Broadcom NetXtreme™ Gigabit Ethernet Adapter User's Guide
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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 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.

"B57 Utilities Program User's Guide" provides the information on how to use the B57util utilities DOS program on Broadcom NetXtreme™ Gigabit Ethernet adapter, in particular BCM5700 and its related components.

"BCM570x Diagnostic User's Guide" provides the information on configuration file specification, command line options and engineering diagnostic commands on Broadcom NetXtreme™ Gigabit Ethernet adapter, in particular to check out the functionality of the BCM5700 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 systems 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

<table>
<thead>
<tr>
<th>Typeface or Symbol</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>AaBbCc123</td>
<td>This type is used for names of commands, files, and directories used within the text.</td>
<td>View the readme.txt file.</td>
</tr>
<tr>
<td></td>
<td>It also depicts on-screen computer output and prompts.</td>
<td>Main#</td>
</tr>
<tr>
<td>AaBbCc123</td>
<td>This bold type appears in command examples. It shows text that must be typed in exactly as shown.</td>
<td>Main# sys</td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td>To establish a Telnet session, enter: host# telnet IP-address</td>
</tr>
<tr>
<td></td>
<td>This also shows book titles, special terms, or words to be emphasized.</td>
<td>Read your Users Guide thoroughly.</td>
</tr>
<tr>
<td>[]</td>
<td>Command items shown inside brackets are optional and can be used or excluded as the situation demands. Do not type the brackets.</td>
<td>host# ls [-a]</td>
</tr>
</tbody>
</table>

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
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.
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

![Gigabit Ethernet Controller Properties](image)

**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.

![Broadcom NetXtreme Gigabit Ethernet Properties](image)

**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.

![Network and Dial-up Connections](image)

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.
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.
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.

![Broadcom Advanced Server Program Driver Properties](image)

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.

![Image of a text editor showing teamconfig.bcg]

**Restore a VLAN Configuration**

1. To restore a configuration, click **Restore** at the Broadcom Advanced
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.
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 5.0 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 Network 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 Broadcom CD-ROM into your system's CD-ROM drive, 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).

   ![Insert Disk](image)

   **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**.

![Select OEM Option](image)

The adapter files are installed, then the Network window is displayed showing the newly installed adapter.

![Network](image)

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 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.
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.

![Select Network Protocol]

5. Select **Have Disk**. The following screen appears.

![Insert Disk]

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.

![Network Protocols Screen]

4. Highlight Broadcom Advanced Server Program Driver and click **Remove**. The following screen appears.

![Warning Screen]
5. Select **Yes**.
6. Select **Close**. The following screen appears.

![Network Settings Change]

You must shut down and restart your computer before the new settings will take effect.

Do you want to restart your computer now?

[ ] Yes  [ ] No

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 "Installing Broadcom Advanced Server Program".
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 be 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 and VLANs associated with the team. If you delete a team, any VLANs configured*
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, then 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.
Broadcom® Boot Agent Driver Software: Broadcom NetXtreme™ Gigabit Ethernet Adapter 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.


- 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.
Client Setup

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

1. Select and program the proper MBA image.
2. Enable/disable the MBA driver with the provided Broadcom DOS utility.
3. Setup the BIOS for the boot order.

Select/Program Proper PXE/MBA Image

PXE/MBA is released with four different images. They are described as follows:

- **B57pxe.bin**: This is a monolithic image that consists of both PXE base-code (BC) and UNDI code. This image should be used on the adapter where motherboard doesn't have built-in BC. However, an adapter programmed with this image is still operational in the motherboard's BIOS with built-in BC; the BC on the adapter will not be used.

- **B57undi.bin**: This is an UNDI image that consists of UNDI code only (split implementation). This module should be programmed on the adapter where the motherboard's BIOS has built-in BC.

- **B57base.bin**: This is a BC image that consists of BC code only (split implementation). This module should be programmed on the motherboard's BIOS.

- **b57mba.nic**: This is a monolithic image that consists of both base-code (BC) and UNDI code. This image is intended for NIC application. This image only supports PXE and RPL.

The PXE/MBA image can be programmed to the adapter's serial EEPROM or the motherboard's BIOS LAN On Motherboard (LOM). Broadcom provides a DOS utility (b57util) to program this image to the serial EEPROM. For the adapter, the PXE image is programmed into the EEPROM during the manufacturing process.

To program monolithic image to the adapter, perform the following: Boot up into
DOS. Assume that the Broadcom software CD is in drive D.

```
d:\dos\utility

b57util -upgf [devnum|all] [boot|base|pxe|undi|rpl] [path]
```

where:

- devnum= specific device(s) number (0,1,2,...) to be programmed
  or
- all= All device(s) found in the system to be programmed
- path= Path of the image to be programmed
- boot= Boot code portion of the eeprom. bin - eeprom.bin image
- base= b57base.bin - Base driver image
- pxe= b57pxe.bin - Monolithic driver image
- undi= b57undi.bin - UNDI driver image
- rpl= b57mba.nic - Monolithic driver image, this image supports PXE and RPL

Any combinations of<boot | base | pxe | undi | rpl> are illegal.

This process takes from 1 to 5 minutes depending on the image you choose or type of NVRAM (serial EEPROM or flash).

If the Broadcom adapter is on the motherboard (LOM), the MBA needs to be installed as a part of a motherboard BIOS code upgrade. Contact the motherboard manufacturer to program (flash) MBA images to the motherboard's BIOS.

**Enable/Disable**

MBA is disabled by default. To enable MBA, boot up into DOS. This is assuming that the Broadcom software CD is in drive D.

```
d:\DOS\utility
```
b57util -pxee [devnum|all]

or

b57util -mbae [devnum|all]

where:

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

or

all= All device(s) found in the system to be programmed

To disable MBA, perform the following:

d:\DOS\utility

b57util -pxed [devnum|all]

or

b57util -mbad [devnum|all]

where:

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

or

all= All device(s) found in the system to be programmed

To enable boot agent with optionally selected boot agent, perform the following:

d:\DOS\utility

b57util -mbae devnum[pxe|rpl]

where:

devnum= specific device(s) number (0,1,2,...) to be programmed
all= All device(s) found in the system to be programmed

**Boot Method**

By default, MBA will detect if the BIOS supports BBS (BIOS Boot Specification). If the BIOS supports BBS, then MBA will use BBS as the boot method. If it does not support BBS, then it will use Int18h instead. However, for some legacy machines equipped with an old BIOS, this may not work. In this case, users must force MBA to use Int18h, Int19h, or BBS as the boot method.

To specify the boot method, press the following keys when you see the Broadcom startup banner:

1. For Int18h : Ctrl + F8
2. For Int19h : Ctrl + F9
3. For BBS : Ctrl + F10

**MBA Speed**

By default, MBA is set to auto-negotiate. However, 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
b57util -pxes devnum [auto | 10h | 10f | 100h | 100f]
```

or
b57util -mbas devnum [auto | 10h | 10f | 100h | 100f]

where:

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

or

all= All device(s) found in the system 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.
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://developer.intel.com/ial/WfM/tools/pxe/index.htm.

Red Hat Linux

Red Hat Linux 6.2 (or higher) distribution has PXE server support. It allows users to do a complete Linux installation over the network. Distribution also comes with boot images - boot kernel (vmlinuz) and initial ram disk (initrd). These two images can be found on the CD disk#1:

/misc/src/trees/boot/vmlinux

/misc/src/trees/initrd-network.img

Please refer to Red Hat documentation for how to install PXE server on Linux.

Initrd.img distributed with Red Hat 6.2 does not have a Linux network driver for the Broadcom NetXtreme™ Gigabit Ethernet Adapter. Similarly, Red Hat 7.0 is also distributed with boot images. They can be found in
CD disk#1:

/images/pxeboot/vmlinux

/images/pxeboot/initrd.img

In this version, it prompts you to insert a driver disk for drivers that are not part of the standard distribution. You can create a driver disk for the Broadcom NetXtreme™ Gigabit Ethernet Adapter from the image distributed with the Broadcom Software CD.

Intel has also created patches to the Linux PXE server code to allow clients to do a remote boot. You can download these patches from: http://developer.intel.com/ial/WfM/tools/pxesdk20linux/index.htm.

A remote boot does not require a standard Linux network driver for the Broadcom NetXtreme™ Gigabit Ethernet Adapter. After the PXE client downloads the Linux kernel and initial ram disk, the Linux universal driver that came with the Linux distribution will bind with the UNDI code of the PXE to form a Linux network driver.

**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.

Please read all restrictions and disclaimers.
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 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

<table>
<thead>
<tr>
<th>기증발</th>
<th>사용자 안내문</th>
</tr>
</thead>
<tbody>
<tr>
<td>B급 기기 (기정용 정보통신기기)</td>
<td>이 기기는 기정용으로 전자파적합등록을 한 기기로서 주거지역에서는 물론 모든 지역에서 사용할 수 있습니다.</td>
</tr>
</tbody>
</table>

1. 기기의 명칭(모델명) : 
2. 인증번호 : 
3. 인증받은 자의 상호 : (B) 
4. 제조사명일 : 
5. 제조지/제조국가 :

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

Back to Top

Back to Contents

Please read all restrictions and disclaimers.
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).
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**

<table>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>On</td>
<td>Good Gigabit Ethernet link.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No 1000 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.</td>
</tr>
<tr>
<td>100</td>
<td>On</td>
<td>Good 100 Mbps Fast Ethernet link.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No 100 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.</td>
</tr>
<tr>
<td>10</td>
<td>On</td>
<td>Good 10 Mbps Fast Ethernet link.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No 10 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.</td>
</tr>
<tr>
<td>ACT</td>
<td>Blinking</td>
<td>Brief bursts of data detected on the port.</td>
</tr>
<tr>
<td></td>
<td>On</td>
<td>Streams of data detected on the port.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No data detected on the port.</td>
</tr>
</tbody>
</table>
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.
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 FRAMEETHERNET_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 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.

<table>
<thead>
<tr>
<th>Module</th>
<th>Size</th>
<th>Used by</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCM5700</td>
<td>&lt;size&gt;</td>
<td>&lt;n&gt;</td>
</tr>
</tbody>
</table>
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 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 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.
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.

**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 known problems and solutions using Windows 2000:

<table>
<thead>
<tr>
<th>Problem:</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to create Broadcom LAC connections icons having same name under network properties menu.</td>
<td>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 &quot;Local Area Connection ##&quot; 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.</td>
</tr>
<tr>
<td>Uninstalling the BASP software and user is prompted to reboot early</td>
<td>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.</td>
</tr>
</tbody>
</table>

<p>| Solution: | In Windows 2000, BASP creates additional |</p>
<table>
<thead>
<tr>
<th><strong>Problem:</strong> Cannot enable VLAN after it is disabled.</th>
<th><strong>Solution:</strong> Network connections in &quot;Network Connection and Dial-up&quot; 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 &quot;connection failed!&quot;. This is known problem with Windows 2000. When this happens, reboot the system will enable the virtual connection again.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem:</strong> Able to configure Internet Connection Sharing (ICS) when there aren't any unassigned adapters.</td>
<td><strong>Solution:</strong> 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 &quot;outside&quot; connection, and another network connection as &quot;inside&quot; connection. Broadcom has observed that ICS allow any available network connection to be &quot;outside&quot; and &quot;inside&quot; 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 &quot;outside&quot; and &quot;inside.&quot;</td>
</tr>
<tr>
<td><strong>Problem:</strong> Team configuration is not retained when user goes back to edit.</td>
<td><strong>Solution:</strong> In configuring BASP team configuration, the actual changes of the configuration is not committed until the user click &quot;OK&quot; in &quot;Network Properties&quot; 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 &quot;OK&quot; in &quot;Network Properties&quot; window after making changes.</td>
</tr>
</tbody>
</table>
| **Problem:** IP address is configurable on a 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
member of the team.

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>/.
**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:

```
cd /usr/src/linux-<kernel_version>.SuSE
cp /boot/vmlinux.config .config
cp /boot/vmlinux.version.h include/linux/version.h
cp /boot/vmlinux.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`

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:
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. |
UnixWare

The following table lists known UnixWare problems and solutions:

| Problem | 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 bcke 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, | Solution: When the system is booted up without any
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem:</strong> The Broadcom NetXtreme Gigabit Ethernet adapter may not perform at optimal level when it is added by Hot Plug on some system.</td>
<td><strong>Solution:</strong> 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.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Problem:</strong> The Broadcom NetXtreme Gigabit Ethernet adapter can not be seen on the PCI BUS.</td>
<td><strong>Solution:</strong> 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. Refer to b57diag for configuration instructions.</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Port Type</th>
<th>Connector</th>
<th>Media</th>
<th>Maximum Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10BASE-T</td>
<td>RJ-45</td>
<td>Cat. 3, 4, or 5 UTP</td>
<td>100 meters (328 feet)</td>
</tr>
<tr>
<td>100/1000BASE-T</td>
<td>RJ-45</td>
<td>Cat. 5 UTP</td>
<td>100 meters (328 feet)</td>
</tr>
</tbody>
</table>

## Performance Specifications

This following table lists specifications for single-port BCM5700/5701:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI clock</td>
<td>66 MHz max</td>
</tr>
<tr>
<td>PCI-X clock</td>
<td>133 MHz</td>
</tr>
<tr>
<td>PCI/PCI-X Data/Address</td>
<td>32-bit and 64-bit</td>
</tr>
<tr>
<td>PCI data burst transfer rate</td>
<td>132 MB/second (32-bit bus)</td>
</tr>
<tr>
<td></td>
<td>264 MB/second (64-bit bus)</td>
</tr>
<tr>
<td></td>
<td>528 MB/second (64-bit bus at 66 MHz)</td>
</tr>
<tr>
<td>PCI-X data burst transfer rate</td>
<td>400 MB/second (32-bit bus at 100 MHz)</td>
</tr>
<tr>
<td></td>
<td>800 MB/second (64-bit bus at 100 MHz)</td>
</tr>
<tr>
<td></td>
<td>600 MB/second (32-bit bus at 100 MHz) - 5701 only</td>
</tr>
<tr>
<td></td>
<td>1024 MB/second (64-bit bus at 100 MHz) - 5701 only</td>
</tr>
<tr>
<td>PCI modes</td>
<td>Master/slave</td>
</tr>
<tr>
<td>10/100/1000BASE-T</td>
<td>10/100/1000 Mbps (full duplex)</td>
</tr>
</tbody>
</table>
**Physical Characteristics**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>16.6 cm (6.6 in.)</td>
</tr>
<tr>
<td>Width</td>
<td>6.45 cm (2.54 in.)</td>
</tr>
</tbody>
</table>
## Power Requirements

