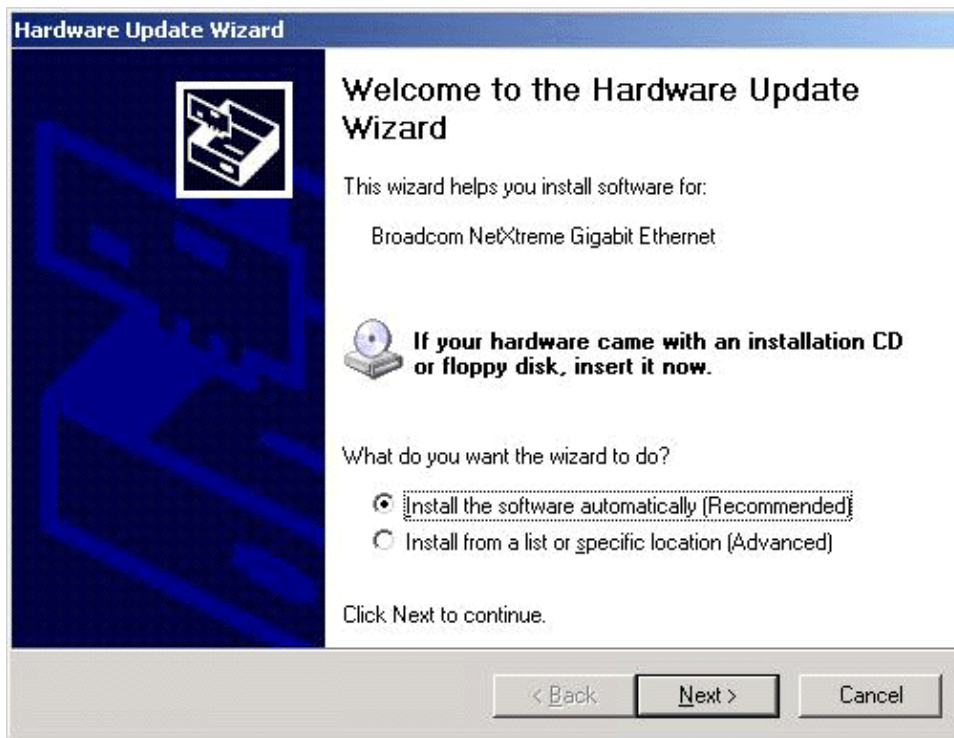
The Hardware Update Wizard searches for the appropriate driver and automatically updates the software.
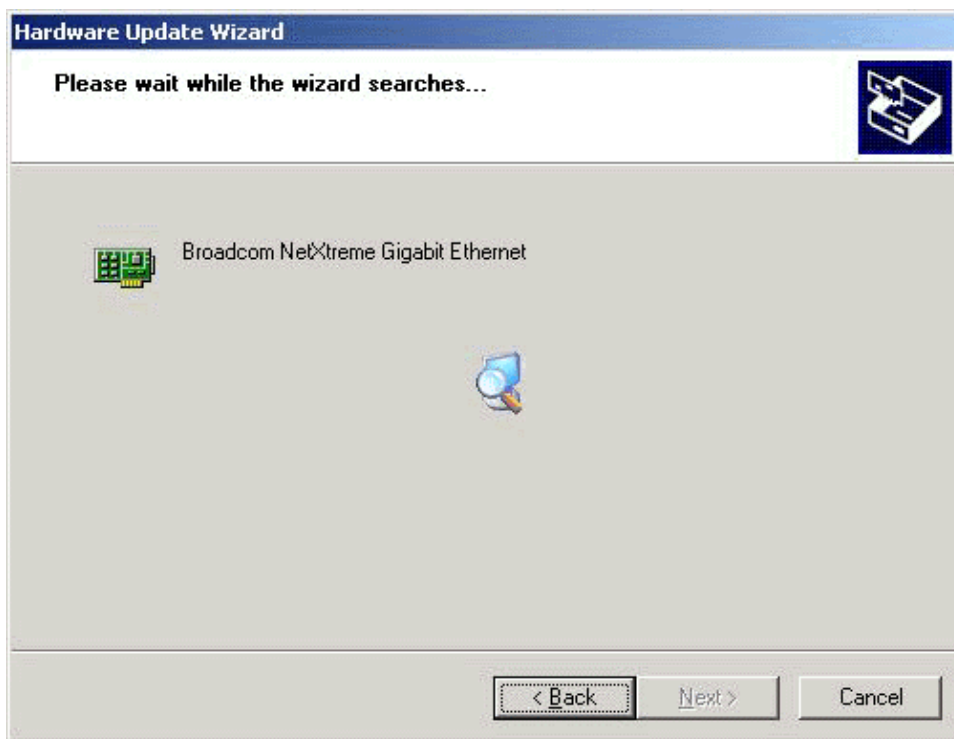
If asked to specify the location of the Windows .NET CD–ROM instead, click **Browse** (don't use the text entry field) and locate the path to the Gigabit Ethernet drivers that was specified above.

6. Once the software update is complete, click Finish to close the wizard and complete the software installation.
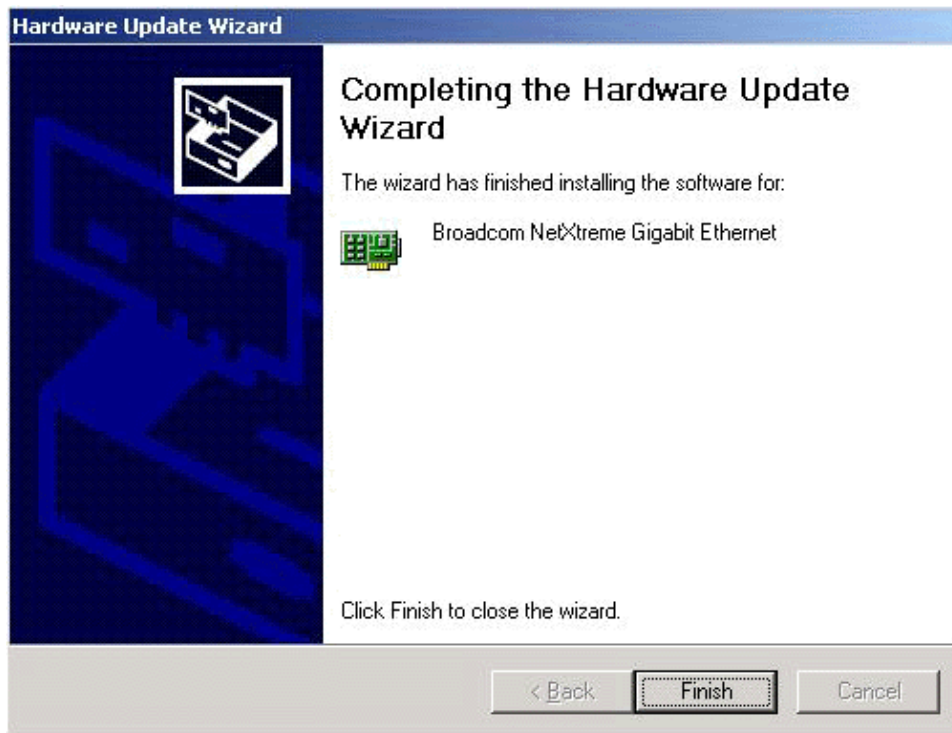
Once installation of the driver software is complete, you are ready to modify configuration parameters.

Modifying Configuration Parameters

Although the default values should be appropriate in most cases, you may change any of the available options to meet the requirements of your specific system. Once the adapter driver software has been installed, you can use this procedure to verify or change the following adapter properties:

- 802.1p QOS
- Checksum Offload
- Ethernet@WireSpeed™
- Flow Control
- Jumbo Mtu
- Large Send Offload
- Speed & Duplex
- Wake Up Capabilities
- WOL Speed

Driver Properties Advanced Tab

To configure the adapter parameters, bring up the **Driver Properties Advanced** tab as follows:

1. Click **Start** then select **Control Panel** from the pop–up menu.
2. Click on the Performance Maintenance category, then click on the System Control Panel icon to display the System Properties window.
3. Click the **Hardware** tab and then click **Device Manager**. The Device Manager window displays.
4. Scroll down the list of hardware devices to *Network Adapters*. Click the plus (+) to the left of the icon to display the list of adapters currently configured.
5. Double–click the Gigabit Ethernet Adapter you want to configure. The Gigabit Ethernet Properties window displays, showing the **General** tab.

6. Click the **Advanced** tab. A window showing the list of configurable properties (and default values) for the adapter displays.

7. Change the operating parameters as desired. To change adapter operating parameters listed under the **Advanced** tab, click on the options listed under *Properties* and then use the pull–down window under *Value* to change the default or assigned value.

802.1p QOS Parameter

The **802.1p QOS** parameter is a standard that enables Quality of Service. Disabled by default, select **Enable** from the Value drop–down menu to enable this parameter. Once enabled, select **Disable** from the **Advanced** tab "Value" drop–down menu to disable this parameter.

Checksum Offload Parameter

Normally the **Checksum Offload** function is computed by the protocol stack. By selecting one of the **Checksum Offload** parameters, the checksum can be computed by the Gigabit Ethernet Adapter. To enable one of the **Checksum Offload** parameters, select the parameter from the **Advanced** tab "Value" drop–down menu. These parameters are described and shown below:

- **Rx TCP/IP Checksum** – Enables receive TCP, IP, and UDP checksum offloading
- **Tx TCP/IP Checksum** – Enables transmit TCP, IP, and UDP checksum offloading
- **Tx/Rx TCP/IP Checksum** (default) – Enables transmit and receive TCP, IP, and UDP checksum offloading

Ethernet@WireSpeed™ Parameter

The **Ethernet@WireSpeed** parameter enables a 1000BASE−T Ethernet adapter to establish a link at a lower speed when only 2 pairs of wires are available in the cable plant. By default, the adapter is set to **Enable**. To disable the Ethernet@WireSpeed™ parameter, select **Disable** from the "Value" drop−down menu as shown below:

- **Disable** – Disables Ethernet@WireSpeed
- **Enable** (default) – Enables Ethernet@WireSpeed

Flow Control Parameter

The Flow Control parameter allows the user to enable or disable the receipt or transmission of PAUSE frames. PAUSE frames enable the adapter and the switch to control the transmit rate. The side that is receiving the PAUSE frame will momentarily stop transmitting. The recommended selection is **Disable**, which will configure the adapter to ignore PAUSE frames. Disabled by default, to enable Flow Control to receive, transmit, or receive and transmit PAUSE frames, select the appropriate parameter from the **Advanced** tab "Value" drop–down menu described and shown below.