<table>
<thead>
<tr>
<th>Specification</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5700, 5701, and 5702</strong></td>
<td></td>
</tr>
<tr>
<td>Operating voltage</td>
<td>+5 V ± 5%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>10 Watts</td>
</tr>
<tr>
<td></td>
<td>2A @ +5VDC</td>
</tr>
<tr>
<td><strong>5703</strong></td>
<td></td>
</tr>
<tr>
<td>Operating voltage</td>
<td>+3.3V +/-10% for BCM95703A30 and BCM95703SA31</td>
</tr>
<tr>
<td></td>
<td>+5V +/- 5% for BCM95703A30U and BCM95703SA31U</td>
</tr>
<tr>
<td>Power consumption</td>
<td>4 Watts</td>
</tr>
<tr>
<td></td>
<td>1.2A @ +3.3V for BCM95703A30</td>
</tr>
</tbody>
</table>
## Environmental Specifications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Operating Specification</th>
<th>Storage Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td>0°C to 55°C (+32°F to +131°F)</td>
<td>-40°C to +85°C (-40°F to +185°F)</td>
</tr>
<tr>
<td><strong>Relative humidity</strong></td>
<td>5% to 85% (non-condensing) 40°C, 16 hour dwells at extremes</td>
<td>5% to 95% (non-condensing) 10°C/hour</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td>Up to 10,000 ft.</td>
<td>Up to 35,000 ft.</td>
</tr>
<tr>
<td><strong>Shock</strong></td>
<td>10g, 1/2 sine wave, 11 msec</td>
<td>60g, 1/2 sine wave, 11 msec</td>
</tr>
<tr>
<td><strong>Vibration, peak to peak displacement</strong></td>
<td>0.005 in. max (5 to 32 Hz)</td>
<td>0.1 in. max (5 to 17 Hz)</td>
</tr>
<tr>
<td><strong>Vibration, peak acceleration</strong></td>
<td>0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)</td>
<td>0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)</td>
</tr>
</tbody>
</table>
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.
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, baspmgmt.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:

```plaintext
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.
Please read all restrictions and disclaimers.

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 Server Program for Novell NetWare
- Broadcom Advanced Control Suite
- Software for Linux
- Creating a Driver Disk
**Functional Description**

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 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.

![Figure 1. The Broadcom NetXtreme™ Gigabit Ethernet Adapter (5701 shown)](image-url)
Figure 2. The Broadcom NetXtreme™ Gigabit Ethernet Adapter (5702 shown)
Figure 3. The Broadcom NetXtreme™ Gigabit Ethernet Adapter (5703C 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.

Back to Top
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) - Netware 5.1 does 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
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 4. Broadcom NetXtreme™ Gigabit Ethernet Adapter Faceplate](image)

The adapter 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>
<thead>
<tr>
<th>LED</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>On</td>
<td>Good Gigabit Ethernet link.</td>
</tr>
<tr>
<td>1000</td>
<td>Off</td>
<td>No 1000 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.</td>
</tr>
<tr>
<td>100</td>
<td>On</td>
<td>Good 100 Mbps Fast Ethernet link.</td>
</tr>
<tr>
<td>100</td>
<td>Off</td>
<td>No 100 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.</td>
</tr>
<tr>
<td>10</td>
<td>On</td>
<td>Good 10 Mbps Fast Ethernet link.</td>
</tr>
<tr>
<td>10</td>
<td>Off</td>
<td>No 10 Mbps link; possible link at different speed, possible bad cable, bad connector, or configuration mismatch.</td>
</tr>
<tr>
<td>ACT</td>
<td>Blinking</td>
<td>Brief bursts of data detected on the port.</td>
</tr>
<tr>
<td>ACT</td>
<td>On</td>
<td>Streams of data detected on the port.</td>
</tr>
<tr>
<td>Off</td>
<td>No data detected on the port.</td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Failover/Failback - All Broadcom</th>
<th>Failover/Failback - Multivendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>IPX</td>
</tr>
<tr>
<td></td>
<td>W2K</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>NT 4.0</td>
<td></td>
</tr>
<tr>
<td>NW 5.x/6.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load Balance - All Broadcom</th>
<th>Load Balance - Multivendor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IP</strong></td>
<td><strong>IPX</strong></td>
</tr>
<tr>
<td>W2K</td>
<td>Y</td>
</tr>
<tr>
<td>NT 4.0</td>
<td>Y</td>
</tr>
<tr>
<td>NW 5.x/6.0</td>
<td>Y</td>
</tr>
<tr>
<td>LX 7.2/7.3</td>
<td>Y</td>
</tr>
</tbody>
</table>

*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 Microsoft
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 Microsoft
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 Compaq, Dell, and IBM
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** ᵀ The Vital Sign screen allows you to view vital adapter information, network status, and network connectivity. Active Adapters are listed.

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

- **Statistics** ᵀ 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 Dell
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
- Windows .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.

![Image of a window showing setup status](image)

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**.
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)
- 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)
- 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)

• 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, and 7.2 Linux distributions for i386 and IA64 (kernel version 2.4.x). Furthermore, the driver has only been tested as a loadable module.
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.
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 cards edge connector. Never attempt to install any damaged adapter. If the adapter is damaged, report it to Broadcom.

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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 Instructions. 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 adapters 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 adapters 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 adapters 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 adapter has 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.

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

1. Prepare an appropriate cable. The following table lists the cable characteristics for connecting to 10/100/1000BASE-T ports:

<table>
<thead>
<tr>
<th>Port Type</th>
<th>Connector</th>
<th>Media</th>
<th>Maximum Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10BASE-T</td>
<td>RJ-45</td>
<td>Cat. 3, 4, or 5 UTP</td>
<td>100 meters (328 feet)</td>
</tr>
<tr>
<td>100/1000BASE-T</td>
<td>RJ-45</td>
<td>Cat. 5 UTP</td>
<td>100 meters (328 feet)</td>
</tr>
</tbody>
</table>


2. Connect one end of the cable to the Gigabit Ethernet Adapter.
3. Connect the other end of the cable to an RJ-45 Ethernet network port.

Note Once the cable is properly connected at both ends, the adapter port LEDs should be functional. See Table 1 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.
Please read all restrictions and disclaimers.
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

Please read all restrictions and disclaimers.

This chapter provides the following information:

- Overview
- Installing the Broadcom Advanced Control Suite
- Removing the Broadcom Advanced Control Suite
- Initializing the Broadcom Advanced Control Suite
- Vital Sign
- Diagnostics
- Cable Analysis
- Load Balance/Virtual LAN
- Save and Restore Configuration
- Load Balance/Virtual LAN Statistics
- Statistics
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

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.

Insert the Broadcom CD-ROM into your systems CD-ROM drive.
1. 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**.

![Add/Remove Programs](image)

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.

Click **Start** button, click **Settings**, then click **Control Panel**.

1. Click **Start** button, click **Settings**, then click **Control Panel**.

2. Double click the **Broadcom NetXtreme™ Gigabit Ethernet** icon.

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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.
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 as 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.
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.
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.

   ![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.

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.

![Error]

*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.
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.

![Save As dialog box](image)

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.

![Temp directory](image)
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,
3. At the Open screen, select the configuration file to be restored and click Open.

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.

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.
Load Balance/Virtual LAN Statistics

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

![Statistics Screen](image_url)
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:
Broadcom Custom Statistics

- 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.
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 teams 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.
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.
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](image)

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLAN #1</td>
<td>An IP subnet consisting of the Main Server, PC #3, and PC #5. This subnet represents an engineering group.</td>
</tr>
<tr>
<td>VLAN #2</td>
<td>Includes the Main Server, PCs #1 and #2 via shared media segment, and PC #5. This VLAN is a software development group.</td>
</tr>
<tr>
<td>VLAN #3</td>
<td>Includes the Main Server, the Accounting Server and PC #4. This VLAN is an accounting group.</td>
</tr>
<tr>
<td>Main Server</td>
<td>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.</td>
</tr>
<tr>
<td>Accounting Server</td>
<td>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.</td>
</tr>
<tr>
<td>PCs #1 and #2</td>
<td>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.</td>
</tr>
<tr>
<td>PC #3</td>
<td>A member of VLAN #1, PC #3 can communicate only with the Main Server and PC #5. Tagging is not enabled on PC #3s switch port.</td>
</tr>
<tr>
<td>PC #4</td>
<td>A member of VLAN #3, PC #4 can only communicate with the servers. Tagging is not enabled on PC #4s switch port.</td>
</tr>
</tbody>
</table>
|                    | A member of both VLANs #1 and #2, PC #5 has an Broadcom
PC #5 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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B57 Utilities Program User's Guide

This chapter provides the following information:

- Introduction
- Prerequisites
- Functions List
- Function Description
Introduction

This document provides the information on how to use the B57util utilities DOS program on Broadcom NetXtreme™ Gigabit Ethernet adapter, 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:

```
Dev Fmw Bus/Dev Perm.MACAddr SVID SSID Curr.MACAddr SV
=== === ======= =========== ====== ===== ===
0 1.2 03:09:0 00101801026C 14E4 1644 00101801026C 14
1 1.0 03:0A:0 001018010278 14E4 1644 001018010278 14
2 1.3 05:05:0 001018010212 14E4 1644 001018010212 14

b57util>wole all
Enabling wol for device 0
Enabling wol for device 1
Enabling wol for device 2

Dev Fmw Bus/Dev Perm.MACAddr SVID SSID Curr.MACAddr SV
=== === ======= =========== ====== ===== ===
0 1.2 03:09:0 00101801026C 14E4 1644 00101801026C 14
1 1.0 03:0A:0 001018010278 14E4 1644 001018010278 14
2 1.3 05:05:0 001018010212 14E4 1644 001018010212 14

b57util>
```
Prerequisites

**OS:** Dos 6.22  
**Software:** b57util.exe.
## Functions List

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<td>pxee</td>
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<tr>
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<td>exit</td>
</tr>
</tbody>
</table>
Functions Description

wole

cmd: wole

Description: Enable WOL.

Syntax: [-]wole devnum

devnum : Device number. It can be one or more devices in the list. Use ‘all’ for all devices.

The syntax for devnum is as followed:

<d [,d]... | all>

Where d is the device number 0 to number of devices – 1. For example, if you have three devices in the system, the valid device number is 0, 1, or 2.

Example:

From DOS prompt:

C:\>b57util wole 0 ; Enable WOL for device 0

C:\>b57util –allwole ; Enable WOL for all devices found in the system

From CLI prompt:

b57util>wole 0,2 ; Enable WOL for device 0 and device 2

Please note there is no spaces allowed in the device list. Furthermore, the ‘all’ parameter must be in lower case.

The ‘-‘ before command is optional to support compatibility with
**wold**

**cmd:** wold

**Description:** Disable WOL.

**Syntax:** `-wold` devnum

devnum : Device number. It can be one or more devices in the list. Use ‘all’ for all devices.

The devnum parameter is same as wole command. Please see wole command for the examples.

**pxee**

**cmd:** pxee

**Description:** Enable PXE.

**Syntax:** `-pxee` devnum

devnum : Device number. It can be one or more devices in the list. Use ‘all’ for all devices.

The devnum parameter is same as wole command. Please see wole command for the examples.

**pxed**

**cmd:** pxed

**Description:** Disable PXE.

**Syntax:** `-pxed` devnum

devnum : Device number. It can be one or more devices in the list. Use
‘all’ for all devices.

The devnum parameter is same as wole command. Please see wole command for the examples.

**pxes**

**cmd:** pxes

**Description:** Change PXE speed

**Syntax:** [-]pxes devnum <auto | 10half | 10full | 100half | 100full>

devnum : Device number. It can be one or more devices in the list. Use ‘all’ for all devices.

The devnum parameter is same as wole command. The speed must be entered in lower case and exact spelling as stated in the Syntax.

Example:

Changes all device to speed auto for PXE.

C:\>b57util pxes all auto

**upgf**

**cmd:** upgf

**Description:** Upgrade the EEPROM content

**Syntax:** [-]upgf devnum <boot | base | pxe | undi> [path]

devnum : Device number. It can be one or more devices in the list. Use ‘all’ for all devices.

The devnum parameter is same as wole command. Please see wole command for the examples.

There are four kinds of images can be programmed in to EEPROM:
eeprom.bin, b57base.bin, b57pxe.bin, and b57undi.bin.

When ‘boot’ option is entered, the firmware boot code "eeprom.bin" is programmed into eeprom. When one of ‘base’, ‘pxe’, and ‘undi’ parameter is entered, the b57xxx.bin image is programmed into PXE area.

The optional [path] parameter is used to specify where the file is if it is not in the same directory as b57util.exe.

**ver**

cmd: ver

Description: Display software version.

Syntax: ver

Example:

C:\>b57util –ver
b57util.exe V1.6
Copyright (c) 2000, 2001 Broadcom Corporation, all rights reserved

**help**

cmd: help

Description: Display help

Syntax: help

Example:

C:\>b57util –help
b57util.exe V1.6
Copyright (c) 2000, 2001 Broadcom Corporation, all rights reserved
wole WOL Enable
wold WOL Disable
pxee PXE Enable
pxed PXE Disable
pxes PXE speed
upgr Upgrade eeprom content
help Display Help
ver Display software version
exit Exit software

exit

cmd: exit

**Description:** Exit program.

**Syntax:** exit from CLI mode.

**Example:**

b57util> exit
BCM570x Diagnostic User's Guide

This chapter provides the following information:

- **Introduction**
- **Prerequisites**
- **Diagnostic Tests**
- **Command Line Option Parameters**
- **EEPROM.txt Format**
- **User Interface Commands**
- **Special Instructions**
- **Test and Functions Description**
Introduction

This program runs in two modes: Manufacturing mode and Engineering mode. The mode is determined with the command line option or the configuration file. When the program is running in manufacturing mode, it starts to run all tests in the configuration. If it detects an error, it displays an error and exits the program. When the program is in engineering mode, it prompts user to enter commands. The commands are explained in the later chapters. This document provides the information on configuration file specification, command line options and engineering diagnostic commands on Broadcom NetXtreme™ Gigabit Ethernet adapter, in particular to check out the functionality of the BCM5700 and its related components.

In general, this program has a set of default configuration. It is overwritten by configuration file. The command line option overwrites both default and the configuration files.

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Prerequisites

The engineering diagnostic is executed under DOS protected mode, this requires dos4gw.exe to be placed in the same directory of the b57diag.exe.

**OS:** Dos 6.22

**Software:** b57diag.exe, dos4gw.exe, and cpu.bin.

**Input File List:** The following files should be found in the same location of the b57diag.exe.

- ctrlreg.txt (mac registers test input file)
- ctrlreg.reg (mac registers input file for engineering mode)
- mac_pref.txt (mac address prefix number input file)
- miireg.txt (mii registers test input file)
- miireg.reg (mii registers input file for engineering mode)
- pcicfg.reg (PCI configuration registers input file for engineering mode)
- vpdwrite.txt (write vpd input file)
- seprg.txt (program EEPROM input file)
- physcript.txt (Phy speed select)
- wol.txt (Power Down MAC pattern input file)
- firmware.bin (TX & RX CPUs Firmware file)
- eeprom.bin (Serial EEPROM config input file)
- cpu.bin (CPU test)
Output File List:

The following files will be generated in run time.

    diagcfg.bin

    b57diag.log
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. BIST
A4. Interrupt Test

Group B.

B1. Scratch Pad Test
B2. BD SRAM Test
B3. DMA SRAM Test
B4. MBUF SRAM Test
B5. External SRAM Test
B6. MBUF SRAM via DMA Test
B7. MBUF Special Test

Group C.

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

Group D.

D1. Mac Loopback Test
D2. Phy Loopback Test
D3. RJ45 Loopback Test

Error Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Got 0x%08x @ 0x%08x. Expected 0x%08x</td>
</tr>
<tr>
<td>2.</td>
<td>Cannot run test while chip is running</td>
</tr>
<tr>
<td>3.</td>
<td>Invalid NIC device</td>
</tr>
<tr>
<td>4.</td>
<td>Read only bit %s got changed after writing zero at 0x%x</td>
</tr>
<tr>
<td>5.</td>
<td>Read only bit %s got changed after writing 1's at 0x%x</td>
</tr>
<tr>
<td>6.</td>
<td>Read/Write bit %s did not get cleared after writing 1's at 0x%x</td>
</tr>
<tr>
<td>7.</td>
<td>Read/Write bit %s did not get set after writing 1's at 0x%x</td>
</tr>
<tr>
<td>8.</td>
<td>BIST failed</td>
</tr>
<tr>
<td>9.</td>
<td>Could not generate interrupt</td>
</tr>
<tr>
<td>10.</td>
<td>Test aborted by user</td>
</tr>
<tr>
<td>11.</td>
<td>Tx DMA:Got 0x%08x @ 0x%08x. Expected 0x%08x</td>
</tr>
<tr>
<td>12.</td>
<td>Rx DMA:Got 0x%08x @ 0x%08x. Expected 0x%08x</td>
</tr>
<tr>
<td>13.</td>
<td>Tx DMA failed</td>
</tr>
<tr>
<td>14.</td>
<td>Rx DMA failed</td>
</tr>
<tr>
<td>15.</td>
<td>Data error, got 0x%08X at 0x%08X, expected 0x%08X</td>
</tr>
<tr>
<td>16.</td>
<td>Second read error, got 0x%08X at 0x%08X, expected 0x%08X</td>
</tr>
<tr>
<td>17.</td>
<td>Failed writing EEPROM at 0x%04X</td>
</tr>
<tr>
<td>18.</td>
<td>Failed reading EEPROM at 0x%04X</td>
</tr>
<tr>
<td>19.</td>
<td>EEPROM data error, got 0x08X at 0x04X, expected 0x%08X</td>
</tr>
<tr>
<td>20.</td>
<td>Cannot open file %s</td>
</tr>
<tr>
<td>21.</td>
<td>Invalid CPU image file %s</td>
</tr>
<tr>
<td>22.</td>
<td>Invalid CPU image size %d</td>
</tr>
<tr>
<td>23.</td>
<td>Cannot allocate memory</td>
</tr>
<tr>
<td>24.</td>
<td>Cannot reset CPU</td>
</tr>
<tr>
<td>25.</td>
<td>Cannot release CPU</td>
</tr>
<tr>
<td>26.</td>
<td>CPU test failed</td>
</tr>
<tr>
<td>27.</td>
<td>Invalid Test Address Range</td>
</tr>
<tr>
<td></td>
<td>Valid NIC address is 0x%08x-0x%08x and exclude 0x%08x</td>
</tr>
<tr>
<td>28.</td>
<td>DMA:Got 0x%08x @ 0x%08x. Expected 0x%08x</td>
</tr>
<tr>
<td>29.</td>
<td>Unsupported PhyId %04X:%04X</td>
</tr>
<tr>
<td>30.</td>
<td>Too many registers specified in the file, max is %d</td>
</tr>
<tr>
<td>31.</td>
<td>Cannot write to VPD memory</td>
</tr>
<tr>
<td>32.</td>
<td>VPD data error, got %08X @ 0x04X, expected %08X</td>
</tr>
<tr>
<td>33.</td>
<td>No good link! Check Loopback plug</td>
</tr>
<tr>
<td>34.</td>
<td>Cannot TX Packet!</td>
</tr>
<tr>
<td>35.</td>
<td>Requested to Tx %d. Only %d is transmitted</td>
</tr>
<tr>
<td>36.</td>
<td>Expected %d packets. Only %d good packets are received. %d unknown packets have been received. %d bad packets have been received.</td>
</tr>
<tr>
<td>37.</td>
<td>%c%d is an invalid Test</td>
</tr>
<tr>
<td>38.</td>
<td>EEPROM checksum error</td>
</tr>
</tbody>
</table>
Error in reading WOL/PXE
Error in writing WOL/PXE
No external memory detected
DMA buffer %04X is large, size must be less than %04
File size %d is too big, max is %d
Invalid %s
Failed writing 0x%x to 0x%x

Cannot perform task while chip is not running. (need driver)
Cannot open register define file or content is bad
ASF Reset bit did not self-cleared
ATTN_LOC %d cannot be mapped to %cX CPU event bit %d
%s Register is not cleared to zero after reset
Cannot start poll ASF Timer
poll ASF bit did not get reset after acknowledged
Timestamp Counter is not counting
%s Timer is not working
Cannot clear bit %s in %cX CPU event register
Invalid "EEPROM FILENAME" file size, expected %d but
Invalid magic value in %s, expected %08x but found %
Invalid manufacture revision, expected %c but found %
Invalid Boot Code revision, expected %d.%d but found
Cannot write to EEPROM
Cannot read from EEPROM
Invalid Checksum
Invalid Magic Value
Invalid MAC address, expected %02X-%02X-%02X-%02X-%02X-%02X
Slot error, expected an UUT to be found at location
Adjacent memory has been corrupted while testing block
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.

<table>
<thead>
<tr>
<th>Offset</th>
<th>R/O Mask</th>
<th>R/W Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00000400</td>
<td>0x00000000</td>
<td>0x007ffff8c</td>
</tr>
<tr>
<td>0x00000404</td>
<td>0x0380107</td>
<td>0x00000000</td>
</tr>
<tr>
<td>0x00000408</td>
<td>0x00000000</td>
<td>0x07c01400</td>
</tr>
<tr>
<td>0x0000040c</td>
<td>0x00000000</td>
<td>0xc000007f</td>
</tr>
<tr>
<td>0x00000410</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x00000414</td>
<td>0x00000000</td>
<td>0x0fffffff</td>
</tr>
<tr>
<td>0x00000418</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x0000041c</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x00000420</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x00000424</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x00000428</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x0000042c</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x00000430</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x00000434</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x0000043c</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x00000440</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x00000444</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x00000448</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
<tr>
<td>0x0000044c</td>
<td>0x00000000</td>
<td>0x0000ffff</td>
</tr>
</tbody>
</table>
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
A3. 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

A4. 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.
**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, 0xaaaaaaaa, and 0x5555aa55.

**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, 0xaaaaaaaa, and 0x5555aa55.

**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. 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

**B6. 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.

<table>
<thead>
<tr>
<th>Test Pattern</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;16 00's 16 FF's&quot;</td>
<td>Full the entire host DMA buffer with 16 bytes of 00’s and then 16 bytes of FF’s.</td>
</tr>
<tr>
<td>&quot;16 FF's 16 0's&quot;</td>
<td>Full the entire host DMA buffer with 16 bytes of 00’s and then 16 bytes of FF’s.</td>
</tr>
<tr>
<td>&quot;32 00's 32 FF's&quot;</td>
<td>Full the entire host DMA buffer with 32 bytes of 00’s and then 32 bytes of FF’s.</td>
</tr>
<tr>
<td>&quot;32 FF's 32 00's&quot;</td>
<td>Full the entire host DMA buffer with 32 bytes of FF’s and then 32 bytes of 00’s.</td>
</tr>
<tr>
<td>&quot;00000000's&quot;</td>
<td>Full the entire host DMA buffer with all zeros.</td>
</tr>
<tr>
<td>&quot;FFFFFFFF's&quot;</td>
<td>Full the entire host DMA buffer with all FF’s.</td>
</tr>
<tr>
<td>&quot;AA55AA55's&quot;</td>
<td>Full the entire host DMA buffer with data 0xAA55AA55.</td>
</tr>
<tr>
<td>&quot;55AA55AA's&quot;</td>
<td>Full the entire host DMA buffer with data 0xAA55AA55.</td>
</tr>
</tbody>
</table>

**Default:** Enabled

**B7. MBUF Special Test**

**Command:** memtest –c

**Function:** Initially, full up the entire test block with the inverted test pattern. Then, for every 128-byte boundary, rewrite the test pattern. Verify all test memories contains the correct test data, as it should be.

**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 verify 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:

<table>
<thead>
<tr>
<th>Offset</th>
<th>R/O Mask</th>
<th>R/W Mask</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00</td>
<td>0x0000</td>
<td>0x7180</td>
</tr>
<tr>
<td>0x02</td>
<td>0xffffff</td>
<td>0x0000</td>
</tr>
<tr>
<td>0x03</td>
<td>0xffffff</td>
<td>0x0000</td>
</tr>
<tr>
<td>0x04</td>
<td>0x0000</td>
<td>0xffffff</td>
</tr>
<tr>
<td>0x05</td>
<td>0xefff</td>
<td>0x0000</td>
</tr>
<tr>
<td>0x06</td>
<td>0x0001</td>
<td>0x0000</td>
</tr>
<tr>
<td>0x07</td>
<td>0x0800</td>
<td>0xb7ff</td>
</tr>
<tr>
<td>0x08</td>
<td>0xffffff</td>
<td>0x0000</td>
</tr>
<tr>
<td>0x09</td>
<td>0x0000</td>
<td>0xff00</td>
</tr>
<tr>
<td>0x0a</td>
<td>0x7c00</td>
<td>0x0000</td>
</tr>
<tr>
<td>0x10</td>
<td>0x0000</td>
<td>0xffbf</td>
</tr>
<tr>
<td>0x11</td>
<td>0x3300</td>
<td>0x0000</td>
</tr>
<tr>
<td>0x19</td>
<td>0x001f</td>
<td>0x0000</td>
</tr>
<tr>
<td>0x1e</td>
<td>0x0000</td>
<td>0xffffff</td>
</tr>
<tr>
<td>0x1f</td>
<td>0x0000</td>
<td>0xffffff</td>
</tr>
</tbody>
</table>

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.

**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 Giga bit 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
Command Line Option Parameters

When user invoke this program, a set of option parameter can be used to overwrite the configuration file or the default configuration. This section summarizes the options. The options are case sensitive.

-c <num> specify UUT device number

When more than one device is in the system, the devices are number starting from zero. For example, if there is three devices detected, the device is numbered as 0,1,and 2. In this case, by entered the parameter –c 2 will select the last found device as default UUT.

In manufacture testing mode, by default, all devices are tested; however, if this option is used, only that selected device is tested.

Example: -c 2

-coe Continue on error

Enter this option will allow the test to continue even if with error. The software will reset the iteration value as well as the error code.

Example: -coe

-l <file> log file

All diagnostic output can be saved in a log file. Type log file name is specified by this option. The default is no log file.

Example: -l mylogfile.txt

-w enable WOL programming in manufacture mode

After a successful manufacturing testing, the program will program WOL to either enable or disable mode. By default, the WOL is programmed as disable. By entering this option will enable WOL.

When –f is entered, software uses eeprom.bin’s content for WOL setting.
When –w is entered with –f, software forces WOL enabled.

Example: -w

-x enable PXE in manufacture mode

After a successful manufacturing testing, the program will program PXE to either enable or disable mode. By default, the PXE is programmed as disable. By entering this option will enable PXE.

When –f is entered, software uses eeprom.bin’s content for PXE setting.

When –x is entered with –f, software forces PXE enabled.

Example: -x

-t <id> disable test

-T <id> enable test

A certain test is enabled or disabled by default. User can overwrite the enabling status by those options. The test id must start with a letter ‘A’, ‘B’, ‘C’, or ‘D’ to indication the group and followed by test numbers. Each digit of number represents the sub-test number. For example, if the user wants to disable test A1 and A3. The option –t A13 should be entered. If no test numbers entered, all tests in that group are selected. For the tests not specified, the default setting will be used.

Example -t A15BC1 -T C4 -t D2

This disables A1, A5, B1, B2, B3, B4, B5, B6, C1, D2 and enables C4

Default Setting:

Enabled Tests:

A1. Indirect Register Test
A2. Control Register Test
A4. Interrupt Test
B1. Scratch Pad Test
B2. BD SRAM Test
B3. DMA SRAM Test
B4. MBUF SRAM Test
B6. MBUF SRAM via DMA Test
C1. EEPROM Test
C1. CPU Test
C2. DMA Test
C3. MII Test
D1. Mac Loopback Test
D2. Phy Loopback Test

Disabled Tests:

A3. BIST
B5. External SRAM Test
C4. VPD Test
C6. ASF Test
D3. RJ45 Loopback Test

-I <num> iteration number

Use this option to specify the number of times the tests to be run. The default is run one time. A number zero indicates loop forever. A control-C or control-break key can be used to break the loop. Any error detected will also stop testing after reporting the error.

Example: -I 5

Run tests five times.

-ver display current version number

If this option is entered, it displays the software version number/silkscreen revision and then exits the program.

-srev display internal silicon version number

If this option is entered, it displays the software version number/silicon version and then exits the program.
-e <code> Encryption Code

This option is required to use option -geneep, –f, -m, –n, and -s.

-geneep Generate eeprom.bin file from eeprom.txt

A password is needed to run this option. With this option, it updates eeprom.bin with the specifications defined in eeprom.txt.

<table>
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<th>Keywords</th>
<th>Argument</th>
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<tr>
<td>MAC_PREFIX</td>
<td>Three 8-bit hex numbers separated by column</td>
</tr>
<tr>
<td>POWER_DISSIPATED</td>
<td>Four decimal number ranges 0 to 255 separated by column</td>
</tr>
<tr>
<td>POWER_CONSUMED</td>
<td>Four decimal number ranges 0 to 255 separated by column</td>
</tr>
<tr>
<td>SUBSYSTEM_VENDOR_ID</td>
<td>A 16-bit hex number</td>
</tr>
<tr>
<td>SUBSYSTEM_DEVICE_ID</td>
<td>A 16-bit hex number</td>
</tr>
<tr>
<td>PXE</td>
<td>Disable or Enable</td>
</tr>
<tr>
<td>PXE_SPEED</td>
<td>Auto, 10hd, 10fd, 100hd, 100fd, 1000hd or 1000fd</td>
</tr>
</tbody>
</table>
WOL Disable or Enable

PRODUCT_NAME Max. 64-byte string

PART_NUMBER Max. 11-byte string

ENGINEERING_CHANGE Max. 10-byte string

MANUFACTURING_ID A 16-bit hex number

ASSET_TAG Max. 16-byte string

VOLTAGE_SOURCE 1.3 or 1.8

FORCE_PCI Disable or Enable

Example of eeprom.txt

MAC_PREFIX = 00:10:18

POWER_DISSIPATED = 10:0:0:100

POWER_CONSUMED = 10:0:0:100

SUBSYSTEM_VENDOR_ID = 14e4

SUBSYSTEM_DEVICE_ID = 1644
PXE = Disable

PXE_SPEED = Auto

WOL = Disable

PRODUCT_NAME = Broadcom Gigabit Ethernet Controller

PART_NUMBER = BCM95700A6

ENGINEERING_CHANGE = 107070-16

MANUFACTURING_ID = 14e4

ASSET_TAG = XYZ01234567

VOLTAGE_SOURCE = 1.3

FORCE_PCI = Disabled

"-bus bb:dd Test UUT location"

If this option is specified, the program will only test the UUT at the specified bus number and device number. This option is ignored if –c
option is entered.

-dpmi Use DPMI memory allocation

Use DPMI memory allocation method to allocate memory instead of malloc() or free()

-f Program eeprom.bin

This option requires the file eeprom.bin in the same working directory. The program programs the content into EEPROM before testing.

-m Program MAC address

If this option is entered, the program will prompt user for a new MAC address before starts testing. Prompt user for the MAC address. With this option, user must enter/scan the MAC address before testing. The program also checks for the file "mac_pref.txt" This is a text file should contain six digits of ASCII MAC three-byte-prefix address. Any of the following formats are supported:

Example:

001018

00 10 18

00

10

18

If this file exists, user has option to enter/scan 7 digit hex number. The first digit will be ignored and the last 6 digits will be used for the lower part of MAC address. Combine with the prefix, it creates 6 byte (12 digit) hex number. If this file does not exist, the whole 12-digit number must be entered for the MAC address. For readability, when entering MAC address, a space character is allowed between each byte. For example, any of the following examples are valid.
001018010203

00 10 18 01 02 03

1010203 (currently, the scanner uses this format)

-**n Run program in Manufacturing Loop mode.**

With this option, the –I, iteration number option, is ignored. The program will run in manufacturing loop mode. Power on/off is supported. After each test, the program will prompt user to exchange the UUT before starts another testing.

-**s Skip eeprom programming process.**

With this option, the program will skip the eeprom programming process. However, it will check for the eeprom content and print a warning message if the content is not valid.

The -m and -f combination will create the following behavior:

**With both -f and -m:**

Program will not validate the eeprom content and go ahead to prompt user for the MAC address. It programs MAC address and EEPROM content and then checks the validity of eeprom content at the end of programming.

Loading EEPROM content from eeprom.bin: passed

Programming EEPROM from eeprom.bin....: passed

Checking EEPROM content.............: passed

**-f only:**

Program will check the validity of eeprom. If it is not valid, it will act as a), -f -m option. If it is good, it saves the MAC address from eeprom, program new eeprom.bin content into EEPROM and then restores the original MAC address. It checks the validity of eeprom
content once more at the end of programming.

Checking EEPROM content................: passed

Loading EEPROM content from eeprom.bin: passed

Programming EEPROM from eeprom.bin....: passed

Checking EEPROM content................: passed

or

Checking EEPROM content................: invalid

Loading EEPROM content from eeprom.bin: passed

Programming EEPROM from eeprom.bin....: passed

Checking EEPROM content................: passed

-m only:

Program will check the validity of EEPROM. If it is not valid, it will act as a), -f -m option. If it is good, the program will prompt the user for a new MAC address and program the MAC address only. It checks the validity of EEPROM content once more at the end of programming.

Checking EEPROM content................: passed

Programming MAC address..................: passed

Checking EEPROM content................: passed

or

Checking EEPROM content................: invalid

Loading EEPROM content from eeprom.bin: passed

Programming EEPROM from eeprom.bin....: passed
Checking EEPROM content................: passed

d) no -m and -f options

Program will check the validity of EEPROM. If it is not valid, it will act as a), -f -m option. If it is good, it proceeds to normal diagnostics.

Checking EEPROM content..............: passed

or

Checking EEPROM content...............: invalid

Loading EEPROM content from eeprom.bin: passed

Programming EEPROM from eeprom.bin....: passed

Checking EEPROM content...............: passed
EEPROM.TXT Format

A set of commands is defined to allow user to change EEPROM.BIN content. To update EEPROM.BIN, user must enter –e <code> -geneep options at the command prompt. A password must be entered to run this option.

MAC_PREFIX = xx:xx:xx
POWER_DISSIPATCHED = d:d:d:d
POWER_CONSUMED = d:d:d:d
SUBSYSTEM_VENDOR_ID = xxxx
SUBSYSTEM_DEVICE_ID = xxxx
PXE = {enable, disable}
PXE_SPEED = {auto, 10hd, 10fd, 100hd, 100fd, 1000hd, 1000fd}
WOL = {enable, disable}
PRODUCT_NAME = string
PART_NUMBER = string
ENGINEERING_CHANGE = string
MANUFACTURING_ID = string
ASSET_TAG = string

All reserved words are not case sensitive. A ‘;’, ‘//’ can be used at the beginning of line as comment.

Example:

; This comment line
// This also can be used as comment line

// Blank line is also allowed

// This is Broadcom’s MAC prefix
MAC_PREFIX = 00:10:18

POWER_DISSIPATCHED = 10:0:0:100
POWER_CONSUMED = 10:0:0:100
SUBSYSTEM_VENDOR_ID = 14e4
SUBSYSTEM_DEVICE_ID = 1644
pxe = disable
PXE_Speed = 100fd
WOL = enable
Product_name = Broadcom Gigabit Ethernet Controller
PART_NUMBER = BCM95700A6
ENGINEERING_CHANGE = 106679-15
MANUFACTURING_ID = 14e4
Asset_Tag = XYZ1234567
User Interface Commands

The commands are summarized in twelve groups: vpd, seeprom, cpu, dma, packet, mii, mem, test, power, irq, mac, and misc.

Command Group vpd
- vpdwrite: Write VPD Memory
- vpdread: Read VPD Memory

Command Group seeprom
- semode: Set SEEPROM Mode to Manual or Auto Mode
- seread: Read SEPPROM
- sewrite: Write SEPPROM
- secfg: Configure SEEPROM
- seprg: Program SEPPROM
- sever: Display Serial EEPROM
- sechksum: Check/Update Serial EEPROM

Command Group cpu
- cpudtt: Dump Debuging Trace of TX CPU
- cpudrt: Dump Debugging Trace of RX CPU

Command Group dma
- dmaw: DMA from NIC
- dmar: DMA from Host to NIC
- dma_h: Dump DMA Entries
- dma_d: Dump DMA Entries with

Command Group packet
- maclpk: Configure MAC loopback
- nicstats: Display NIC statistics
- ringindex: Dump Ring Index
- blast: Blast Packets in Poll
- tprot: Blast with TPROT packets
- txpkt: Transmit Packet
- phyctrl: Configure Speeds/Duplex Mode
- statusblk: Dump Statistics Block
- reset: Reset Chip
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<td>Configure Rx parameters</td>
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<td>Read PHY register via MII</td>
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<td>Write PHY registers via MII</td>
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<td>miimode</td>
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<tr>
<td>bertstats</td>
<td>Dump PHY BIST Statistics</td>
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<td>rm</td>
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<tr>
<th>Command Group</th>
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<td>Run Register Tests</td>
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<tr>
<td>msi</td>
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<td>memtest</td>
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<td>bist</td>
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<tr>
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<tr>
<td>pmdcfg</td>
<td>Add/Del Pattern</td>
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<td>pmmpcfg</td>
<td>Power Down MAC</td>
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<table>
<thead>
<tr>
<th>Command Group</th>
<th>Description</th>
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<tr>
<th>Command Group</th>
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<td>Load Driver</td>
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<td></td>
<td>Open Logfile</td>
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<td></td>
<td>Initialize PCI Configuration</td>
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<td></td>
<td>Scan for All PCI Devices</td>
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<tr>
<td></td>
<td>Enter DOS Shell</td>
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<tr>
<td></td>
<td>Configure Diagnostics</td>
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</table>
Special Instructions

1. Mac register test:
   Unload MAC driver before running test.

2. Memory test:
   Unload MAC driver before running test.

3. DMA test:
   Unload MAC driver before running test.

4. TX RX packets:
   TX sides need to be configured (txcfg).
   RX sides need to be configured (rcfg).
   Configure MAC and PHY loop back.
   Call txpkt to transmit packets.

5. The following tests need to setup test configuration before running.
   To setup test configuration, run "diagcfg". Diag config can be saved in system for future use.
   Test:
   Memory test
   NIC test

6. Unload driver before power down NIC card.

7. Load driver after power up NIC card.

8. Blast Test:
   Load MAC driver before running test.
Test and Functions Description

vpdwrite

**cmd:** vpdwrite

**Description:** Write data to VPD storage.

**Syntax:** vpdwrite <start[-end | len] value> | <filename>

File format:

Address range: 0x00 – 0xFF

num_bytes: 256 (max)

If only one argument is entered, filename is assumed. Otherwise, 'start [len] value' format must be used.

**Example:**

vpdread

**cmd:** vpread (Not support in A0)

**Description:** Read data from VPD storage

**Syntax:** vpdread <begin_addr> [- end_addr | num_bytes]

Address range: 0x00 – 0xFF

num_byte: 256 (max)

**Example:**

vpdtest

**cmd:** vpdtest (Not support in A0, A1)
**Description:** Write designed pattern to VPD storage. Then read back and compare with designed pattern.

**Syntax:** `vpdtest [iteration]`

**Options:**

- `-b<n>`: Pattern to test.
  - 0 - Increment (def);
  - 1 - Decrement ; 1 - 0's
  - 2 - FF's
  - 3 - AA55
  - 4 - 55AA

- `-d`: Force Destructive Test

**Example:**