- **Auto –** PAUSE frame receipt and transmission is optimized
- **Disable –** (default) PAUSE frame receipt and transmission is disabled (recommended)
- **Rx PAUSE –** PAUSE frame receipt is enabled
- **Rx/Tx PAUSE –** PAUSE frame receipt and transmission is enabled
- **Tx PAUSE –** PAUSE frame transmission is enabled

Jumbo Mtu Parameter

The **Jumbo Mtu** parameter allows the adapter to transmit and receive oversized Ethernet frames that are greater than 1514 but less than 9000 bytes in length. Note that this parameter will require a switch that is able to process large frames.

Set at **1500** bytes by default, to increase the size of the received frames, increment the byte quantity in 500–byte increments from the **Advanced** tab "Value" counter, shown below.

> *NOTE – 5705 does not support jumbo frames. It can transmit jumbo packets by TCP segmentation, but the ethernet frame size is still limited to 1514 bytes. Receive frame size is also limited to 1514 bytes.*

Large Send Offload Parameter

Normally the TCP segmentation is done by the protocol stack. By enabling the **Large Send Offload** value, the TCP segmentation can be done by the Gigabit Ethernet Adapter. To enable the **Large Send Offload**, select the parameter from the **Advanced** tab "Value" drop–down menu. These values are described and shown below:

NOTE – Large Send Offload features are only supported on the 5701 NetXtreme Adapter.

- **Disable** – Disables large send offloading
- **Enable** (default) – Enables large send offloading
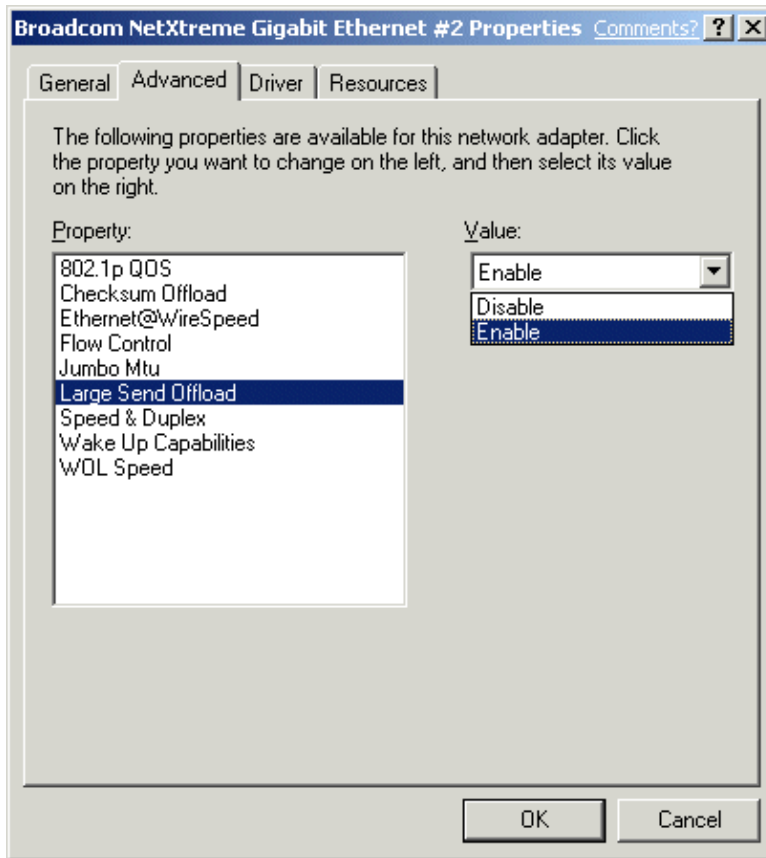
Speed & Duplex Parameter

The **Speed & Duplex** parameter allows the user to set the connection speed to the network and mode. Note that Full–Duplex Mode allows the adapter to transmit and receive network data simultaneously. The adapter is set to **Auto** (optimum connection) by default. Set the speed and mode as described and shown below:

- **10 Mb Full** – Sets the speed at 10Mbps and mode to Full Duplex
- **10 Mb Half –** Sets the speed at 10Mbps and mode to Half Duplex
- **100 Mb Full –** Sets the speed at 100Mbps and mode to Full Duplex
- **100 Mb Half –** Sets the speed at 100Mbps and mode to Half Duplex
- **Auto –** (Default) Sets the speed and mode for optimum network connection (recommended)

*NOTE – 1Gbps speed is enabled by selecting **Auto**.*

*NOTES – **Auto** is the recommended selection. This selection allows the adapter to dynamically detect the line speed and duplex mode of the network. Whenever the network capability changes, the adapter will automatically detect and adjust to the new line speed and duplex mode. Ensure that the link partner is also configured for Auto.*

Wake Up Capabilities Parameter

The **Wake Up Capabilities** parameter allows the user to set the adapter to wake up from a low power mode when it receives a network wake up frame. Two wake up frames are possible: **Magic Packet** and **Wake Up Frame**. By default, the adapter is set to **Both**. To set the adapter to wake up from a frame, select the appropriate **Advanced** tab parameter from the "Value" drop–down menu as described and shown below:

- **Both** (default) – Selects both **Magic Packet** and **Wake Up Frame** as wake up frames
- **Magic Packet** – Select **Magic Packet** as the wake up frame
- **None** – Selects no wake up frame
- **Wake Up Frame** – Selects **Wake Up Frame** as the wake up frame
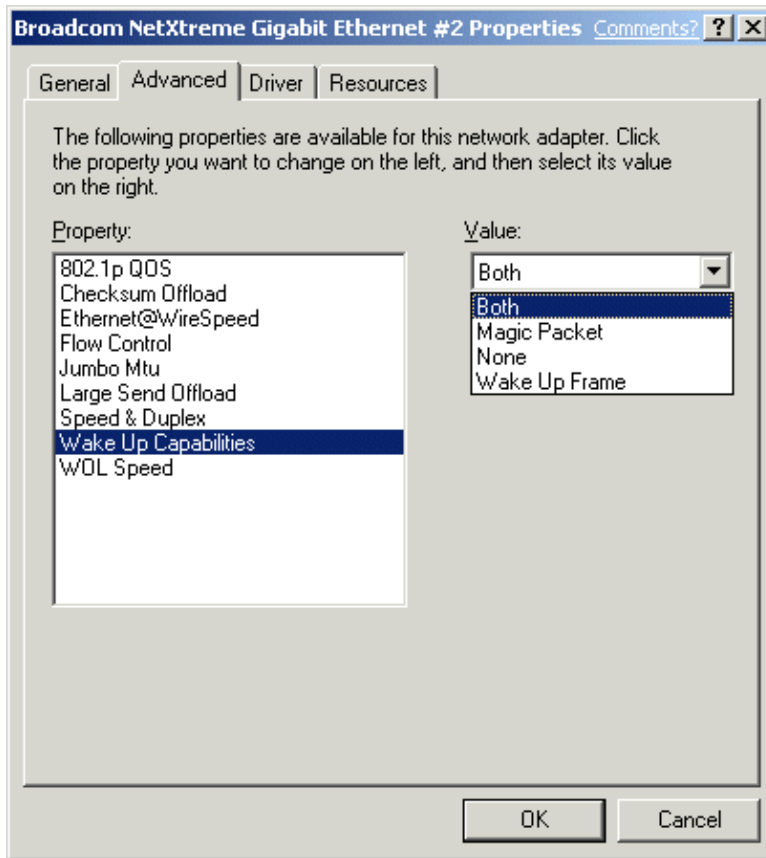
WOL Speed Parameter

The **WOL Speed** parameter allows the user to select the speed at which the adapter connects to the network during Wake–on–LAN mode. By default, the adapter is set to **Auto**. Set the speed as described and shown below:

NOTE – WOL Speed at 100 Mb is only supported on the 5701 NetXtreme Adapter.

- **10 Mb** – Sets the speed at 10 Mb
- **100 Mb** – Sets the speed at 100 Mb
- **Auto** (default) – Sets the speed for optimum network connection

Save Settings

1. When the adapter parameter configuration is complete, click **OK** at the Gigabit Ethernet Controller Properties screen to accept the settings.
2. If prompted to restart your computer, click **Yes**. Note that, while it is not necessary to reboot the system for new adapter properties to take effect, rebooting is recommended to reinitialize all registers.
3. Verify that the adapter port LEDs operate as described in Table 1 in the *Introduction*.

Power Management

Power management specifies whether the operating system turns off the selected device if that device is able to be turned off. If the device is busy doing something, however, (servicing a call, for example), the operating system will not shut down the device. The operating system will try to shut down every possible device only when it is hibernating. Some devices must stay on at all times. If you need the device to stay on at all times, do not check this box.

NOTE – To enable the Wake–on LAN in standby mode for the Broadcom NetXtreme™ Gigabit Ethernet adapter you must select the "Allow the device to bring the computer out of standby" checkbox.

NOTE – In order for WOL to operate properly this feature must be enabled on the adapter card. To enable WOL refer to the b57util: Utilitites Program User's Guide for details.

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Removing the Driver Software

Before physically removing an adapter from your system, first remove the adapter driver software.