```
semode
```

**cmd:** `semode`

**Description:** Configure Serial EEPROM to either Auto (I²C) or Manual (Bit-Bang) Mode.

**Syntax:** `semode <auto> | <man> | <>` for help

**Example:**

1. Set Serial EEPROM mode to Auto (I²C).
   ```0:> semode auto```

2. Set Serial EEPROM mode to Manual (Bit-Bang).
0:> semode man

3. Display Current mode

0:> semode

Current semode is auto

seread

cmd: seread

Description: Read content of designated block of Serial EEPROM.

Syntax: seread <begin_addr> [- end_addr | num_bytes]

Address range: 0x00 – 0x1000

Num_bytes: 4097

Example:

1. Set number base to hex, then read and display serial eeprom locations from 0x00 to 0x20

0:> radix 16
0:> seread 0-20
*** Dump Serial EEPROM (Auto Mode) ***
000000: 669955aa 08000000 00000069 00000200 d97b07d0
00000000 00000000 00000000
000020: 00000000

2. Set number base to hex then read location 0x18 of serial eeprom.

0:> radix 16
0:> seread 18 1
*** Dump Serial EEPROM (Auto Mode) ***
000018: 000000ff

sewrite
**cmd:** sewrite

**Description:** Write data to designated block of Serial EEPROM.

**Syntax:** sewrite <begin_addr>[- end_addr | value]

Address range: 0x0000 – 0x1000

**Example:**

1. Set number base to hex, write 0x55AA to serial eeprom from locations 0x30 to 0x35

   0:> radix 16
   0:> sewrite 30-35 55AA
   *** Write Serial EEPROM (Auto Mode) ***

2. Set number base to hex, write 0x2 to serial eeprom location 0x

   0:> radix 16
   0:> sewrite 25 2
   *** Write Serial EEPROM (Auto Mode) ***

**seprg**

**cmd:** seprg

**Description:** Program designated Serial EEPROM block via an input file. Input file need to be found in the same location as b57diag.exe.

**Syntax:** seprg <file_name>

**File_name:**

**Example:**

1. Program Serial EEPROM via input file seprg.bin
   0:> seprg seprg.bin

**secfg**
**cmd:** secfg

**Description:** Configure Serial EEPROM content.

If selected program with defaults (-f=1), eeprom.bin must be found in the same directory of b57diag.exe.

**Syntax:** secfg

**Options:**

- `-a<n>` : Verbose Level
- `-f` : Force to program with defaults

**Example:**

1. Program Serial EEPROM with defaults value and set verbose level to 0.

0:> secfg -fv=0

Reading current serial eeprom ... OK

1. MAC Address : 00:00:00:00:00:00
2. Part Number : BCM5700
3. Revision : P0
4. Power Dissipated (D0:D1:D2:D3) : 0:0:0:0
5. Power Consumed (D0:D1:D2:D3) : 0:0:0:0
0. Exit
20. Save and Exit

Enter your choice (option=paramter) :0

1. Set verbose level = 1 to display detail of the Serial EEPROM configuration.

0:> secfg -v=1

Reading current serial eeprom ... OK
Magic Number : 0x669955aa
Boot Code Info (start,length,offset): 0x08000000,0x69,0x0200
Code Directory (start,length,offset)
Dir#0 : 0x0,-4,0x000000ff Dir#1 : 0x1,8,0x00000000
Dir#2 : 0x0,0,0x00000000 Dir#3 : 0x0,0,0x00000000
Dir#4 : 0x0,0,0x00000000 Dir#5 : 0x0,0,0x00000000
Dir#6 : 0x0,0,0x00000000 Dir#7 : 0x0,0,0x00000000

1. MAC Address : 00:00:00:00:00:00
2. Part Number : BCM5700
3. Revision : P0
4. Power Dissipated (D0:D1:D2:D3) : 0:0:0:0
5. Power Consumed (D0:D1:D2:D3) : 0:0:0:0
0. Exit
20. Save and Exit

Enter your choice (option=paramter) : 0

setest

cmd: setest

Description: Serial EEPROM read write test

Syntax: setest [iteration]

Example:

1. Run Serial EEPROM read write test.

0:seeprom> setest 2

Iteration 1 of 2

C1. EEPROM Test.........: Passed
Iteration 2 of 2

C1. EEPROM Test………: Passed

1. Display Help.

0:>

setest ?

Usage : setest [iteration]

Description:

The default iteration is 1. 0 means run forever

cpudrt

cmd: cpudrt

Description: Read and display RX CPU trace

Syntax: cpudrt <begin_addr>[- end_addr | num_bytes]

Address range: 0x00 – 0x80

Example:

1. Read and display RX CPU trace from location 0x00 to 0x04.

0:> cpudrt 0-5
000 MainCpuA t00000030 164414e4 e1000004 00000000
164414e4 00000000
001 *BUpCpuA t00000032 00000000 0800034 00440400
00001c40 00000000
002 *BUpCpuA t00000001 00000001 0800034 00440000
00000000 00000000
003 t00000000 0000000 0000000 0000000 0000000 0000000
0000000
004 t00000000 0000000 0000000 0000000 0000000 0000000
0000000
1. Read and display 4 locations of RX CPU trace from start from location 0x00.

```
0:>
cpudrt 0 5
000 t00000030 164414e4 e1000004 00000000 164414e4
00000000
001 t00000032 00000000 08000034 00440400 00001c40
00000000
002 t00000001 00000001 08000034 00440000 00000000
00000000
003 t00000000 00000000 00000000 00000000 00000000
00000000
```

cpudtt

cmd: cpudtt

**Description:** Read and display TX CPU trace

**Syntax:** cpudtt <begin_addr>[- end_addr | num_bytes ]

Address range: 0x00 – 0x80

**Example:**

1. Read and display TX CPU trace from location 0x00 to 0x04.

```
0:>
cpudtt 0-5
000 t0000002f c0000000 00000000 00000000 00000000
00000000
001 t00000000 00000000 00000000 00000000 00000000
00000000
002 t00000000 00000000 00000000 00000000 00000000
00000000
003 t00000000 00000000 00000000 00000000 00000000
00000000
004 t00000000 00000000 00000000 00000000 00000000
00000000
```
2. Read and display 4 locations of TX CPU trace from start from location 0x00.

```
0: cputest 0 5
000 MainCpuB t0000002f c0000000 00000000 00000000
00000000 00000000
001 t00000000 00000000 00000000 00000000 00000000
00000000
002 t00000000 00000000 00000000 00000000 00000000
00000000
003 t00000000 00000000 00000000 00000000 00000000
00000000
```

cputest

cmd: cputest

**Description:** TX / RX CPU Test. This test needs an input CPU file in the same location as b57diag.exe. The default file name is cpu.bin unless specified by –f option.

**Syntax:** cputest [iteration]

- `-f`: input filename

**Example:**

1. Running CPU Test two times.

```
0: cputest 2
Iteration 1 of 2

C2. CPU Test...:Passed

Iteration 2 of 2

C2. CPU Test...:Passed
```
cmd: dmar

Description: Setup DMA Host Memory to NIC memory

Syntax: dmar

Options:

- `-a <u32>` NIC address to DMA data to

- `-l <u32>` Length of DATA in bytes to DMA

- `-p <u32>` Pattern of Data.

0 - increment

1 - decrement

2 - FF's

3 - 00's

4 - AA 55...

5 - 55 AA...

6 - FFFFFFFF 00000000 FFFFFFFF 00000000

7 - FFFFFFFF 0000000000000000 FFFFFFFF 00000000

8 - FFFFFFFF 00000000000000000000000000000000

-h Use high priority DMA Read.

-b Byte Swap

-w Word Swap

-f Force to 32-bit bus

Example:
1. Get valid NIC address, then set up DMA host memory to NIC memory. Using high priority DMA Read and enable byte swap.