1. Start your Windows .NET system and log in. You must have Network Administrator privileges to remove the driver software.
2. Open the Control Panel and double–click the System icon.
3. At the System Properties screen, click the **Hardware** tab.
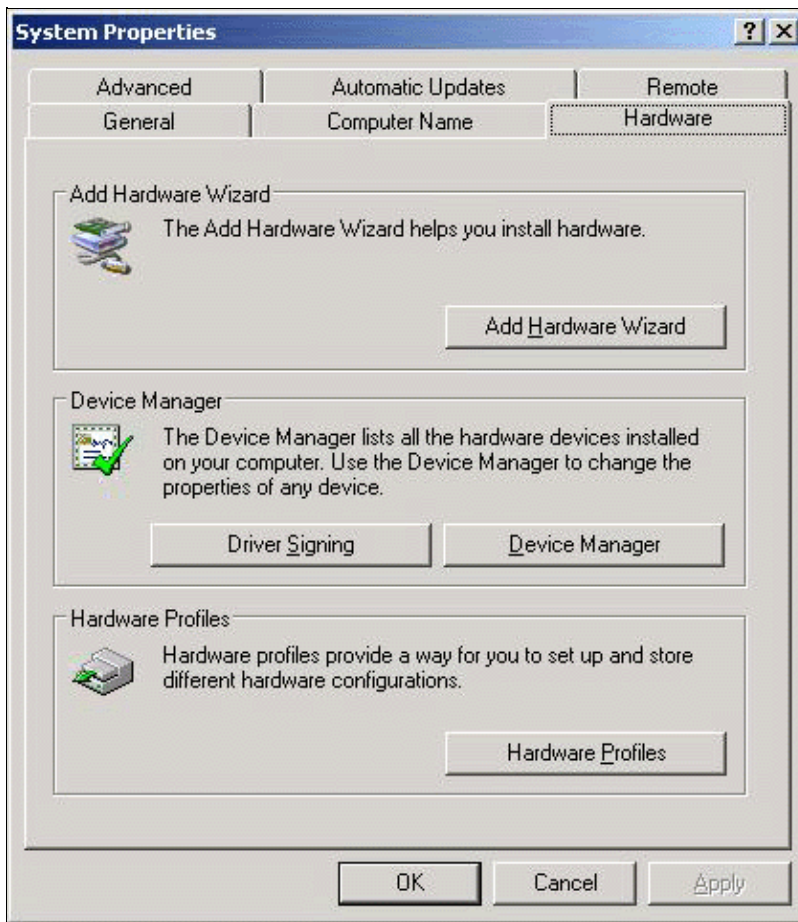
4. Click **Device Manager**. The Device Manager screen will appear.
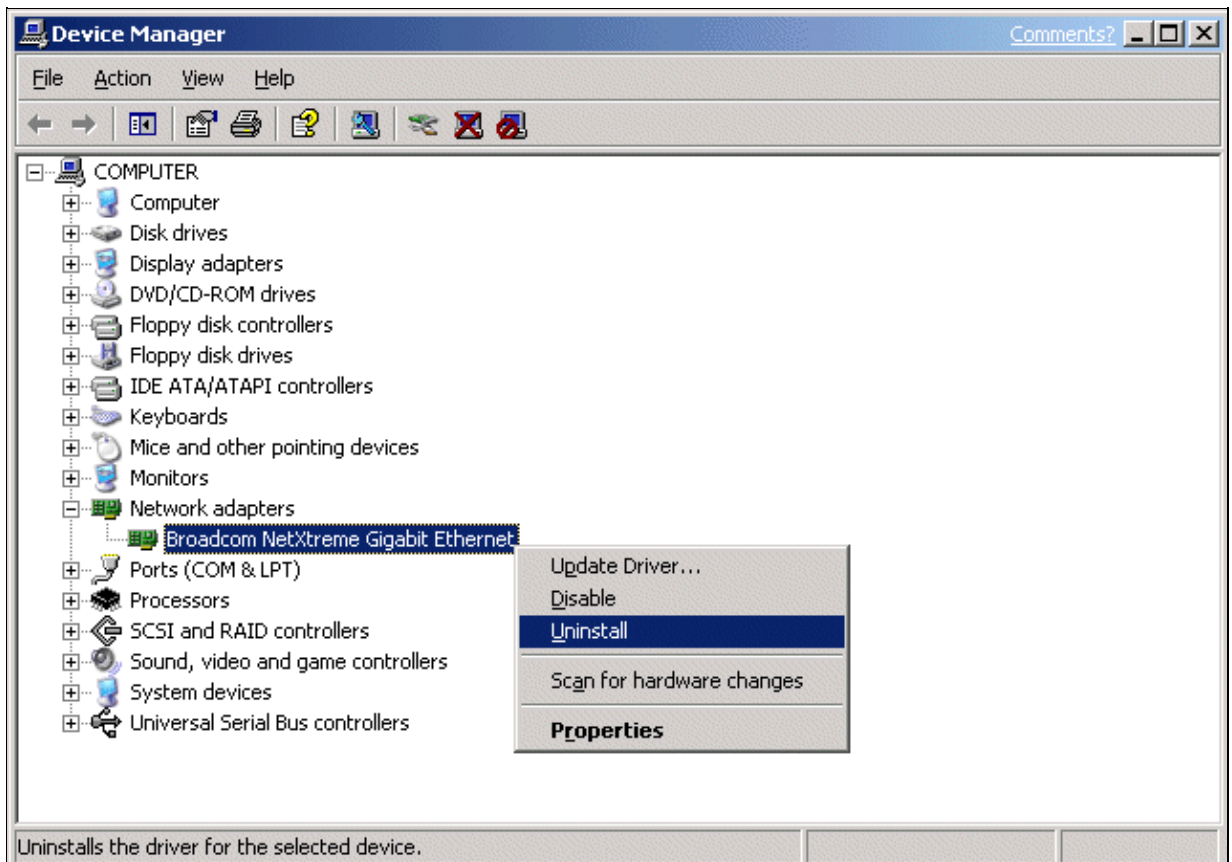
5. Expand **Network adapters** (click the **+** sign). All network adapters will display.

6. Right−click on the adapter to be removed and select **Uninstall**.

7. Click OK to complete the installation.

> NOTE – Not all driver files are removed as part of this procedure. Note that the driver and adapter can be removed via Hot Plug, if supported.

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BROADCOM®

Windows NT® Driver Software: Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide

This chapter provides the following information:

● Installing the Driver Software

● Changing Configuration Parameters

● Updating the Driver Software

● Removing the Driver Software

● Installing Broadcom Advanced Server Program

● Uninstalling Broadcom Advanced Server Program

● Configuring Teaming

● Configuring VLANs

Installing the Driver Software

The Gigabit Ethernet Adapter must be physically installed in your system prior to installing the driver software. See "Installing the Hardware" for details.

> NOTE – A network device driver must be installed before the Gigabit Ethernet Adapter can be used with your Windows NT system. *BACS Help files require Internet Explorer 4.0 or later to work properly.*

> NOTE – We recommend using *Internet Explorer 5.0 to view help files.*

Install the adapter software for Windows NT as follows:

1. Verify that the Windows NT system is upgraded with Service Pack 4 or later.

2. Start your Windows NT system and log in. You must have System Administrator privileges to install the driver software.

3. Open the Control Panel.

4. In the Control Panel, double–click the Network icon.

5. When the Network window opens, select the **Adapters** tab.
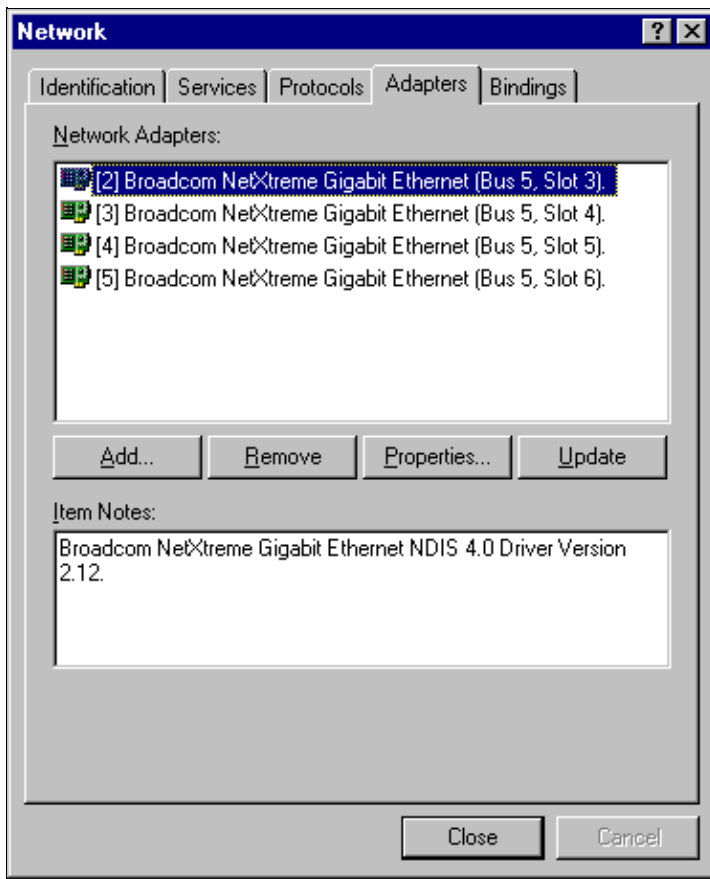
6. Click **Add** to install a new adapter.

All previously installed drivers are listed under Network Adapters.
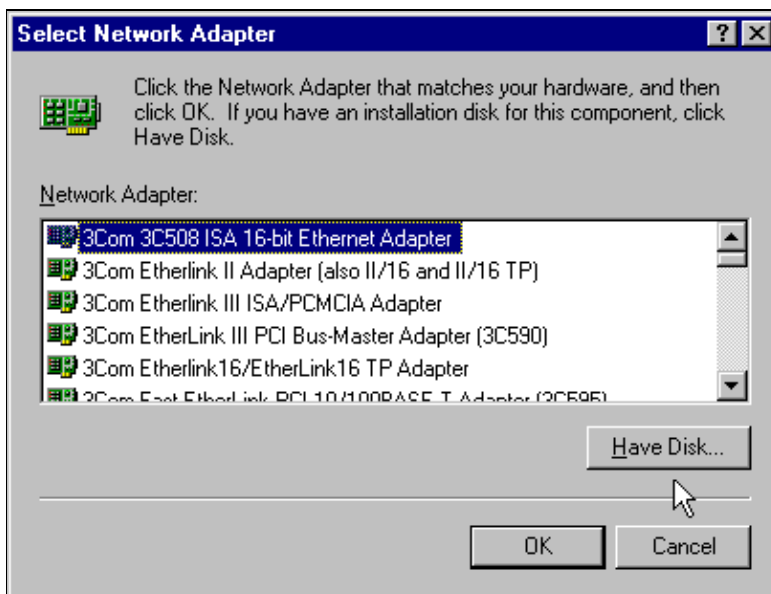
7. When the Select Network Adapter window opens, click **Have Disk**....

8. When prompted, insert the driver installation media, or choose a location to install the driver from. Type the path to the driver, and click **OK**.

   For example, to install the adapter driver software for Windows NT, type **e:** in the Insert Disk location box (where "*e:*" is the designation of the CD–ROM drive on your system).
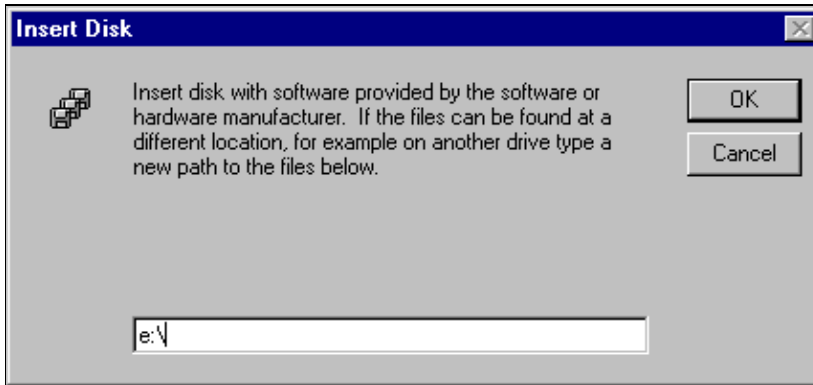
NOTE – If you acquired the adapter software on floppy disk or from the Broadcom support website, enter the path to where the adapter driver files reside on your system.

9. With "Gigabit Ethernet Controller" highlighted in the Select OEM Option window, click **OK**.
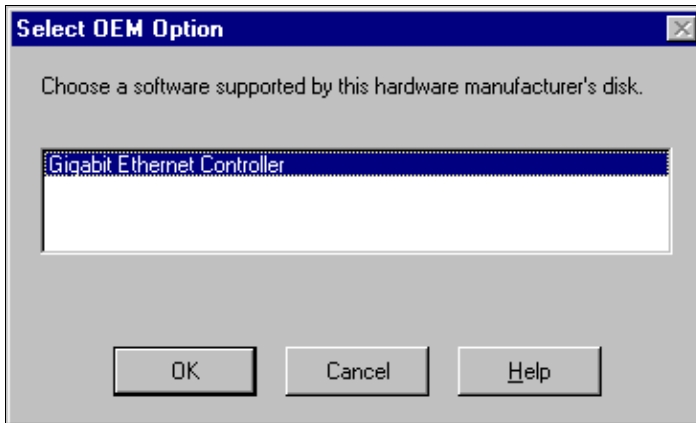
The adapter files are installed, then the Network window is displayed showing the newly installed adapter.
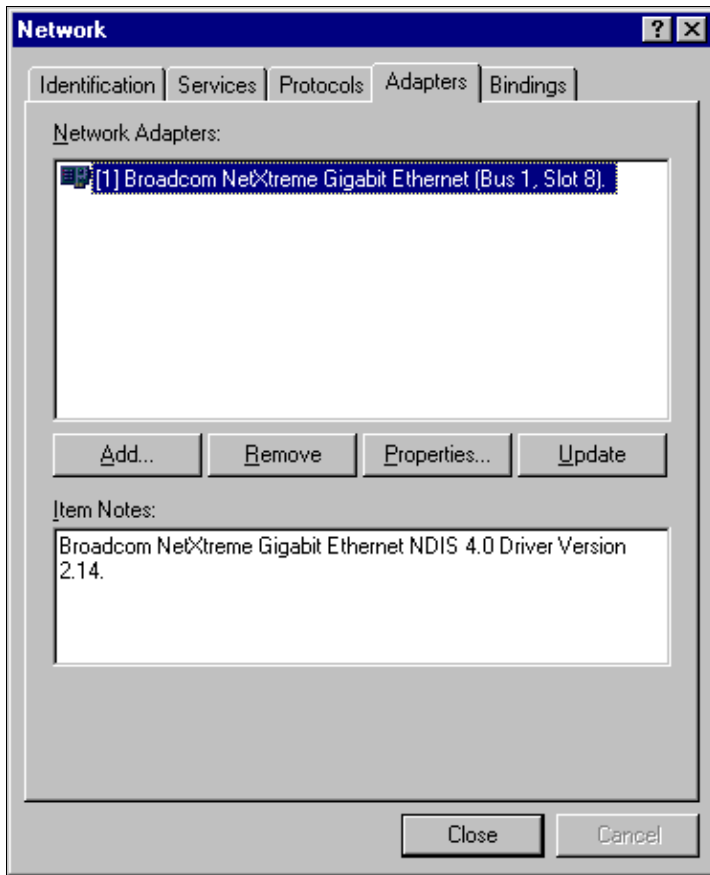
10. Click **Close**, then the Microsoft TCP/IP Properties window appears.
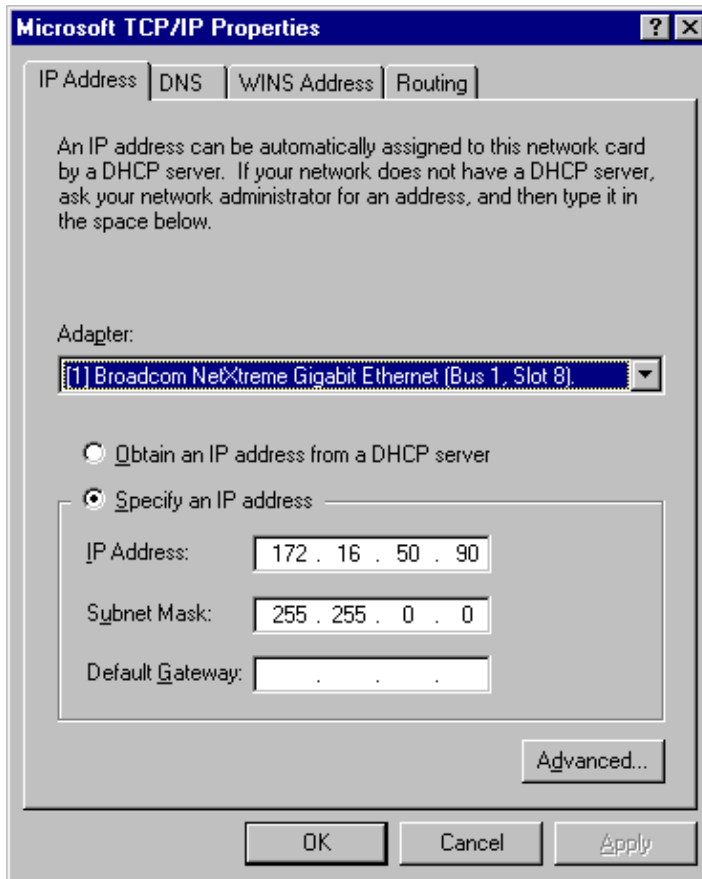
11. Configure the TCP/IP protocol and click **OK**.
12. When prompted to restart your computer, click **Yes**.

Changing Configuration Parameters

Once the adapter driver software has been installed, you can examine and change the configuration options at any time. The following adapter parameters are user–configurable:

- Basic properties: Tx and Rx Flow Control, Duplex Mode, and Port Speed
- Optional properties: Failover Team Configuration and VLAN Configuration

Gigabit Ethernet Controller Parameters Screen

To configure adapter parameters, first bring up the Gigabit Ethernet Controller parameters screen as follows:

1. Open the Control Panel and right–click the **Network** icon.
2. When the Network window opens, select the **Adapters** tab.
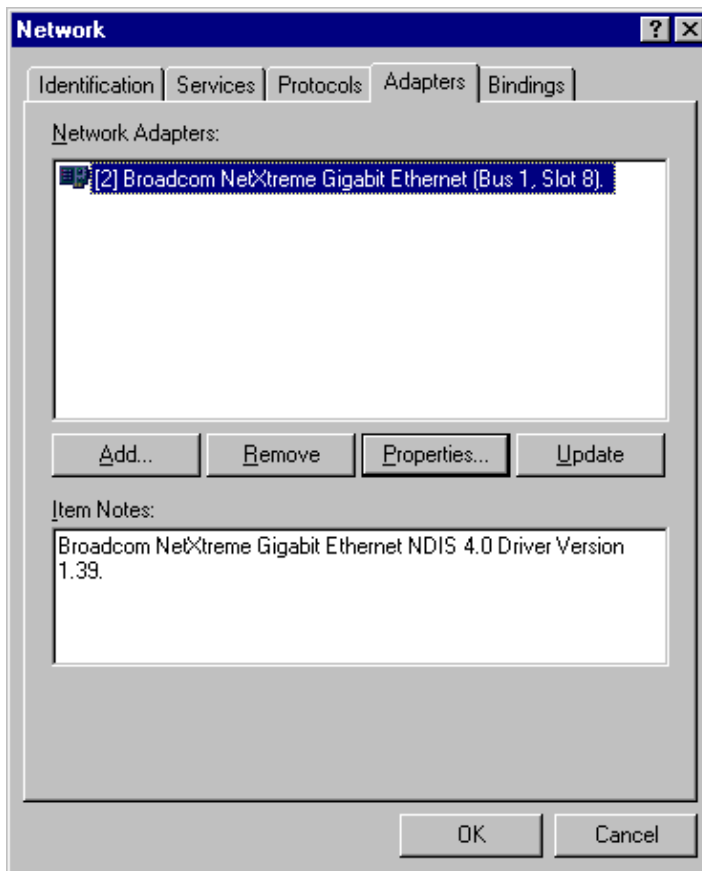
The bus and slot numbers of the highlighted adapter are listed as part of the adapter name in the Network Adapter window.

3. Select the desired adapter from the Network Adapters window and click on Properties. The Gigabit Ethernet Controller parameters window opens.
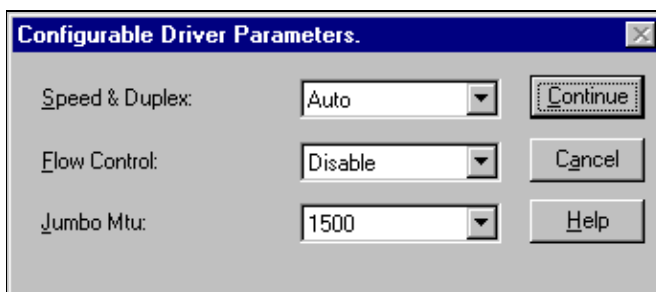
The possible adapter parameter types are:

   ♦ Speed & Duplex
   ♦ Flow Control
   ♦ Jumbo Mtu

Refer to the parameter settings below for configuration details.