0:> dmar

Valid NIC address is 0x00000000-0x0001ffff and exclude 0x00002000-0x000020c0

0:> dmar -a=0 -l=100 -p=4 -h -b -w -6

Host Address : 0x001422a0

NIC Address : 0x00000000

Length : 0x0100

Priority : High

Byte Swap : Yes

Word Swap : Yes

DMAing from Host memory to NIC memory ... OK

2. Sup DMA host memory to NIC memory. Using low priority DMA Read and disable byte swap.

0:> dmar -a=0 -l=100

Host Address : 0x001422a0

NIC Address : 0x00000000

Length : 0x0100

Priority : Low

Byte Swap : No

Word Swap : No
3. Display Help.

    0:> dmaw -?

Usage : dmar

Options:

- a <u32> : NIC address to DMA data to.
- l <u32> : Length of DATA in bytes to DMA.
- p <u32> : Pattern of Data.

  0 - byte increment ; 1- byte decrement

  2 - FF's ; 3 - 00's ; 4- AA 55 ... ; 5 - 55 AA ...

  6 - FFFFFFFF 00000000 FFFFFFFF 00000000

  7 - FFFFFFFFFFFFFFFFFFFFF FFFFFFFF 0000000000000000

  8 - FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF FFFFFFFF 0000000000000000...

  9 - 0000000000000000000000000000000000000000000000000000000000000000 FFFFFFFF...

  a - Word Increment ; b - Dword Increment

  c - Word Decrement ; d - Dword Decrement

- h : Use high priority DMA Read.

  - b : Byte Swap

  - w : Word Swap

  - f : Force to use 32-bit
**cmd:** dmaw

**Description:** Setup DMA NIC Memory to HOST memory

**Syntax:** dmaw

**Options:**

- `-a<u32>` NIC address to DMA data from
- `-l<u32>` Length of DATA in bytes to DMA
- `-h` Use high priority DMA Write
- `-b` Byte Swap
- `-w` Word Swap
- `-d` Dump content of Host Memory
- `-f` Force to use 32-bit bus

**Example:**

1. Setup DMA NIC Memory to HOST memory. Using high priority DMA Read and enable byte swap and disable detail display.

   
   0:> dmaw -a=1 -l=10 -hbdf
   
   **Host Data :**
   
   ```
   00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   ```

2. Setup DMA NIC Memory to HOST memory. Using low priority DMA Read and disable byte swap and enable detail display.

   
   0:> dr maw -a=0 -l=10
   
   **Host Address :** 0x003421f8
   
   **NIC Address :** 0x00000000
Length : 0x0010
Priority : Low
Byte Swap : No
Word Swap : No
DMAing from NIC memory to Host memory ... OK
Host Data :
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

3. Display Help.

0:> dmaw ?

Usage : dmaw

Options:

-a<u32> NIC address to DMA data from.
-l<u32> Length of DATA in bytes to DMA.
-h Use high priority DMA Write.
-b Byte Swap
-w Word Swap
-d Dump content of Host Memory
-f Force to use 32-bit bus

dma_h

cmd: dma_h

Description: Display DMA entries in HEX
Address range: 0x2000 – 0x3FFFF

**Syntax:** dma_h <begin_addr>[- end_addr | num_bytes]

**Example:**

1. Read DMA content start from location 0x2000 to 0x2040.

   0:> dma_h 2000-2040
   002000: 00000000 00000000 00000000 00000000 00000000 00000000
   002020: 00000000 003421f8 00000000 10070010 00020004
deadbeef deadbeef deadbeef
   002040: 00000000

2. Read 40 bytes DMA content start from location 0x2000.

   0:> dma_h 2000 40
   002000: 00000000 00000000 00000000 00000000 00000000 00000000
   00000000 00000000 00000000
   002020: 00000000

dma_d

**cmd:** dma_d

**Description:** Display DMA entries with decode

**Syntax:** dma_d <begin_addr>[- end_addr | num_bytes]

**Example:**

1. Read and decode DMA content from location 0x2000 to 0x2040.

   0:> dma_d 2000-2040

   **** DMA entry @ 0x2000 ****
   Host Address : 00000000:00000000
   NIC Address : 0x00000000
   Complete Q : Unknown
Source Q  : Unknown
Length    : 0
Flags     : 0x00000000
Opaque Data : 0x00000000 0x00000000 0x00000000

**** DMA entry @ 0x2020 ****
Host Address : 00000000:003421F8
NIC Address  : 0x00000000
Complete Q   : Rx Data Complete Q
Source Q     : DMA High Priority WQ
Length       : 16
Flags        : 0x00020004
Opaque Data  : 0xdeadbeef 0xdeadbeef 0xdeadbeef

2. Read and decode 40 bytes DMA content start from location 0x2000.

0:> dma_d 2000 40

**** DMA entry @ 0x2000 ****
Host Address : 00000000:00000000
NIC Address  : 0x00000000
Complete Q   : Unknown
Source Q     : Unknown
Length       : 0
Flags        : 0x00000000
Opaque Data  : 0x00000000 0x00000000 0x00000000

dmatest

   cmd: dmatest

   Description: DMA Test

   Syntax: dmatest [iteration]

   Options:

   -l<u32> Length of data to do DMA
-a<u32> NIC address

-f Force to use 32-bit bus

**Example:**

1. Run DMA test.

   0:> dmatest
   **** Testing low priority DMA ***
   DMAing HOST (@0x003421f8) to NIC (@0x02100) length = 0x400 ... OK
   DMAing NIC (@0x02100) to HOST (@0x003421f8) length = 0x400 ... OK
   Checking data contents ... OK
   **** Testing High priority DMA ***
   DMAing HOST (@0x003421f8) to NIC (@0x00002100) length = 0x400 ... OK
   DMAing NIC (@0x02100) to HOST (@0x003421f8) with length = 0x400 ... OK
   Checking data contents ... OK

2. Display Help.

   0:> dmatest -?
   Usage : dmatest [iteration]
   Options:
   -l<u32> Length of data to do DMA
   -a<u32> NIC address
   -f Force to use 32-bit bus

**txcfg**

**cmd:** txcfg

**Description:** Configure transmits packet protocol

**Syntax:** txcfg
Example:

0:> txcfg
   1. Source MAC
   2. Destination MAC
   3. Length (14-1518)
   4. Packet Type { EthV2(1), 802.3(2), SNAP(3) }
   5. Protocol Field { IP(800) }
   6. Source IP
   7. Destination IP
   8. IP Protocol Field { UDP(17), TCP(6) }
      80. Source Port
      81. Destination Port
   9. IP Option Length (32-bit Words)
  10. TCP Option Length (32-bit Words)
  11. Pattern { Inc(1), Random(2), 0s(3), FFs(4) }
  12. IP Checksum Offload{ YES(1), NO(2) }
  13. TCP/UDP Checksum Offload { YES(1), NO(2) }
  14. TCP/UDP Pseudo Checksum Only { YES(1), NO(2) }
  15. Insert VLAN Tag { YES(1), NO(2) }
  16. VLAN Tag
   0. Exit
Enter your choice (option=paramter) :

**txpkt**

**cmd:** txpkt

**Description:** Transmit Packets. Driver must be loaded.

**Syntax:** txpkt [num_packet]

**Options:**

- -f<u32> Max Number of Fragments
- -j Random number of Fragments
-k Use Random Packet Length
-z<u32> Minimum Fragment Size
-r<u32> Tx Ring Number
-o Insert Fragment Count and Fragment Size into the Packet
-i Incremental Length
-s<u32> Start Packet Length
-d<u32> Interpacket Delay in Microseconds
-g<u32> Tx Flags
-m Use multiple Tx Ring Test
-p<u32> Number of Tx Rings to Use in Multiple Ring Test
-q<u32> Number of Packets per Ring
-b<u32> Burst Length
-l Don’t Initialize Packets
-c Clear Statistics
-x Display Real Time NIC Statistics

Example:

1. Transmitting one packet. Driver must be loaded.

0:> loaddrv
Reinitializing PCI Configuration Space
Bus Number : 0
Device/Funtion : 14/0
Base Address : 0xf4000004
IRQ : 10
Bringing up MAC driver ... OK
0:>

txpkt 1

****************** Blasting Packets ************
Packets to Transmit : 1  Tx Ring Number
Source MAC : 00:01:02:03:04:05
Destination MAC : 10:11:12:13:14:15
Packet Type : Ethernet II
Pattern : Increment (00,01,02 ...)
Interpacket Delay : 0  Fragment Size
Incremental Length : Y  Start Length
IP Checksum Offload : N  TCP/UDP Chks
Pseudo-Chksum Only : N
VLAN Tag Insertion : N  VLAN Tag

****************************************************
Transmitting packet : 1 ( 60 bytes)

rx cfg

cmd: rxcfg

Description Configure RX parameters.

Syntax: rxcfg

Example:

0:>
rxcfg
1. Host Loopback { Enable(1), Disable(2) }
2. Modify Rx Packet { Enable(1), Disable(2) }
3. Dump Rx Packet { None(1), Hex(2), Decode(3) }
4. Dump Rx Length
5. Tx Fragment Length
6. Tx Flags
7. Tx VLAN Tag
8. Tx Ring Number
9. Tx Generate CRC { Enable(1), Disable(2) }
10. Capture Rx Pacpcket { Enable(1), Disable(2) }
0. Exit
stsblk

**cmd:** stsblk

**Description:** Display Statistics Block.

**Syntax:** stsblk

**Example:**

```
0:> stsblk
*************** STATISTICS Block @ 0x0027c0c0 *
  ifHCInOctets    :  0
  ifHCInUcastPkts :  0
  ifHCInBroadcastPkts :  0
  d3StatsAlignmentErrors :  0
  xoffPauseFramesReceived :  0
  xoffStateEntered :  0
  etherStatsJabbers :  0
  inRangeLengthError :  0
  etherStatsPkts64Octets :  0
  etherStatsPkts128-255 :  0
  etherStatsPkts512-1023 :  0
  etherStatsPkts1523-2047 :  0
  etherStatsPkts4096-8191 :  0
  ifHCOutOctets :  0
  outXonSent :  0
  flowControlDone :  0
  d3StatsSingleColFrames :  0
  dt3StatsDeferredTx :  0
  d3StatsLateCol :  0
  d3Collided3Times :  0
  d3Collided5Times :  0
  d3Collided7Times :  0
  d3Collided9Times :  0
  d3Collided11Times :  0
  d3Collided13Times :  0
  d3Collided15Times :  0
```
statusblk

**cmd:** statusblk

**Description:** Display Status Block

**Syntax:** statusblk

**Example:**

```
0:> statusblk
```
reset

**cmd:** reset

**Description:** Reset Chip

**Syntax:** reset

**Example:**

0:-> reset
    Global Resetting CHIP ... OK

phyctrl

**cmd:** phyctrl

**Description:** Configure Phy Speed
Syntax: phyctrl

Options:

-\(s\)<u32> 0:10 Mbps, 1:100 Mbps, 2:1000 Mbps, 3:Auto Negotiation.

-h Force Half Duplex

-r Reset PHYs

-f<string> File contains initialization scripts

Example:

1. Configure Phy into Auto Negotiation, full duplex mode.

0:>
physctrl -s=3 -i=1
Resetting PHY ... OK
PHY ID : 0x0020 - 0x6051
PHY Description : BCM5401 Rev#1
Initializing registers (work-around for BCM5401) ... Done Configure MAC and PHY to ... MII/Full/Auto Negotiation mode

maclpb

cmd: maclpb (B0 only)

Description: Enable or Disable MAC loop back

Syntax: maclpb <0|1>

0 to disable. Otherwise enable

Example:

1. Driver must be loaded before configure.

0:> loaddrv
Reinitializing PCI Configuration Space
Bus Number : 0
Device/Funtion : 14/0
Base Address : 0xf4000004
IRQ : 10
Bringing up MAC driver ... OK

2. Enable MAC loop back.

0:> mcaclpb 1
Enabling MAC loopback ... OK

3. Disable MAC loop back.

0:> maclpb 0
Disabling MAC loopback ... OK

**mread**

**cmd:** mread

**Description:** Read PHY registers via MII

**Syntax:** mread <begin_addr>[-<end_addr> | <len>]

Address range: 0x00 – 0x1F

**Example:**

1. Read MII register 0

0:> mread 0
00: 1100

2. Read MII registers 0 to 10

0:> mread 0-10
00: 1100 7949 0020 6051 01e1 0000 0004 2001
08: 0000 0300 0000 0000 0000 0000 0000 3000
10: 0002
3. Read 5 MII registers start from register

0: > mread 0 5
00: 1100 7949 0020 6051 01e1

mwrite

cmd: mwrite

Description: Write PHY registers via MII

Syntax: mwrite <addr > <value>

Address range: 0x00 – 0x1F

Example:

1. Write 0x15 to MII register 2

0: > mwrite 2 15

mdev

cmd: mdev

Description: Current Phy Selection. The default device ID is 0x01. If no parameter is entered, it displays current phy address setting.

Syntax: mdev [<phy_id>]

Example:

0: > mdev 1
Phy Address = 1

miimode

cmd: miimode

Description: MII auto or manual mode select
**Syntax:** miimode <1|0>

**Example:**

```
0:> miimode 0
Setting MII auto mode to OFF
0:> miimode 1
Setting MII auto mode to ON
0:> miimode
```

**miitest**

**cmd:** miitest [iteration]

**Description:** PHY registers read write test

**Syntax:** miitest

**Example:**

1. Running MII Test.

```
0:> miitest
C4. MII Test. ...............:Passed
```

**read**

**cmd:** read

**Description:** Generic Memory Read

**Syntax:** read [@|#|^|\l|s|x|m]<begin_addr> [- end_addr | num_bytes]

@ = Configuration space (address range: 0x00 – 0xFF)

# = Registers (default) (address range: 0x00 – 0x1FFFFF)

* = SRAM (address range: 0x00 – 0x1FFFFF)
$ = Serial EEPROM

% = Parallel EEPROM

m = MII Registers

^ = internal scratchpad (address range: 0x3000 – 0x37FFFF)

l = direct access (dword)

s = direct access (word)

x = direct access (byte)

**Example:**

1. Read from Configuration space

   0:>
   000010: f4000004

2. Read from Register

   0:>
   000010: f4000004

3. Read from SRAM

   0:>
   000010: 00010001

4. Read from internal scratchpad

   0:>
   000000: 000312ae

**write**

**cmd:** write
**Description:** Generic Memory Write

**Syntax:** write [@|#*|$|m|^|l|s|x]<begin_addr> [- end_addr ] <value>

- @ = Configuration space (address range: 0x00 – 0xFF)
- # = Registers (default) (address range: 0x00 – 0x1FFFF)
- * = SRAM (address range: 0x00 – 0x1FFFF)
- $ = Serial EEPROM
- % = Parallel EEPROM
- m = MII Registers
- ^ = internal scratchpad (address range: 0x3000 – 0x37FFFF)
- l = direct access (dword)
- s = direct access (word)
- x = direct access (byte)

**Example:**

1. Write to configuration space.
   
   0:> write @10 f4000004

2. Write to register.
   
   0:> write #10 f4000004

3. Write to SRAM
   
   0:> write *10 10001

4. Write to internal scratchpad
memtest

cmd: memtest

**Description:** Test memory blocks such as scratch pad, BD sram, DMA sram, Mbuf, external SRAM. Running "diagcfg" can configure memory block ranges. See "diagcfg" for detail. Driver must be unloaded.

**Syntax:** memtest [iteration]

**Options:**

- `-s` : Test Scratch Pad (0x30000-0x37fff)
- `-b` : Test BD SRAM (0x0000-0x0fff and 0x4000-0x7fff)
- `-d` : Test DMA SRAM (0x2000-0x3fff)
- `-m` : Test MBUF SRAM (0x8000-0x1ffff)
- `-e` : Test External Memory (0x20000-0xXXXXXXXX)
- `-x` : Test MBUF SRAM via DMA
- `-c` : Test MBUF special test

**Example:**

1. Unload driver if driver loaded, run memory test 1 time. Scratch Pad, DMA blocks had been selected in this example.

   0:> unloaddrv
   Unloading MAC driver ... OK
   0:> memtest

   **B1. Scratch Pad Test**
   **Data Read/Write Test:**
Data Pattern 0x00000000.......: Passed  
Data Pattern 0xFFFFFFFF.......: Passed  
Data Pattern 0xAA55AA55.......: Passed  
Data Pattern 0x55AA55AA.......: Passed  
Alternate Pattern:  
Data Pattern 0x00000000.......: Passed  
Data Pattern 0xFFFFFFFF.......: Passed  
Data Pattern 0xAA55AA55.......: Passed  
Data Pattern 0x55AA55AA.......: Passed  
Address Test....................: Passed  
Walking bit.....................: Passed  
Pseudo Random Data..............: Passed  

B2. BD SRAM Test  
Data Read/Write Test:  
Data Pattern 0x00000000.......: Passed  
Data Pattern 0xFFFFFFFF.......: Passed  
Data Pattern 0xAA55AA55.......: Passed  
Data Pattern 0x55AA55AA.......: Passed  
Alternate Pattern:  
Data Pattern 0x00000000.......: Passed  
Data Pattern 0xFFFFFFFF.......: Passed  
Data Pattern 0xAA55AA55.......: Passed  
Data Pattern 0x55AA55AA.......: Passed  
Address Test....................: Passed  
Walking bit.....................: Passed  
Pseudo Random Data..............: Passed  

Data Read/Write Test:  
Data Pattern 0x00000000.......: Passed  
Data Pattern 0xFFFFFFFF.......: Passed  
Data Pattern 0xAA55AA55.......: Passed  
Data Pattern 0x55AA55AA.......: Passed  
Alternate Pattern:  
Data Pattern 0x00000000.......: Passed  
Data Pattern 0xFFFFFFFF.......: Passed  
Data Pattern 0xAA55AA55.......: Passed  
Data Pattern 0x55AA55AA.......: Passed  
Address Test....................: Passed  
Walking bit.....................: Passed  
Pseudo Random Data..............: Passed
B4. MBUF SRAM Test
Data Read/Write Test:
Data Pattern 0x00000000.......: Passed
Data Pattern 0xFFFFFFFF......: Passed
Data Pattern 0xAA55AA55.......: Passed
Data Pattern 0x55AA55AA.......: Passed
Alternate Pattern:
Data Pattern 0x00000000.......: Passed
Data Pattern 0xFFFFFFFF......: Passed
Data Pattern 0xAA55AA55.......: Passed
Data Pattern 0x55AA55AA.......: Passed
Address Test....................: Passed
Walking bit.....................: Passed
Pseudo Random Data............: Passed

pmdcfg

cmd: pmdcfg

Description: Display Power Management Info

Syntax: pmdcfg

Example:

0:-> pmdcfg
PMCSR : 0x2100
PM Capability : 0xc002
Data Scale  : 1
D0 Power Consumed  (00) : 0x00
D1 Power Consumed  (01) : 0x00
D2 Power Consumed  (02) : 0x00
D3 Power Consumed  (03) : 0x00
D0 Power Dissipated (04) : 0x00
D1 Power Dissipated (05) : 0x00
D2 Power Dissipated (06) : 0x00
D3 Power Dissipated (07) : 0x00
Common Power Cons. (08) : 0x00
pmpd

cmd: pmpd

Description: Power Down MAC. Input file wol.txt should be found in the same location of b57diag.exe. The input file contains patterns. If the file name is not specified, data zero will be used.

Syntax: pmpd [filename]

Options:

-a<u32> 0 to add a pattern; 1 means otherwise

-o<u32> Offset

-m<1:0> 1 enables Magic MAC detection

-i<1:0> 1 enables ACPI Packet Match

-v<1:0> Verbose level

Example:

1. Power down MAC

   0:> pmpd -a=0 -o=0 -m=1 -i=1 -v=1
   No input file specified... Data Pattern contains zeros

   Wake-On-Lan Patterns :

   Halting MAC ... OK
Programming patterns to H/W ... OK
Programming ACPI Registers Buf @ 0x00000800 offset = 0
length = 128.
Enable ACPI Pattern Match
Enable Magic MAC detection

intr

cmd: intr

Description: Display Interrupt Info

Syntax: intr

Example:

0:-> intr
Interrupt Count : 3
IPC MASK : 0xb8 0x0b
IPC IS1 IS2 : 0x00 0x00
IPC IRR1 IRR2 : 0x00 0x00
IPC ILCR1 ILCR2 : 0x00 0x0e

intrtest

cmd: intrtest

Description: Interrupt Test

Syntax: intrtest [iteration]

Example:

1. Running interrupt test 2 times.

0:-> intrtest 2
Iteration 1 of 2:
A4. Interrupt Test...:Passed
Iteration 2 of 2:
A4. Interrupt Test...: Passed

machalt

cmd: machalt

Description: Halt MAC controller

Syntax: machalt

Example:

0:> machalt
Halting MAC ... OK

addmc

cmd: addmc

Description: Add Multicast MAC

Syntax: addmc address0 [address1...]

Example:

0:> addmc FF:FF:00:0A:00:00

delmc

cmd: delmc

Description: Delete Multicast MAC

Syntax: delmc address0 [address1...]

Example:

0:> delmc FF:FF:00:0A:00:00
ftq

**cmd:** ftq

**Description:** Display FTQ info

**Syntax:** ftq

**Example:**

```
0:>

***** Dump FTQ Peak/Write (Control,Full Counte
DMA Read FTQ (1) : 00000000 00000000
DMA High Read FTQ (2) : 00000000 00000000
DMA Write FTQ (6) : 00000000 00000000
DMA High Write FTQ (7) : 00000000 00000000
DMA Complete Dx FTQ (3) : 00000000 00000000
Send BD Comp. FTQ (4) : 00000000 00000000
Send Data Init FTQ (5) : 00000000 00000000
Send Data Comp. FTQ (9) : 00000000 00000000
Rx BD Complete FTQ (13) : 00000000 00000000
Rx Data Complete FTQ (16) : 00000000 00000000
S/W Type 1 FTQ (8) : 00000000 00000000
Host Coalescing FTQ (10) : 00000000 00000000
MAC TX FTQ (11) : 00000000 00000000
Mbuf Cluster Free FTQ (12) : 00000000 00000000
RX List Placement FTQ (14) : 00000000 00000000
RX Data Initiator FTQ (15) : 00000000 00000000
S/W Type 2 FTQ (17) : 00000000 00000000
```

mbuf

**cmd:** mbuf

**Description:** Display Content of MBUFs

**Syntax:** mbuf <chain|info|cluster|hdr|ckhdr|dump [</mbuf
Options:

-m : MBUF number to display/decode. 0:decode, 1: in hex

Example:

1. Display MBUF.

   0:> mbuf dump -m1
   ***** MBUFS 0x100 @ 0x00008000 *****
   00008080 00000000 00000000 00000000 00000000
   00000000 00000000 00000000 00000000 00000000
   00000000 00000000 00000000 00000000 00000000
   00000000 00000000 00000000 00000000 00000000
   Chain : 0  Frame : 0  Next MBUF : 0x0101
   Next Frame Pointer : 0x00000000
   Data:
   00000000 00000000 00000000 00000000 00000000
   00000000 00000000 00000000 00000000 00000000
   00000000 00000000 00000000 00000000 00000000
   00000000 00000000 00000000 00000000 00000000

2. Display MBUF chain.

   0:> mbuf chain ->143->144->145->146->147->148->149->14a->14b->14c->14d->14e->14f->150
   >161->162->163->164->165->166->167->168->169->16a->16b->16c ->16d->16e->16f->170->
   >171->172->173->174->175->176->177->178->179->17a

loaddrv
**cmd:** loaddrv

**Description:** Load NIC driver

**Syntax:** loaddrv

**Example:**

```
0:>
Reinitializing PCI Configuration Space
Bus Number      : 0
Device/Funtion  : 14/0
Base Address    : 0xf4000004
IRQ             : 10
Bringing up MAC driver ... OK
```

**unloaddrv**

**cmd:** unloaddrv

**Description:** Unload NIC driver

**Syntax:** unloaddrv

**Example:**

```
0:>
Unloading MAC driver ... OK
```

**loadfw**

**cmd:** loadfw

**Description:** Load Firmware to TX & RX CPUs

**Syntax:** loadfw <-f=filename | -r | -t> | <-> for help

   -f : firmware file
-r : Load firmware to RX-CPU
-t : Load firmware to TX-CPU

Example:

0:> loadfw -?
Usage : loadfw <t|r> <filename>

Use ‘t’ option to load firmware to TX CPU and ‘r’ to RX CPU. File name also must be specified.

nicetest

cmd: nicetest

Description: NIC test includes memory test, serial eeprom test, interrupt test, packet exchange, MAC registers test, Mii registers test, cpu test, dma test. This test need to be configured by running "diagcfg". See "diagcfg" for detail.

Syntax: nicetest [iteration]

Example:

0:> nicetest

Testing Device:
  0:PCI BUS#3:BCM5700(B0),0xfd00004,IRQ 11,Con

Manufacturing revision    : C
Boot Code revision        : 0.8

Group A. Register Tests
  A1. Indirect Register Test..........: Passed
  A2. Control Register Test..........: Passed
  A4. Interrupt Test...............: Passed

Group B. Memory Tests
  B1. Scratch Pad Test
Data Read/Write Test:
  Data Pattern 0x00000000.......: Passed
  Data Pattern 0xFFFFFFFF.......: Passed
  Data Pattern 0xAA55AA55.......: Passed
  Data Pattern 0x55AA55AA.......: Passed
Alternate Pattern:
  Data Pattern 0x00000000.......: Passed
  Data Pattern 0xFFFFFFFF.......: Passed
  Data Pattern 0xAA55AA55.......: Passed
  Data Pattern 0x55AA55AA.......: Passed
Address Test....................: Passed
Walking bit.....................: Passed
Pseudo Random Data..............: Passed

B2. BD SRAM Test
Data Read/Write Test:
  Data Pattern 0x00000000.......: Passed
  Data Pattern 0xFFFFFFFF.......: Passed
  Data Pattern 0xAA55AA55.......: Passed
  Data Pattern 0x55AA55AA.......: Passed
Alternate Pattern:
  Data Pattern 0x00000000.......: Passed
  Data Pattern 0xFFFFFFFF.......: Passed
  Data Pattern 0xAA55AA55.......: Passed
  Data Pattern 0x55AA55AA.......: Passed
Address Test....................: Passed
Walking bit.....................: Passed
Pseudo Random Data..............: Passed
Data Read/Write Test:
  Data Pattern 0x00000000.......: Passed
  Data Pattern 0xFFFFFFFF.......: Passed
  Data Pattern 0xAA55AA55.......: Passed
  Data Pattern 0x55AA55AA.......: Passed
Alternate Pattern:
  Data Pattern 0x00000000.......: Passed
  Data Pattern 0xFFFFFFFF.......: Passed
  Data Pattern 0xAA55AA55.......: Passed
  Data Pattern 0x55AA55AA.......: Passed
Address Test..........................: Passed
Walking bit..........................: Passed
Pseudo Random Data..................: Passed

B3. DMA SRAM Test
Data Read/Write Test:
  Data Pattern 0x00000000...........: Passed
  Data Pattern 0xFFFFFFFF...........: Passed
  Data Pattern 0xAA55AA55...........: Passed
  Data Pattern 0x55AA55AA...........: Passed
Alternate Pattern:
  Data Pattern 0x00000000...........: Passed
  Data Pattern 0xFFFFFFFF...........: Passed
  Data Pattern 0xAA55AA55...........: Passed
  Data Pattern 0x55AA55AA...........: Passed
Address Test..........................: Passed
Walking bit..........................: Passed
Pseudo Random Data..................: Passed

B4. MBUF SRAM Test
Data Read/Write Test:
  Data Pattern 0x00000000...........: Passed
  Data Pattern 0xFFFFFFFF...........: Passed
  Data Pattern 0xAA55AA55...........: Passed
  Data Pattern 0x55AA55AA...........: Passed
Alternate Pattern:
  Data Pattern 0x00000000...........: Passed
  Data Pattern 0xFFFFFFFF...........: Passed
  Data Pattern 0xAA55AA55...........: Passed
  Data Pattern 0x55AA55AA...........: Passed
Address Test..........................: Passed
Walking bit..........................: Passed
Pseudo Random Data..................: Passed

B6. MBUF SRAM via DMA Test
Testing pattern 16 00's 16 FF's ....: Passed
Testing pattern 16 FF's 16 00's ....: Passed
Testing pattern 32 00's 32 FF's ....: Passed
Testing pattern 32 FF's 32 00's ....: Passed
Testing pattern 00000000's ........: Passed
Testing pattern FFFFFFFFFFF's ........: Passed
Testing pattern AA55AA55's ........: Passed
Testing pattern 55AA55AA's ........: Passed

Group C. Miscellaneous Tests
C1. EEPROM Test..............................: Passed
C2. CPU Test..................................: Passed
C3. DMA Test
  Low Priority............................: Passed
  High Priority............................: Passed
C4. MII Test..................................: Passed
C5. VPD Test..................................: Passed

Group D. Data Tests
D1. Internal Loopback Test................: Passed
D2. Phy Loopback Test......................: Passed

**nicstats**

**cmd:** nicstats

**Description:** Display NIC test statistics

**Syntax:** nicstats <-c>

  -c : Clear Statistics

**Example:** Load driver if driver is not loaded.