Speed & Duplex Parameter

The **Speed & Duplex** parameter allows the user to set the connection speed duplexed to the network. Note that Duplex Mode allows the adapter to transmit and receive network data simultaneously. The adapter is set to **Auto** (optimum connection) by default. Set the speed and mode as described and shown below:

- **Auto –** (Default) Sets the speed and mode for optimum network connection (recommended)
- **10 Mb Half** – Sets the speed at 10Mbps and mode to Half Duplex
- **10 Mb Full –** Sets the speed at 10Mbps and mode to Full Duplex
- **100 Mb Half –** Sets the speed at 100Mbps and mode to Half Duplex
- **100 Mb Full –** Sets the speed at 100Mbps and mode to Full Duplex
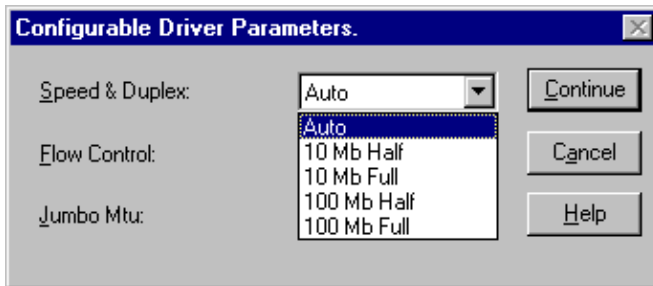
*NOTES – **Auto** is the recommended selection. This selection allows the adapter to dynamically detect the line speed and duplex mode of the network. Whenever the network capability changes, the adapter will automatically detect and adjust to the new line speed and duplex mode. Also, when **Auto** is selected, the 1Gbps speed detection is enabled.*

Flow Control Parameter

The Flow Control parameter allows the user to enable or disable the receipt or transmission of PAUSE frames. PAUSE frames enable the adapter and the switch to control the transmit rate. The side that is receiving the PAUSE frame will momentarily stop transmitting. The recommended selection is **Disable**, which will configure the adapter to ignore PAUSE frames. Disabled by default, to enable Flow Control to receive, transmit, or receive and transmit PAUSE frames, select the appropriate parameter from the drop–down menu described and shown below.

- **Disable –** (default) PAUSE frame receipt and transmission is disabled (recommended)
- **Rx PAUSE –** PAUSE frame receipt is enabled
- **Tx PAUSE –** PAUSE frame transmission is enabled
- **Rx/Tx PAUSE –** PAUSE frame receipt and transmission is enabled
- **Auto –** PAUSE frame receipt and transmission is optimized
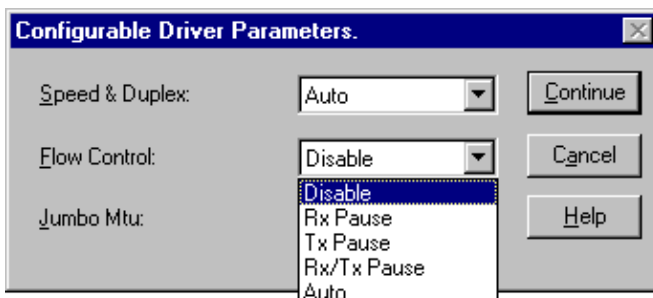
Jumbo Mtu Parameter

The **Jumbo Mtu** parameter allows the adapter to transmit and receive oversized Ethernet frames that are greater than 1514 but less than 9000 bytes in length. Note that this parameter will require a switch that is able to process large frames.

Set at **1500** bytes by default, to increase the size of the received frames, select the byte quantity in 500–byte increments from the drop–down menu shown below.
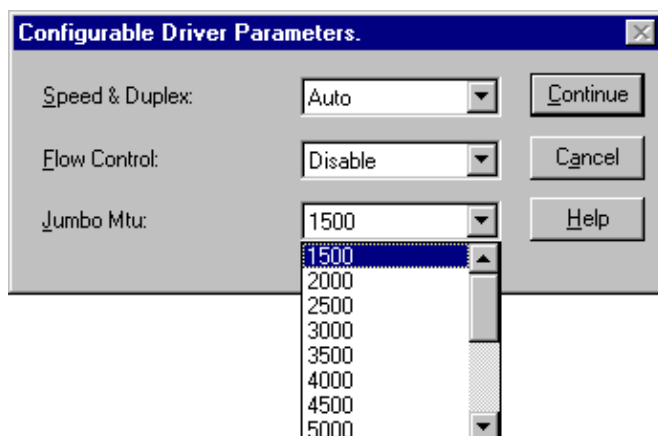
Save Settings

1. When adapter parameter configuration is complete, click **Continue** at the Gigabit Ethernet Controller screen to accept the settings..
2. When prompted to restart your computer, click **Yes**.
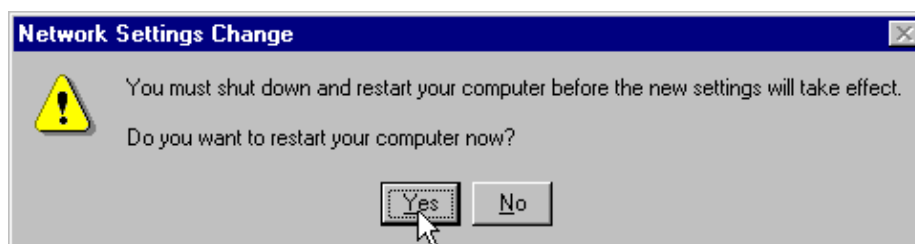
The system restarts, using the new configuration settings.

3. When the system returns to proper operation, verify that the adapter port LEDs operate as described in Table 1 in the *Introduction*.

*NOTE – If no configuration changes have been made, you can click **No** to close the configuration session without restarting your system.*

*NOTE – If other adapters in your system use TCP/IP bindings, the TCP/IP Properties window opens. Perform any necessary TCP/IP configuration and click **OK** when finished. For help in configuring TCP/IP protocol, consult your Microsoft*

Broadcom Advanced Control Suite: Broadcom Gigabit Ethernet Adapter User's Guide

Windows NT 4.0 documentation.

Updating the Driver Software

Do the following to replace version 4.0 adapter driver software with newer versions as they become available.

1. Start your Windows NT system and log in. You must have Network Administrator privileges to install the driver software.
2. Open the Control Panel and double−click the Network icon.
3. When the Network window opens, select the **Adapters** tab.
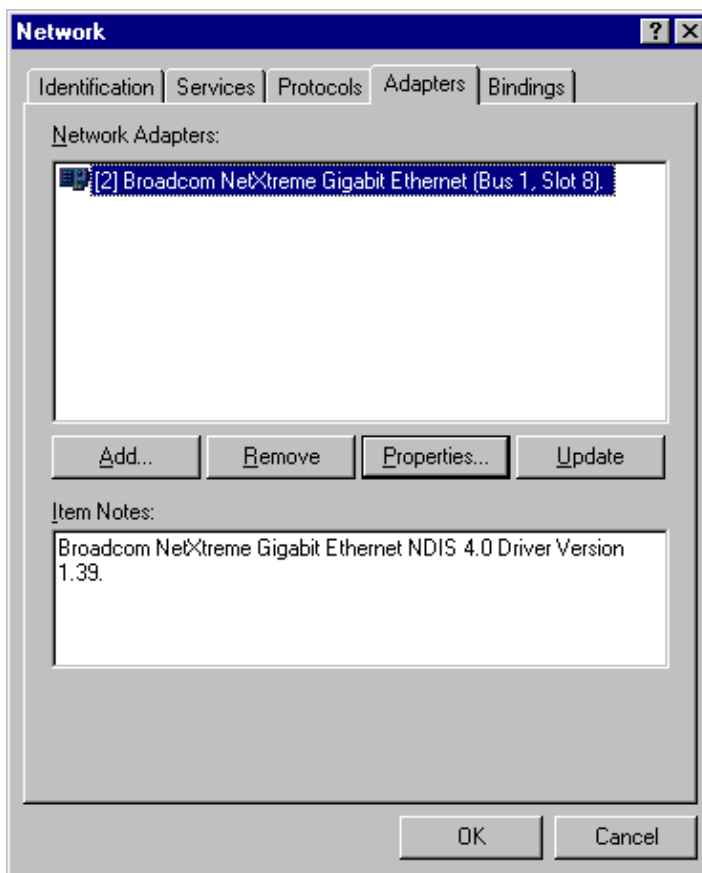
Any previously installed Gigabit Ethernet driver software is listed under Network Adapters.

4. Select a Broadcom Gigabit Ethernet Adapter and click **Update**.
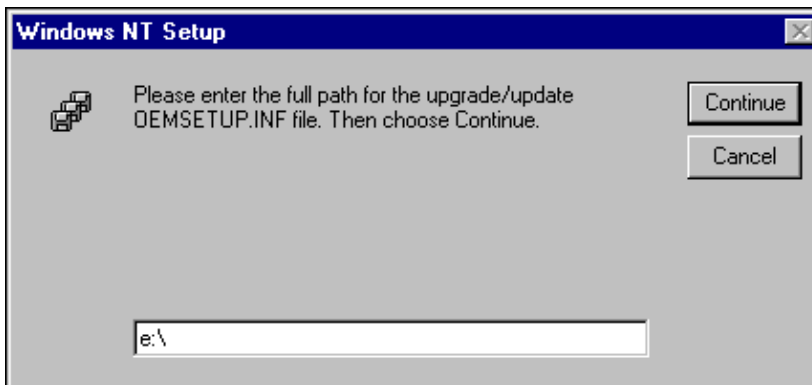5. When the Select Network Adapter window opens, click **Have Disk...**.
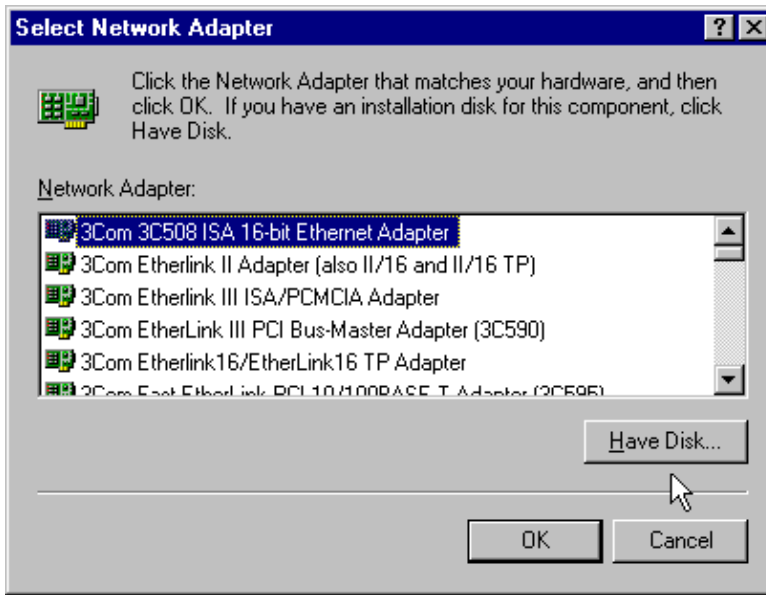
6. When prompted, insert the Broadcom CD−ROM into your system's CD−ROM drive, type the root path to the drive, and click **Continue**.