```
0:>
Reinitializing PCI Configuration Space
Bus Number : 0
Device/Funtion : 14/0
Base Address : 0xf4000004
IRQ : 10
Bringing up MAC driver ... OK
0:>
icstats

==============

Txed Packets (Ring#0) : 0
```
CHIP Statistics

<table>
<thead>
<tr>
<th>Count Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Txed Packets (Ring#1)</td>
<td>0</td>
</tr>
<tr>
<td>Txed Packets (Ring#2)</td>
<td>0</td>
</tr>
<tr>
<td>Txed Packets (Ring#3)</td>
<td>0</td>
</tr>
<tr>
<td>Tx Packets Enq'd (Ring#0)</td>
<td>0</td>
</tr>
<tr>
<td>Tx Packets Enq'd (Ring#1)</td>
<td>0</td>
</tr>
<tr>
<td>Tx Packets Enq'd (Ring#2)</td>
<td>0</td>
</tr>
<tr>
<td>Tx Packets Enq'd (Ring#3)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#00)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#01)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#02)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#03)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#04)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#05)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#06)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#07)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#08)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#09)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#10)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#11)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#12)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#13)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#14)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed Packets (Ring#15)</td>
<td>0</td>
</tr>
<tr>
<td>Rxed CRC-32 Errors</td>
<td>0</td>
</tr>
<tr>
<td>Out of Memory</td>
<td>0</td>
</tr>
<tr>
<td>Too Many Frag Pkt</td>
<td>0</td>
</tr>
</tbody>
</table>

PageUP/PageDN to scroll. Ins/Del toggles refresh.
<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifHCInOctets</td>
<td>0</td>
</tr>
<tr>
<td>ifHCInUcastPkts</td>
<td>0</td>
</tr>
<tr>
<td>ifHCInBroadcastPkts</td>
<td>0</td>
</tr>
<tr>
<td>d3StatsAlignmentErrors</td>
<td>0</td>
</tr>
<tr>
<td>xoffPauseFramesReceived</td>
<td>0</td>
</tr>
<tr>
<td>xoffStateEntered</td>
<td>0</td>
</tr>
<tr>
<td>etherStatsJabbers</td>
<td>0</td>
</tr>
<tr>
<td>inRangeLengthError</td>
<td>0</td>
</tr>
<tr>
<td>etherStatsPkts640octets</td>
<td>0</td>
</tr>
<tr>
<td>etherStatsPkts128-255</td>
<td>0</td>
</tr>
<tr>
<td>etherStatsPkts512-1023</td>
<td>0</td>
</tr>
<tr>
<td>etherStatsPkts1523-2047</td>
<td>0</td>
</tr>
<tr>
<td>etherStatsPkts4096-8191</td>
<td>0</td>
</tr>
<tr>
<td>ifHCOutOctets</td>
<td>0</td>
</tr>
<tr>
<td>outXonSent</td>
<td>0</td>
</tr>
<tr>
<td>flowControlDone</td>
<td>0</td>
</tr>
<tr>
<td>d3StatsSingleColFrames</td>
<td>0</td>
</tr>
<tr>
<td>d3StatsDeferredTx</td>
<td>0</td>
</tr>
<tr>
<td>d3StatsLateCol</td>
<td>0</td>
</tr>
<tr>
<td>d3Collided3Times</td>
<td>0</td>
</tr>
<tr>
<td>d3Collided5Times</td>
<td>0</td>
</tr>
<tr>
<td>d3Collided7Times</td>
<td>0</td>
</tr>
<tr>
<td>d3Collided9Times</td>
<td>0</td>
</tr>
<tr>
<td>d3Collided11Times</td>
<td>0</td>
</tr>
<tr>
<td>d3Collided13Times</td>
<td>0</td>
</tr>
<tr>
<td>d3Collided15Times</td>
<td>0</td>
</tr>
<tr>
<td>d3StatsCarSenseErrors</td>
<td>0</td>
</tr>
<tr>
<td>COSIfHCInPkt[00]</td>
<td>0</td>
</tr>
<tr>
<td>COSIfHCInPkt[02]</td>
<td>0</td>
</tr>
<tr>
<td>COSIfHCInPkt[04]</td>
<td>0</td>
</tr>
</tbody>
</table>

PageUP/PageDN to scroll. Ins/Del toggles refresh.
.
icDmaWrHiPQFull : 0  nicNoMoreRxBDs : 0
.

PageUP/PageDN to scroll. Ins/Del toggles refresh.

CHIP Statistics
=========================================================================
ifInDiscards : 0  ifInErrors : 0  nicRecvThresholdHit : 0
.
icDmaReadQueueFull : 0  COSIfHCOutPkts[00] : 0  COSIfHCOutPkts[02] : 0  COSIfHCOutPkts[04] : 0
.
Rxed Packets (Ring#05) : 0  Rxed Packets (Ring#06) : 0  Rxed Packets (Ring#07) : 0  Rxed Packets (Ring#08) : 0  Rxed Packets (Ring#09) : 0
.

PageUP/PageDN to scroll. Ins/Del toggles refresh.

regtest

**cmd:** regtest

**Description:** MAC registers read write test. Driver must be unloaded.

**Syntax:** regtest [<iteration>]
Example:

1. Running register test.
   0:>
   unloadrv
   Unloading MAC driver ... OK
   0:> regtest

   A2. Control Register Test ...:Passed

dbg

cmd: debug

Description: Display debugs information

Syntax: debug <n>

1: Dump TX / RX Stats
2: Dump Clock Scale info
3: Clear worst interrupt latency
4: Toggle indirect access flag

Example:

1. Display debug information.
   0:> debug 1
   Tx Packets Enqueued : 0
   Tx Packet Complete  : 0
   Tx Packet Complete Error : 0
   Rx Packets          : 0
   Rx Unknown Packets  : 0
   Rx Bad Packets      : 0
   Rx Good Packets     : 0
pciscan

cmd: pciscan

Description: Scan for all PCI Devices

Syntax: pciscan

Example:

0:> pciscan
Scanning PCI devices ...
Bus Dev Func Vendor ID Device ID Class E
=== === === === ========= ========= =========
0 0 0 8086 7190 06:00:00 (0
0 1 0 8086 7191 06:04:00 (0
0 7 0 8086 7110 06:01:00 (0
0 7 1 8086 7111 01:01:80 (0
0 7 2 8086 7112 0C:03:00 (0
0 7 3 8086 7113 06:80:00 (0
0 14 0 12AE 0003 02:00:00 (0
1 0 0 1002 4742 03:00:00 (0

diagcfg

cmd: diagcfg

Description: Configure diagnostics parameter for Memory tests and Manufacturing test (NIC test).

Syntax: diagcfg

Example:

0:misc> diagcfg

Diagnostics Configuration Menu
1. Memory Test Configuration Menu
2. Manufacturing Test Configuration Menu
3. Driver Configuration Menu
4. Abort On Failure {Yes(1), No(0)} : Yes
5. Verbose Level (0..6) : 2

Enter your choice (option=paramter/save/cancel)

Memory Test Configuration Menu

1. SRAM BD1 Start (0x00000000-0x00000fff) : 00000000
2. SRAM BD1 End (0x00000000-0x00000fff) :
3. SRAM BD2 Start (0x00004000-0x00007fff) :
4. SRAM BD2 End (0x00004000-0x00007fff) :
5. SRAM DMA Start (0x00002000-0x00003fff) :
6. SRAM DMA End (0x00002000-0x00003fff) :
7. SRAM MBUF Start (0x00008000-0x0001ffff) :
8. SRAM MBUF End (0x00008000-0x0001ffff) :
9. SRAM SPAD Start (0x00030000-0x00037fff) :
10. SRAM SPAD End (0x00030000-0x00037fff) :
11. Ext. SRAM Start (0x00020000-0x00ffffff) :
12. Ext. SRAM End (0x00020000-0x00ffffff) :
0. Exit to previous menu

Enter your choice (option=paramter) :

Diagnostics Configuration Menu

1. Memory Test Configuration Menu
2. Manufacturing Test Configuration Menu
3. Driver Configuration Menu
4. Abort On Failure {Yes(1), No(0)} :
5. Verbose Level (0..6) :
Enter your choice (option=parameter/save/cancel)

Manufacturing Test Configuration Menu

1. Register Test { Enable(1), Disable(2) }
2. Memory Test { Enable(1), Disable(2) }
3. Serial EEPROM Test { Enable(1), Disable(2) }
4. Interrupt Test { Enable(1), Disable(2) }
5. CPU Test { Enable(1), Disable(2) }
6. DMA Test { Enable(1), Disable(2) }
7. VPD Test { Enable(1), Disable(2) }
8. MII Test { Enable(1), Disable(2) }
9. Packet Tx/Rx { Enable(1), Disable(2) }
0. Exit to previous menu

Enter your choice (option=parameter) :

Diagnostics Configuration Menu

1. Memory Test Configuration Menu
2. Manufacturing Test Configuration Menu
3. Driver Configuration Menu
4. Abort On Failure {Yes(1), No(0)}
5. Verbose Level (0..6)

Enter your choice (option=parameter/save/cancel)

Driver Configuration Menu

1. Rx Coalescing Ticks : 1000
2. Rx Coalescing Ticks During Intr : 0
3. Rx Coalescing Frames : 1
4. Rx Coalescing Frames During Intr : 0
5. Tx Coalescing Ticks : 1000
6. Tx Coalescing Ticks During Intr : 0
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>Tx Coalescing Frames</td>
</tr>
<tr>
<td>8.</td>
<td>Tx Coalescing Frames During Intr</td>
</tr>
<tr>
<td>9.</td>
<td>Statistics Coalescing Ticks</td>
</tr>
<tr>
<td>10.</td>
<td>Tx Packet Descriptor Count</td>
</tr>
<tr>
<td>11.</td>
<td>Rx Standard Packet Count</td>
</tr>
<tr>
<td>12.</td>
<td>Rx Jumbo Packet Count</td>
</tr>
<tr>
<td>13.</td>
<td>Queue Rx Packets</td>
</tr>
<tr>
<td>14.</td>
<td>Tx Copy Buffer Size</td>
</tr>
<tr>
<td>15.</td>
<td>External Memory Exists</td>
</tr>
<tr>
<td>16.</td>
<td>MBUF Base</td>
</tr>
<tr>
<td>17.</td>
<td>MBUF Length</td>
</tr>
<tr>
<td>18.</td>
<td>MBUF WorkAround</td>
</tr>
</tbody>
</table>

0. Exit to previous menu

**log**

**cmd:** log

**Description:** Save all output to log file (ttp.log)

**Syntax:** log

**Example:**

```
0:>
```

```
log
started logfile `b57diag.log`
```

**nolog**

**cmd:** nolog

**Description:** Closes Log file

**Syntax:** nolog

**Example:**

```
0:>
```

```
nolog
```
logfile closed

radix

**cmd:** radix

**Description:** Set the base of input number.

**Syntax:** radix <2 | 8 | 10 | 16>

**Example:** Set base of input number to hex

```
0:> radix 16
0:> radix
current input radix = 16
```

exit, quit

**cmd:** exit, quit

**Description:** Exit System

**Syntax:** exit

**Example:**

```
0:> exit
```

blast

**cmd:** blast

**Description:** Blast Packets in Poll Mode and display statistics. Load MAC driver before running the test.

**Syntax:** blast -l=<length> -t -r -h -c=<num_buf> -k -s

- **-l:** Length of Tx packet (Default = 64)
-t : Enable Tx
-r : Enable Rx
-h : Enable Host Loopback *
-c : Number of Tx buffer (Default = 100)
-k : Applies CRC-32 check on Rx path
-s : Stop on Failure

*Workaround A1 memory Problem: In order to use –h option do the followings.

1. loaddrv
2. mbuf –w=1
3. blast –h
4. Start SmartBit to inject traffic. Watch for CRC Error indication.

**Example:**

1. Load MAC driver and enable transmission.
   0:packet> loaddrv
   PHY ID : 0x0020 - 0x6051
   PHY Description : BCM5401 Rev#1
   Configuring BCM5401 ... Done
   Reinitializing PCI Configuration Space
   Bus Number : 0
   Device/Funtion : 14/0
   Base Address : 0xf4000004
   IRQ : 10
   Bringing up MAC driver ... OK
   0:packet> blast -t
   PageUP/PageDN to scroll. Ins/Del toggles refresh. E Total
                                ===========
   Txed Packets (Ring#0) : 1007609
   Txed Packets (Ring#1) : 0
Txed Packets (Ring#2) : 0
Txed Packets (Ring#3) : 0
Tx Packets Enqed (Ring#0) : 0
Tx Packets Enqed (Ring#1) : 0
Tx Packets Enqed (Ring#2) : 0
Tx Packets Enqed (Ring#3) : 0
Rxed Packets (Ring#00) : 0
Rxed Packets (Ring#01) : 0
Rxed Packets (Ring#02) : 0
Rxed Packets (Ring#03) : 0
Rxed Packets (Ring#04) : 0
Rxed Packets (Ring#05) : 0
Rxed Packets (Ring#06) : 0
Rxed Packets (Ring#07) : 0
Rxed Packets (Ring#08) : 0
Rxed Packets (Ring#09) : 0

PageUP/PageDN to scroll. Ins/Del toggles refresh.

2. Display Help.
0:packet> blast -?
Usage : blast -l= -t -r -h -c= -k -s
- l : Length of Tx packet (Default = 64)
- t : Enable Tx
- r : Enable Rx
- h : Enable Host Loopback
- c : Number of Tx buffer (Default = 100)
- k : Applies CRC-32 check on Rx path
- s : Stop on Failure

gpiowrite

cmd: gpiowrite

Description: Control Output of GPIO Pin
Syntax: gpiowrite <GPIO_num> <1 | 0>

Valid value for <GPIO_num> is 0-2, <value> is 0 or 1.

Example:

1. Write 1 to GPIO#1 Pin

  0:> gpiowrite 1 1

  Writing 1 to GPIO#1

gpioread

cmd: gpioread

Description: Get Input of GPIO Pin

Syntax: gpioread

Example:

1. Read GPIO Pins

  0:> gpioread
  GPIO#0 : 1
  GPIO#1 : 1
  GPIO#2 : 1

version

cmd: version

Description: Display Diagnostics Version

Syntax: version

ringIndex
**cmd:**

**Description:** Dump Ring Index. Load Mac driver before running.

**Syntax:** `ringindex t | r | rt`

**Example:**

1 Load MAC dirver and display TX and RX Ring Index.
0:> loaddrv
PHY ID : 0x0020 - 0x6051
PHY Description : BCM5401 Rev#1
Configuring BCM5401 ... Done
Bringing up MAC driver ... OK
0:> ringindex rt

<table>
<thead>
<tr>
<th>Mailbox</th>
<th>RBDI</th>
<th>RBDC</th>
<th>HC</th>
<th>Sts</th>
</tr>
</thead>
<tbody>
<tr>
<td>RxStdPidx</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>---</td>
</tr>
<tr>
<td>RxStdCidx</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>000</td>
</tr>
<tr>
<td>RetRPidx#00</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>000</td>
</tr>
<tr>
<td>RetRCidx#00</td>
<td>000</td>
<td>---</td>
<td>---</td>
<td>000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mailbox</th>
<th>SBDI</th>
<th>SBDSEL</th>
<th>HC</th>
<th>StsB</th>
</tr>
</thead>
<tbody>
<tr>
<td>SendHostPidx#00</td>
<td>000</td>
<td>000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>SendHostCidx#00</td>
<td>---</td>
<td>---</td>
<td>000</td>
<td>000</td>
</tr>
<tr>
<td>SendHostPidx#01</td>
<td>000</td>
<td>000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>SendHostCidx#01</td>
<td>---</td>
<td>---</td>
<td>000</td>
<td>000</td>
</tr>
<tr>
<td>SendHostPidx#02</td>
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<td>000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>SendHostCidx#02</td>
<td>---</td>
<td>---</td>
<td>000</td>
<td>000</td>
</tr>
<tr>
<td>SendHostPidx#03</td>
<td>000</td>
<td>000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>SendHostCidx#03</td>
<td>---</td>
<td>---</td>
<td>000</td>
<td>000</td>
</tr>
</tbody>
</table>

dos

**cmd:** dos
**Description:** Enter to Dos shell

**Syntax:** dos

**Example:**

0:>	dos

pxecpy

**cmd:** pxecpy

**Description:** Copy PXE code to MBUF memory

**Syntax:** pxecpy <file>

**Example:**

0:>	pxecpy -?

*Usage:* pxecpy <filename>

*Description:*

The file name must be specified in the parameter.

pciinit

**cmd:** pciinit

**Description:** Initialize PCI configuration registers

**Syntax:** pciinit

**Example:**

0:misc> pciinit

Initializing PCI Configuration Space
Bus Number : 0
Device/Funtion : 14/0
Base Address : 0xf4000004
IRQ : 10
Broadcom 5700 NIC is detected

intrctrl

**cmd:** intrctrl

**Description:** Control Interrupt Controller

**Syntax:** intrctrl u|m

  u : unmask current interrupt

  m : mask current interrupt

**Example:**

1. Mask current interrupt
   0:irq> intrctrl m
   Masking Interrupt 10
2. Unmask current interrupt
   0:irq> intrctrl u
   Unmasking Interrupt 10

upgfrm

**cmd:** upgfrm

**Description:** Upgrade boot code firmware or PXE.

**Syntax:** upgfrm <pxe | boot> <filename>

Examples:

1. Upgrade boot code firmware from eeprom.bin
   
   **Upgfrm boot eeprom.bin**
2. Upgrade PXE code from b57pxe.bin

Upgfrm pxe b57pxe.bin

pkttest

**Command:** pkttest

**Description:** Perform MAC and/or PHY loopback test. This test will send 100 packets in incremental length and check for contents of loopbacked packets.

**Syntax:** pkttest \[<iteration>\]

**Options:**
- \(-m\) : Perform MAC loopback test.
- \(-p\) : Perform PHY loopback test.
- \(-e\) : External Loopback Test

**Examples:**

```
pkttest –pm 3 -- Perform MAC and PHY loopback in 3 iterations.
```

teste

**Command:** teste

**Description:** The command enables tests. It effects nicetest, regtest, pkttest, and memtest commands. The test must starts with test group alpha (a-d). If no number is entered, all tests in that group are enabled.

**Syntax:** teste \[<tests> [<tests>…]\]

**Example:** teste a12bc -- Enable test a1, a2, all tests in group b and c
**teste ab cd** -- Enables all tests

**teste** -- Display enabled tests

---

**testd**

**Command:** `testd`

**Description:** The command disables tests. It effects nictest, regtest, pkttest, and memtest commands. The test must starts with test group alpha (a-d). If no number is entered, all tests in that group are disabled.

**Syntax:** `testd [<tests> [<tests>…]]`

**Example:** `testd a12bc` -- Disable test a1, a2, and all tests in group b and c.

  - `testd ab cd` -- Disables all tests.
  - `testd` -- Display disabled tests.

---

**lbertram**

**Command:** `lbertram`

**Description:** Load data to PHY BIST RAM

**Syntax:** `lbertram [filename]`

**Options:** `-f <string>` Filename containing BIST data

  - `-c <u32>` Channel Number

  - `-e` Enable BIST
dbertram

Command: dbertram

Description: Dump PHY BIST RAM

Syntax: dbertram

Options: -c<u32> Channel Number
-t Dump Tx BIST RAM
-r Dump Rx BIST RAM
-b<u32> Begin of BIST RAM
-e<u32> End of BIST RAM

bertstats

Command: bertstats

Description: Dump PHY BIST statistics

Syntax: bertstats

bustest

Command: bustest

Description: Dump PHY BIST statistics

Syntax: bustest

Options: -a NIC
-l Minimum len
**There are total 260 test cases (258 unique tests cases)**

<table>
<thead>
<tr>
<th>Test case#</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ffffffff ffffffff 00000000</td>
</tr>
<tr>
<td>1</td>
<td>ffffffff ffffffff 00000000</td>
</tr>
<tr>
<td>2</td>
<td>ffffffff ffffffff 00000000</td>
</tr>
<tr>
<td>64</td>
<td>7fffffff ffffffff 00000000</td>
</tr>
<tr>
<td>65</td>
<td>00000000 00000000 ffffffff</td>
</tr>
<tr>
<td>66</td>
<td>00000000 00000000 ffffffff</td>
</tr>
<tr>
<td>67</td>
<td>00000000 00000000 ffffffff</td>
</tr>
<tr>
<td>129</td>
<td>00000000 00000000 7fffffff</td>
</tr>
<tr>
<td>130</td>
<td>00000000 00000000 ffffffff</td>
</tr>
<tr>
<td>131</td>
<td>00000000 00000001 ffffffff</td>
</tr>
<tr>
<td>132</td>
<td>00000000 00000002 ffffffff</td>
</tr>
<tr>
<td>194</td>
<td>80000000 00000000 ffffffff</td>
</tr>
<tr>
<td>195</td>
<td>ffffffff ffffffff 00000000</td>
</tr>
<tr>
<td>196</td>
<td>ffffffff ffffffff 00000000</td>
</tr>
<tr>
<td>197</td>
<td>ffffffff ffffffff 00000000</td>
</tr>
</tbody>
</table>
If you run bustest command without any parameters,

byte 0-4 : length
byte 5-6 : iteration#
byte 6-7 : test case#
ERROR MESSAGES

/* 0 */   "PASS",
/* 1 */   "Got 0x%08X @ 0x%08X. Expected 0x%08X"
/* 2 */   "Cannot perform task while chip is run
/* 3 */   "Invalid NIC device",
/* 4 */   "Read only bit %s got changed after wr
/* 5 */   "Read only bit %s got changed after wr
/* 6 */   "Read/Write bit %s did not get cleared
/* 7 */   "Read/Write bit %s did not get set aft
/* 8 */   "BIST failed",
/* 9 */   "Could not generate interrupt",
/* 10 */  "Aborted by user",
/* 11 */  "Tx DMA:Got 0x%08X @ 0x%08X. Expected
/* 12 */  "Rx DMA:Got 0x%08X @ 0x%08X. Expected
/* 13 */  "Tx DMA failed",
/* 14 */  "Rx DMA failed",
/* 15 */  "Data error, got 0x%08X at 0x%08X, exp
/* 16 */  "Second read error, got 0x%08X at 0x%0
/* 17 */  "Failed writing EEPROM at 0x%04X",
/* 18 */  "Failed reading EEPROM at 0x%04X",
/* 19 */  "EEPROM data error, got 0x08X at 0x04X
/* 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
/* 28 */  "DMA:Got 0x%08X @ 0x%08X. Expected 0x%08X"
/* 29 */  "Unsupported PhyId %04X:%04X",
/* 30 */  "Too many registers specified in the f
/* 31 */  "Cannot write to VPD memory",
/* 32 */  "VPD data error, got %08X @ 0x04X, exp
/* 33 */  "No good link! Check Loopback plug",
/* 34 */  "Cannot TX Packet!",
/* 35 */  "Requested to Tx %d. Only %d is transm
/*36*/  "Expected %d packets. Only %d good 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 b
/* 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
/* 51 */  "Cannot open register define file or c
/* 52 */  "ASF Reset bit did not self-cleared",
/* 53 */  "ATTN_LOC %d cannot be mapped to %cX C
/* 54 */  "%s Register is not cleared to zero af
/* 55 */  "Cannot start poll_ASF Timer",
/* 56 */  "poll_ASF bit did not get reset after
/* 57 */  "Timestamp Counter is not counting",
/* 58 */  "%s Timer is not working",
/* 59 */  "Cannot clear bit %s in %cX CPU event
/* 60 */  "Invalid "EEPROM_FILENAME" file size,
/* 61 */  "Invalid magic value in %s, expected %
/* 62 */  "Invalid manufature revision, expected
/* 63 */  "Invalid Boot Code revision, expected
/* 64 */  "Cannot write to EEPROM",
/* 65 */  "Cannot read from EEPROM",
/* 66 */  "Invalid Checksum",
/* 67 */  "Invalid Magic Value",
/* 68 */  "Invalid MAC address, expected %02X-%0
/* 69 */  "Slot error, expected an UUT to be fou
/* 70 */  "Adjacent memory has been corrupted wh
/* 71 */    "The function is not Supported in this
/* 72 */    "Packets received with CRC error",
/* 73 */    "MII error bits set: %04x",
/* 74 */    "CPU does not initialize MAC address r
/* 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 initial
/* 80 */    "EEPROM Bootstrap checksum error",
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.

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.

![System Properties](image)
3. When the System Properties window opens, click the **Hardware** tab to display the following menu.

![System Properties](image)

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
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.
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:

- **Disable** - Disables large send offloading
- **Enable** (default) - Enables large send offloading

*NOTE* Large Send Offload features are only supported on the 5701 NetXtreme Adapter.
The following properties are available for this network adapter. Click the property you want to change on the left, and then select its value on the right.

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:

- **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

---

**NOTE**  
WOL Speed at 100 Mb is only supported on the 5701 NetXtreme Adapter.
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.

![Broadcom NetXtreme Gigabit Ethernet #2 Properties](image)

**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: Utilities Program User's Guide for details.
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.
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.
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**

<table>
<thead>
<tr>
<th>NetWare OS</th>
<th>Support Pack or Patch</th>
<th>Files to be Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>NetWare 5.1</td>
<td>Latest NetWare 5.1 Support Pack</td>
<td>The latest support pack can be found at: <a href="http://support.novell.com/misc/patlst.htm">http://support.novell.com/misc/patlst.htm</a></td>
</tr>
<tr>
<td>NetWare 6.0</td>
<td>Latest NetWare 6.0</td>
<td></td>
</tr>
<tr>
<td>NetWare 4.2</td>
<td>Support Pack 8.0 or later</td>
<td></td>
</tr>
</tbody>
</table>

**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.](image)

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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
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](warning.png)
*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.
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:

```plaintext
# 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.
BASP for Netware

This section contains the following information:

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

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Load-balancing</th>
<th>Fault-tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>IPX</td>
<td>Yes*</td>
<td>Yes**</td>
</tr>
<tr>
<td>Other protocols</td>
<td>No</td>
<td>Yes**</td>
</tr>
</tbody>
</table>

*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.
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.
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

### Virtual Adapter 1 Information

<table>
<thead>
<tr>
<th>Node: Smart Load Balance</th>
<th>Node Address: 00 10 1B 01 00 1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLAN ID:</td>
<td>Untagged</td>
</tr>
<tr>
<td>Frame / Name:</td>
<td>EII / BASP_1_EII</td>
</tr>
<tr>
<td>Protocol / Address:</td>
<td>OSP</td>
</tr>
<tr>
<td>Protocol / Address:</td>
<td>IP / 172.16.3.50</td>
</tr>
<tr>
<td>Packets Transmitted:</td>
<td>24,000</td>
</tr>
<tr>
<td>Packets Received:</td>
<td>24,312</td>
</tr>
</tbody>
</table>

**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

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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 \(\neq 0\) (63 VLANs are tagged 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
Jumbo Frames

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
**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 V SLOT=1 VLAN=2 GVRP
LOAD BASP.LAN FRAME=ETHERNET_802.2 NAME=BASP_1_E82 V SLOT=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 V SLOT=1
LOAD BASP.LAN FRAME=ETHERNET_802.2 NAME=BASP_1_E82 V SLOT=1

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

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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.
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/

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

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

4. Load the driver:

```
inmod 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:

   ```bash
   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:

   ```bash
   cd src
   make
   ```

3. Test the driver by loading it:

   ```bash
   insmod bcm5700.o
   ```

4. Install the driver and man page:

   ```bash
   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 original 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:

   ```bash
   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:

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

3. Compile the kernel:

   ```bash
   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 parameter 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 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 Limitations
- Installating BASP
- Installing BASP RPM Package
- Installing BASP TAR Archive
- BASP Files
- BASP Configuration for Red Hat Distribution
- BASP Configuration for Suse Distribution
- BASP Configuration and Startup for Other Linux Distribution
- BASP Startup Scripts for Red Hat distributions
- BASP Configuration Scripts for Redhat Distributions
- Broadcom NICE patches
- Uninstalling the RPM Package
- Removal of Physical Interface in Generic Trunking and 802.3ad Mode
- BASP SNMP Agent for Linux
- Known Problems
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.
## BASP Files

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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-".

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:

   \[% /etc/init.d/basp start\]

   \(\text{\textbf{NOTE} \: This step is only required for the first time installation. The team configuration will be automatically started on subsequent reboots.}\)

   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 than 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-".

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.
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 least 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 copied to `/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.
- **TEAM_VAx_VLAN:** 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 appropriate Linux 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
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 be modified to add support for the BASP SNMP agent.

2. Follow steps 4 - 6 in the "Installing the TAR Archive" 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.

Please read all restrictions and disclaimers.
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.
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)
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. BRCMbcmepkg: Datastream format
2. BRCMbcmetar.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 BRCMbcmes.png resides
2. pkgadd -d BRCMbcmes.png
   or
   Copy BRCMbcmes.png to /tmp
   cd /tmp
   uncompress BRCMbcmes.png.tar.Z
   tar xvf BRCMbcmes.png.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
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:
     
     \texttt{format A:}
   
   - If you are using the Solaris operating environment, type:
     \n     \texttt{fdformat -Ud}

2. Check to see if Volume Management is running:
   - If you are using DOS, type:
     \n     \texttt{dd filename A:}
   
   - If you are using the Solaris operating environment, type:
     \n     \texttt{volcheck}
     \texttt{ls -l /vol/dev/aliases/floppy0}
   
   - If you see a message similar to this:
     \n     \texttt{lrwxrwxrwx 1 root 34 Jan 21 17:28}
     \texttt{/vol/dev/aliases/floppy0 ->}
     \texttt{/vol/dev/rdiskette0/unnamed_floppy}

   Type:

   \texttt{dd if=bcmedu.img of=/vol/dev/aliases/floppy0}
   \texttt{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.


   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:
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:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>AutoNegotiate</td>
</tr>
<tr>
<td>1</td>
<td>10 Mbps speed and Half Duplex mode</td>
</tr>
<tr>
<td>2</td>
<td>10 Mbps speed and Full Duplex mode</td>
</tr>
<tr>
<td>3</td>
<td>100 Mbps speed and half Duplex mode</td>
</tr>
<tr>
<td>4</td>
<td>100 Mbps speed and Full Duplex mode</td>
</tr>
<tr>
<td>5</td>
<td>Force 1000 Mbps Full Duplex mode.</td>
</tr>
<tr>
<td>6</td>
<td>AutoNegotiate only 1000 Mbps Full Duplex mode.</td>
</tr>
<tr>
<td></td>
<td>AutoNegotiate only 1000 Mbps Half Duplex mode.</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>AutoNegotiate only 100 Mbps Full Duplex mode.</td>
</tr>
<tr>
<td>9</td>
<td>AutoNegotiate only 100 Mbps Half Duplex mode.</td>
</tr>
<tr>
<td>10</td>
<td>AutoNegotiate only 10 Mbps Full Duplex mode.</td>
</tr>
<tr>
<td>11</td>
<td>AutoNegotiate only 10 Mbps Half Duplex mode.</td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Both Tx and Rx flow control are disabled.</td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>-------------</td>
</tr>
<tr>
<td>1</td>
<td>Tx flow control is enabled. Pause frames will be sent if resource is low. But device will not process Rx Pause Frame.</td>
</tr>
<tr>
<td>2</td>
<td>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.</td>
</tr>
<tr>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>4</td>
<td>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.</td>
</tr>
</tbody>
</table>

**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:

\[ \text{TxPacketDescCnt}=200; \]

**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.

\[ \text{RxStdDescCnt}=500; \]

**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.

\[ \text{RxJumboDescCnt}=50; \]

**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.

\[ \text{RxCoalescingTicks}=150; \]

**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 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.
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;
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 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 and write) (read
RxMaxCoalescedFrames and write) (read
TxCoalescingTicks and write) (read
TxMaxCoalescedFrames and write) (read
RxCoalescingTicksDuringInt and write) (read
RxMaxCoalescedFramesDuringInt and write) (read
TxCoalescingTicksDuringInt and write) (read
TxMaxCoalescedFramesDuringInt and write) (read
StatsCoalescingTicks and write) (read
DoubleCopyTxBufferSize and write) (read
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

Please read all restrictions and disclaimers.