   For example, type **e:**

   (Where "*e:*" is the designation of the CD−ROM drive on your system).

   The system then copies the appropriate adapter files from the CD−ROM.

NOTE – If you acquired the adapter software on floppy disk or from the Broadcom support website, enter the path to where the adapter driver files reside on your system.

7. When the copying process is complete, click **Close** in the Network window.
8. When prompted to restart your computer, click **Yes**. The system restarts using the new configuration settings.

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Removing the Driver Software

Before physically removing an adapter from your system, first remove the adapter driver software.

1. Start your Windows NT system and log in. You must have Network Administrator privileges to remove the driver software.
2. Open the Control Panel and double–click the Network icon.
3. When the Network window opens, select the **Adapters** tab.
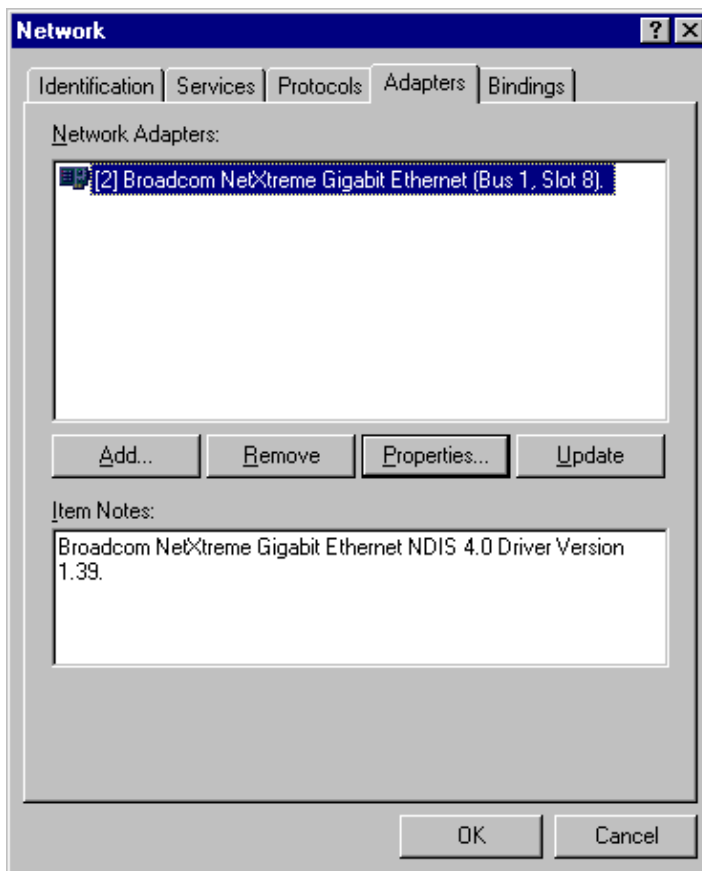
Any previously installed Gigabit Ethernet Adapter is listed under Network Adapters.

5. Individually select each Gigabit Ethernet Adapter you want to remove and click **Remove**.

6. Once the appropriate adapters have been removed, click **Close**.
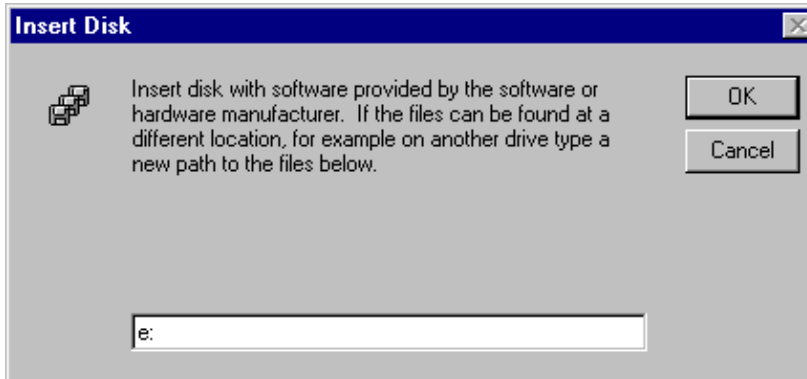7. When prompted to restart your computer, click **Yes**.
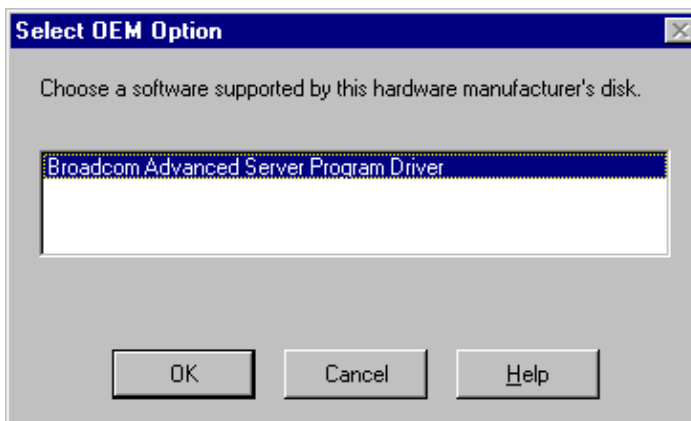
Installing Broadcom Advanced Server Program

1. Right click on **Network Neighborhood**.
2. Select **Properties**.
3. Select the **Protocols** tab.
4. Select **Add**. The following screen appears.
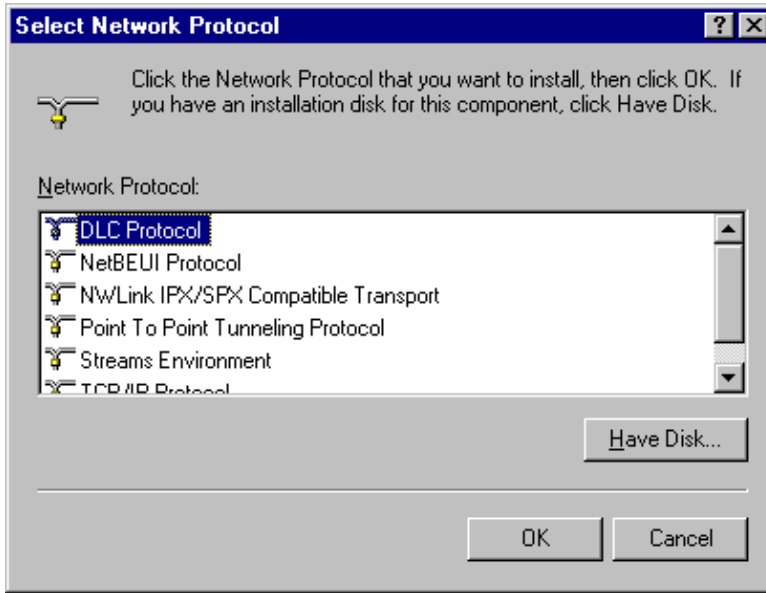
5. Select **Have Disk**. The following screen appears.

6. Insert the software CD ROM and enter the CD drive path in the dialog box. Select **OK**. The following screen appears.
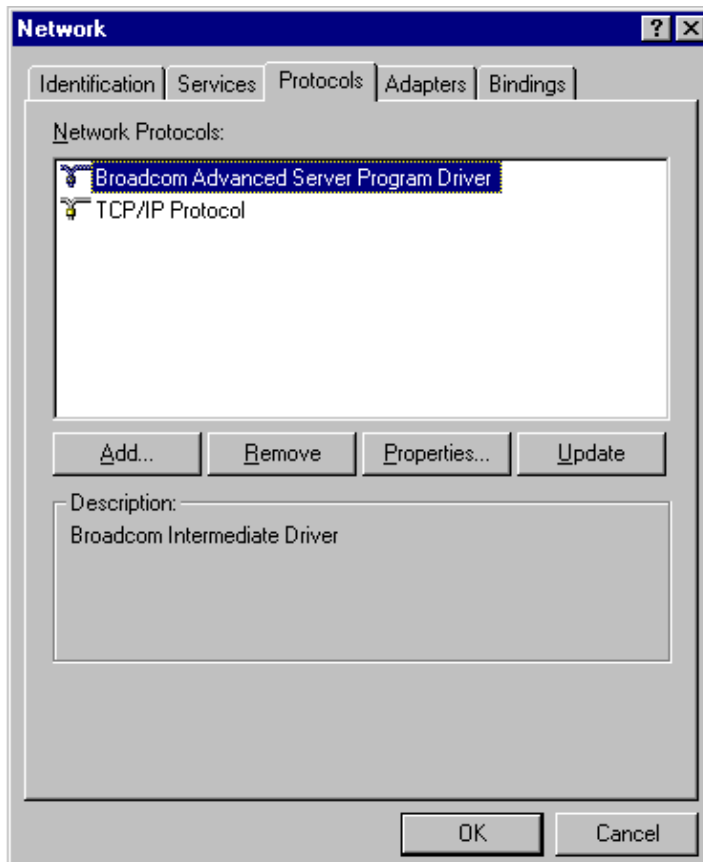

7. Select **OK**.
8. The Broadcom Advanced Server Program Driver screen appears. You can choose to configure a team, or select OK and perform the configuration procedure at a later time.
9. Select **OK**. The Network Dialog Box appears.
10. Select **Close**. The reboot screen appears.
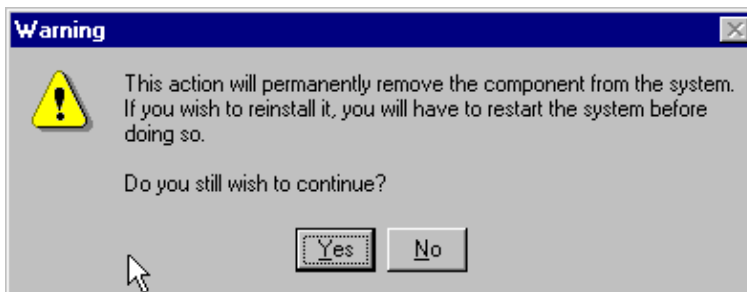11. Select **Yes**. This completes the NT installation procedure.

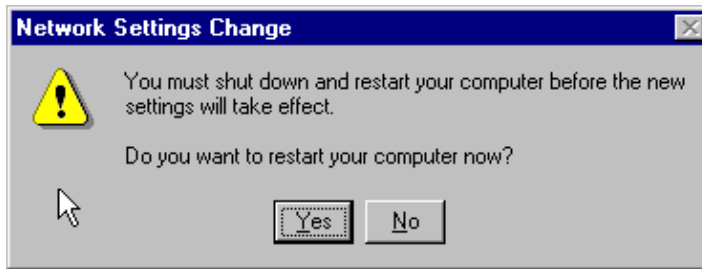# Uninstalling Broadcom Advanced Server Program

1. Right click on **Network Neighborhood**.
2. Select **Properties**.
3. Select the **Protocols** tab. The following screen appears.

4. Highlight Broadcom Advanced Server Program Driver and click **Remove**. The following screen appears.

5. Select **Yes**.
6. Select **Close**. The following screen appears.

7. Select **Yes**. This completes the uninstall procedure.

Configuring Teaming

Teaming configuration is optional. Before configuring teaming, see the "Teaming Overview."

NOTE – To avoid failover problems when using BASP, make sure that the spanning tree is disabled on the switch that the network adapter is connected.

Configuring Teaming consists of the following tasks:

- Accessing the Broadcom Advanced Server Program Driver Properties (BASP).
- Creating teams
- Adding adapters to the teams
- Assigning an IP address to the teams
- Rebooting the system

Each of these tasks is described below, along with how to delete adapters from a team and delete a team.

Accessing the BASP Driver Interface

Use this procedure to access the adapter properties for Teaming Configuration:
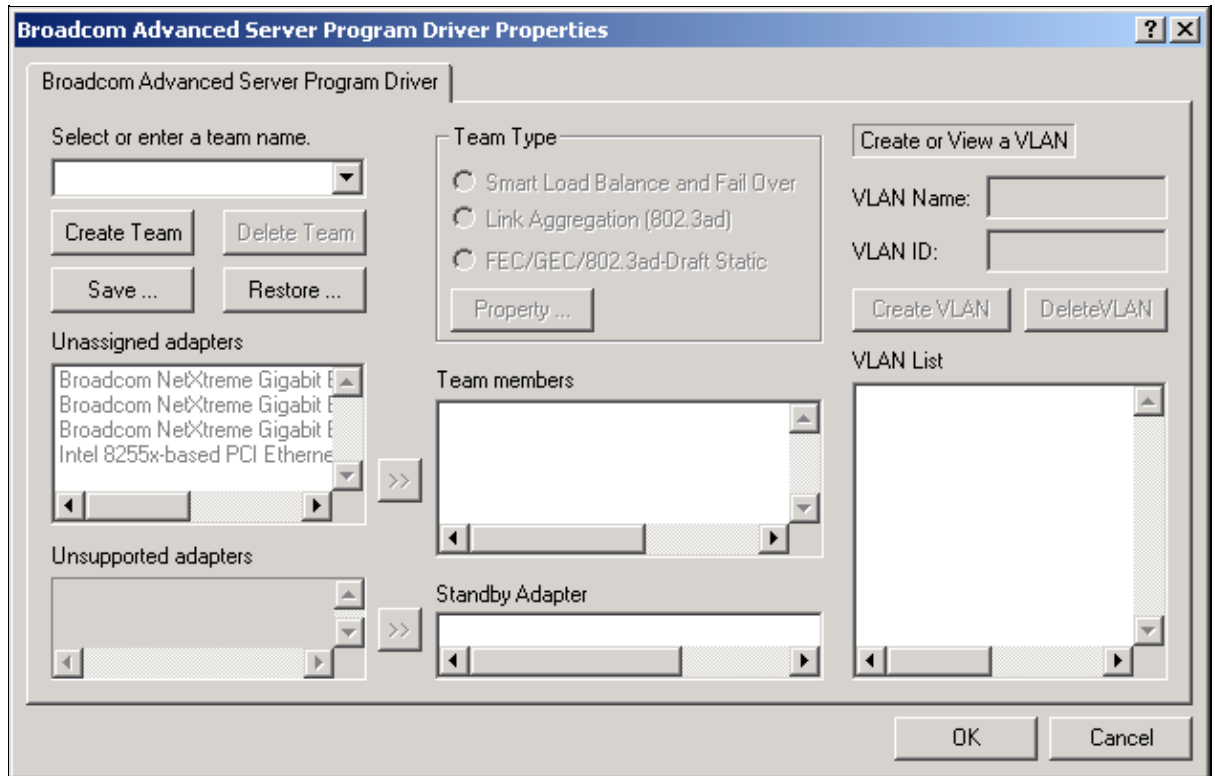
1. Open the Control Panel and double–click the **Network** icon.
2. When the Network window opens, select the **Protocols** tab:
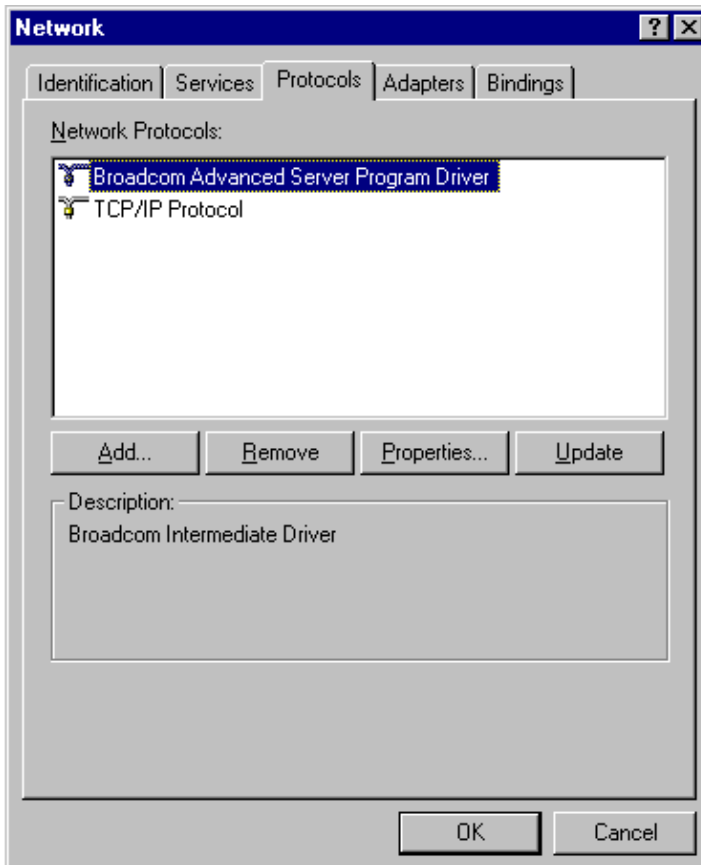
3. Select the BASP driver and click the **Properties** button. The BASP window is displayed.

NOTE – The BASP driver must be installed before the user can access the BASP window. Refer to "<u>Installing Broadcom Advanced Server Program</u>*".*

Interface components of the BASP window are described below:

♦ Select or enter a team name – This entry field is used to select or enter a team name.
♦ Unassigned adapters – This list displays all of the Ethernet adapters that are available to be added to a team. Since each adapter can be added to only one team, the adapter is removed from this list once it has been assigned to a team.
♦ Unsupported adapters – This list displays all unsupported adapters.
♦ Team Type – Smart Load Balance and Fail Over: Load balancing FEC/GEC: Also known as general trunking. No standby adapter is allowed when this option is selected.
♦ Team members – This list displays all adapters that belong to a selected team.
♦ Standby Adapter – This list displays the standby adapter selected for a selected team.
♦ VLAN List – This list displays all the VLANs that have been created for the selected team.

Creating a Team and Assigning Adapters

A team is comprised of at least one primary adapter. Each adapter can belong to only one team. To configure a new team, access the Broadcom Advanced Server Program Driver Properties window and perform the following steps:
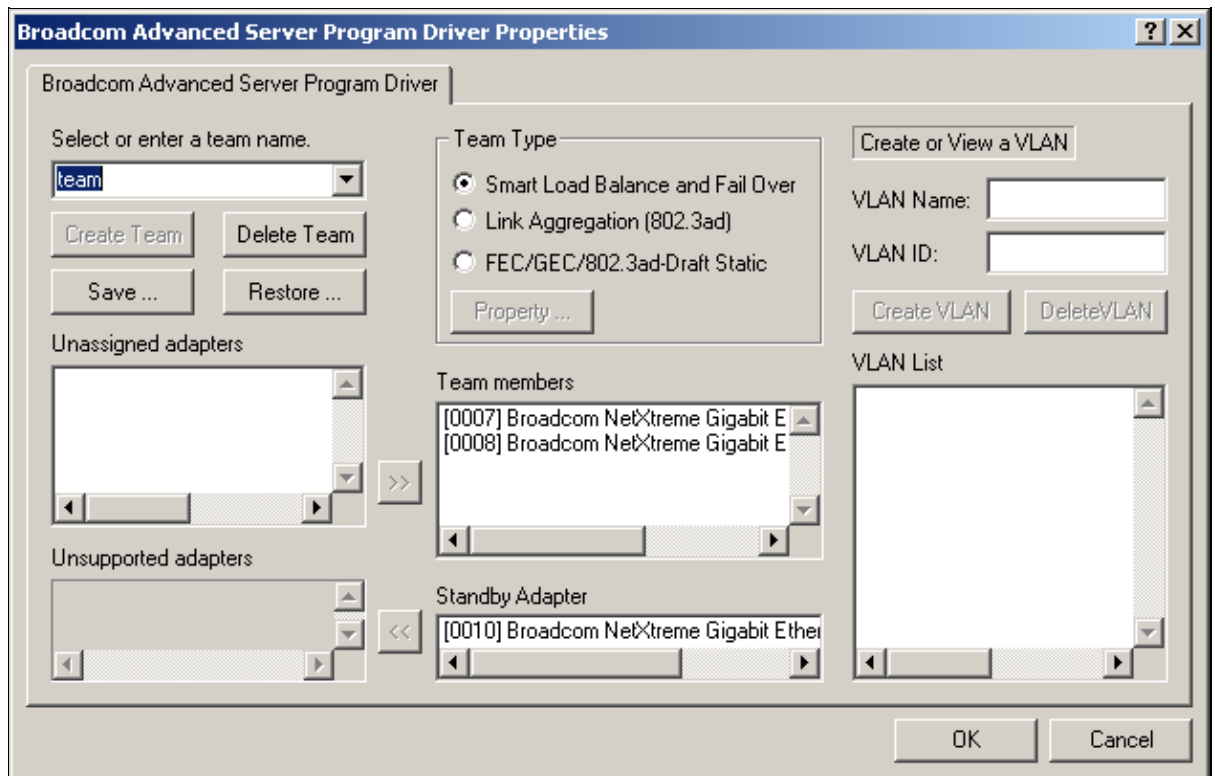
1. Enter a team name in the "Select or enter a team name" entry field.
2. Click the **Create Team** button.

3. Place an adapter into the team.
     ♦ In the Unassigned adapters list, select the adapter(s) that you want to add to the team created in the previous step. Move the selected adapters to the Team members list box using the double arrows.
     ♦ When you are finished configuring teams, click the **OK** button to accept the changes.

NOTE – At least one adapter must be displayed in the Team Members list box.

4. If a team has no adapters assigned, you will be prompted to add another adapter or delete the team.
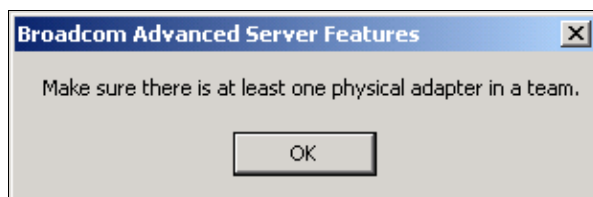
5. Click the **OK** button. When team configuration has been correctly performed, one Virtual Team adapter driver will be created for each configured team and will appear along with the other adapters in the Network and Dial–up Connections window.
6. Configure the Team IP address if necessary. If other adapters in your system use TCP/IP bindings, the TCP/IP Properties window will open. Configure the IP address and any other necessary TCP/IP configuration for the team and click the **OK** button when finished.

Removing Adapters from a Team

To remove an adapter from its assigned team, select the adapter in the Team Members list and press the **Delete** key or the double−left arrow. The adapter will be removed from the team list and will reappear in the Unassigned adapters list.

> *NOTE – If you remove an adapter from a team, you must reboot the system before the changes takes effect.*

Deleting a Team

To delete a configured team and release its assigned adapters, select the team in the team list and click **Delete Team**. The team and all its assigned adapters will be removed from the team list. The released adapters will reappear in the Unassigned adapters list.

> *NOTE – Adapters that are part of a team inherit all the basic configuration properties of the team, inc the team. If you delete a team, any VLANs configured for that team will also be deleted.*

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Configuring VLANs

VLANs Configuration is optional. Before configuring VLANs, see the "VLANs Overview."

> *NOTE – Adapters that are members of a Team can also be configured to support VLANs. However, VLANs cannot be configured for non−Broadcom adapter.*

By default, Gigabit Ethernet Adapters are configured with VLAN support disabled. Up to 64 VLANs can be defined for each team on your server. Configuring VLANs consists of the following tasks:

- Accessing the VLAN configuration interface.
- Adding VLAN(s) to the team(s). This includes assigning a unique identifier and name for each new VLAN.
- Rebooting the system.

> *NOTE – When adding 64 VLANs, the 64th VLAN must have a VLAN ID of 0 (63 VLANs are tagged and 1 VLAN is untagged).*

Each of these tasks is described below, along with how to delete VLANs or modify the properties of a configured VLAN.

Accessing the Adapter VLAN Configuration Interface

Use this procedure to access the adapter properties for VLAN Configuration:

1. Open the system Control Panel and double–click the **Network** icon.
2. When the Network window opens, select the **Protocols** tab:
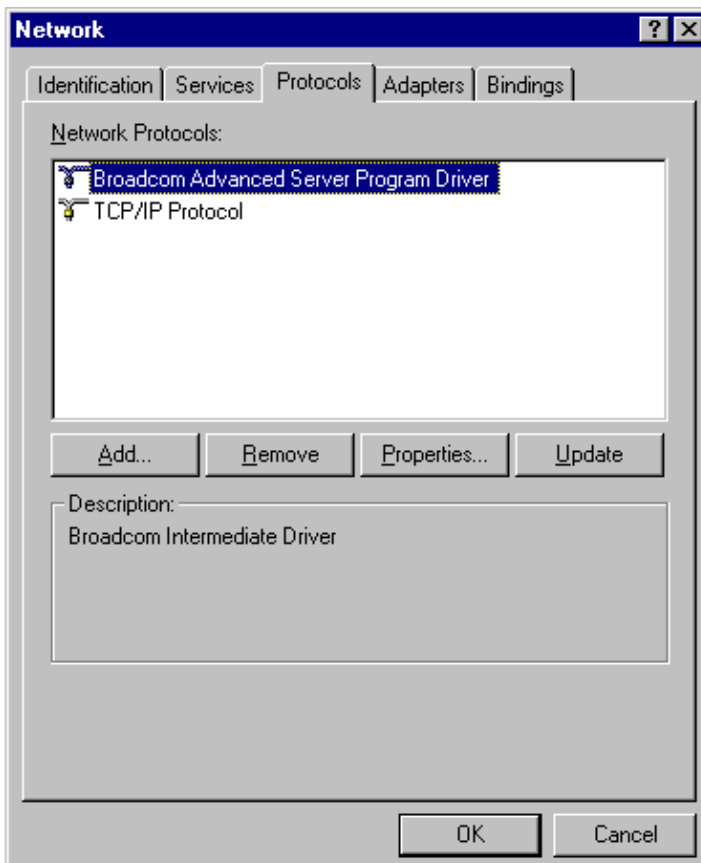
3. Select the BASP driver and click the **Properties** button. The BASP window is displayed, from where you can configure VLANs.
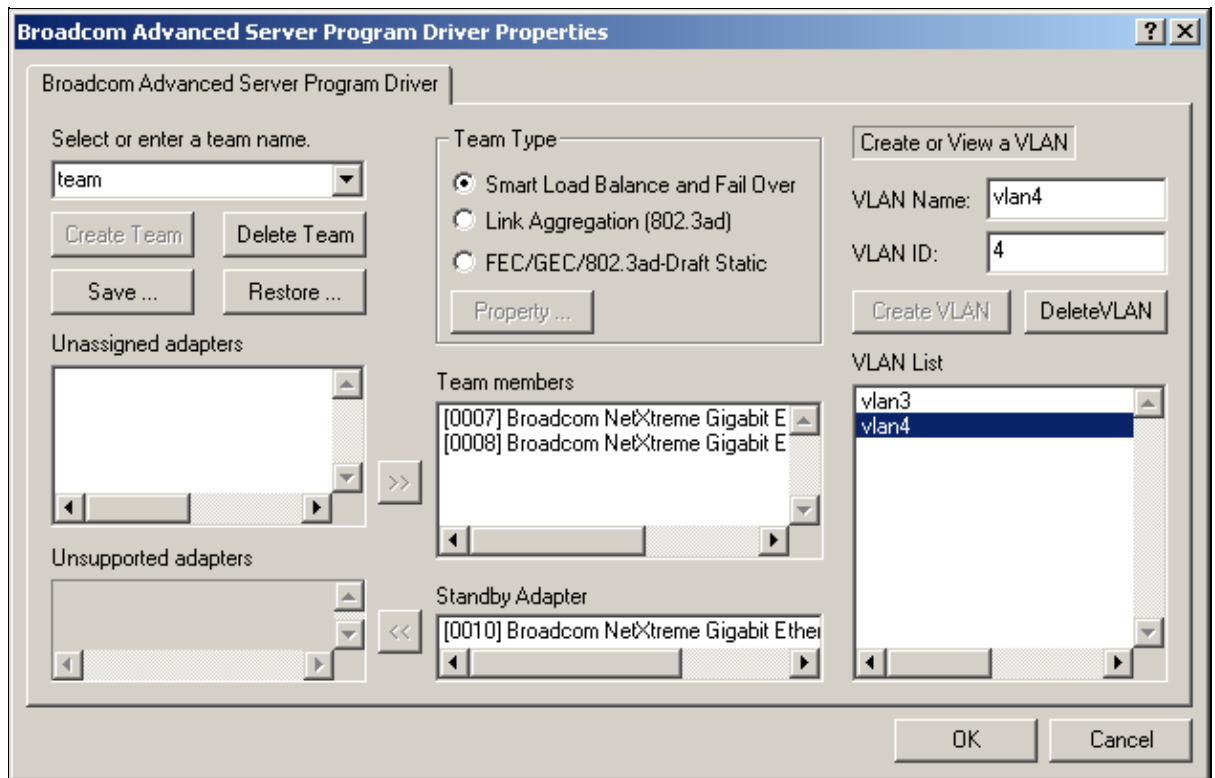
The BASP configuration window lists the installed adapters and the VLANs configured for each Team, if any. Each VLAN is identified with a unique identifier number and name that will only appear in this window. Interface components of the VLAN Configuration window are described in detail below:

- ♦ VLAN List – This list displays all of the VLANs that have been configured.
- ♦ Control Buttons – There are two control buttons: Create VLAN, and Delete VLAN. These buttons are used for creating and deleting VLANs.

Adding a VLAN

You can define up to 64 VLANs per team. To configure a new VLAN, perform the following steps:

1. From the BASP window, select the team that you want to add a VLAN.
2. Enter a VLAN Name and VLAN ID, the click the **Create VLAN** button.
3. When you are finished adding VLANs to this team, click the **OK** button. A new virtual adapter is created for each VLAN. The TCP/IP Properties window will open. Configure the IP address and any other necessary TCP/IP configuration for this virtual adapter and click the **OK** button when finished.
4. You must shut down and restart your computer before the new settings will take effect. When prompted to restart your computer, click **Yes**.

NOTE – To maintain optimum adapter performance, your system should have 64 MB of system memory for each eight VLANs created per adapter.

Deleting a VLAN

NOTE – If you delete a Team, any VLANs configured for that team will also be deleted.

To delete a configured VLAN, perform the following steps:

1. From the BASP window, select the VLAN you want to delete and click the **Delete VLAN** button. The selected VLAN will be deleted from the VLAN list window.
2. When you are finished deleting VLANs, click the **OK** button to accept the changes.
3. You must shut down and restart your computer before the new settings will take effect. When prompted to restart your computer, click **Yes**.

NOTE – When VLANs are created and then deleted the original team name and adapter assignments [Primary\Standby] are still present, but the IP address for the team is not deleted.

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