

# Advanced Control Suite

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## Gigabit Ethernet Network Adapters

AT-2916SX

AT-2931SX

# User's Guide

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# Preface

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This guide contains instructions on how to install and configure the Advanced Control Suite software for the AT-2916SX and AT-2931SX Ethernet network adapters on Windows 2000, Windows 2003, and Linux platforms. For information about how to install the AT-2931SX and AT-2916 SX adapters as well as procedures to install and configure the related software, see the *Gigabit Ethernet Network Adapters Installation Guide* (part number 613-000049).

The Preface contains the following sections:

- “Where to Find Web-based Guides” on page 10
- “Contacting Allied Telesyn” on page 11

## Where to Find Web-based Guides

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

## Contacting Allied Telesyn

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

### Online Support

You can request technical support online by accessing the Allied Telesyn Knowledge Base: <http://kb.alliedtelesyn.com>. You can use the Knowledge Base to submit questions to our technical support staff and review answers to previously asked questions.

### Email and Telephone Support

For Technical Support via email or telephone, refer to the Support & Services section of the Allied Telesyn web site: [www.alliedtelesyn.com](http://www.alliedtelesyn.com).

### Returning Products

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

To obtain an RMA number, contact Allied Telesyn Technical Support through our web site: [www.alliedtelesyn.com](http://www.alliedtelesyn.com).

### Sales or Corporate Information

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

### Management Software Updates

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

- Allied Telesyn web site: [www.alliedtelesyn.com](http://www.alliedtelesyn.com)
- Allied Telesyn FTP server: <ftp://ftp.alliedtelesyn.com>

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



## Chapter 1

# Advanced Server Program Overview

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This chapter provides an introduction to the Allied Telesyn Advanced Server Program and contains following sections:

- ❑ “Broadcom Advanced Server Program (BASP) Overview” on page 14
- ❑ “Broadcom Advanced Control Suite 2 (BACS 2) Features” on page 15
- ❑ “BASP for Windows 2000 and Windows 2003” on page 16
- ❑ “BASP for Linux” on page 17

## Broadcom Advanced Server Program (BASP) Overview

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BASP is an intermediate software driver for Windows Server 2003, Windows 2000, and Linux that provides load-balancing, fault-tolerance, and VLAN features.

The BASP features are provided by creating teams (virtual adapters) that consist of multiple NIC interfaces. A team can consist of one to eight NIC interfaces. You can designate each interface as a primary or standby\* interface. All primary interfaces in a team participate in Load-balancing operations by sending and receiving a portion of the total traffic. Standby interfaces 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 work with any third party's NIC adapters, but are only supported with the Allied Telesyn Gigabit Ethernet adapters. VLANs only work with the Allied Telesyn Gigabit Ethernet adapters.

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### Note

\*You can use Standby only in Smart Load-Balance mode (see Limitations below).

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Smart Load-balance (SLB) mode works with all Ethernet switches without configuring the switch ports to any special trunking mode. Only IP traffic is load-balanced in both inbound and outbound directions. In comparison, IPX traffic is load-balanced in the outbound direction only. Other protocol packets are sent and received through one primary NIC only. Fault-tolerance for non-IP traffic is only supported using the Allied Telesyn Gigabit Ethernet adapters. The Generic Trunking mode requires the Ethernet switch to support some form of port trunking mode (for example, 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.

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### Note

Allied Telesyn recommends that you disable the spanning tree protocol at the switch when you use BASP. This setting minimizes the downtime due to spanning tree loop determination when failing over.

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### Note

The Broadcom Advanced Server Program (BASP) requires that at least one adapter in the team be an Allied Telesyn Gigabit Ethernet adapters.

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## Broadcom Advanced Control Suite 2 (BACS 2) Features

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The Broadcom Advanced Control Suite 2 (BACS 2) is a graphical user interface with the following functions. (See Chapter 2, "Broadcom Advanced Control Suite 2 (BACS 2) Applications" on page 19 for additional information.)

- ❑ Vital Sign – The Vital Sign screen allows you to view vital adapter information, network status, and network connectivity. Active Adapters are listed.
- ❑ Resources – Shows the system resources of the selected device.
- ❑ Hardware – Shows the hardware information (the ASIC version and the firmware version) for the selected device.
- ❑ Network Test – The Network Test screen allows you to verify IP network connectivity. This test verifies if the NDIS driver is installed correctly. Also, it tests connectivity to a gateway or other specified IP address on the same subnet.
- ❑ Diagnostics – The Diagnostics screen allows you to view information about adapters. This function is used to test the network interface card.
- ❑ Configuration – Sets configuration options (NIC Battery Saving Mode, for example).
- ❑ Statistics – The Statistics screen allows you to view traffic statistics for the Allied Telesyn Gigabit Ethernet adapters as well as adapters from other vendors. Statistical values and coverage is more comprehensive for the Allied Telesyn Gigabit Ethernet adapters.
- ❑ Load Balance/Virtual LAN – The Load Balance/Virtual LANs screen allows you to configure advanced features. You can configure any available adapter as part of a team.

## **BASP for Windows 2000 and Windows 2003**

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The following options are supported under Windows 2000 and Windows 2003. For additional information, see Chapter 3, “Installing BACS on Windows 2000 and Windows 2003 Systems” on page 63.

### **Failover and Load Balance**

- Adapter teaming for failover
- Smart Load Balance™
- Smart Load Balance (auto-failback disable)
- 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 are supported only on the Allied Telesyn Gigabit Ethernet adapters.

## BASP for Linux

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The following options are supported under Linux. For additional information, see Chapter 4, “Installing BACS on a Linux System” on page 67.

### **Failover and Load Balance**

- ❑ SLB mode requires NICE drivers and works with all Ethernet switches without configuring the switch ports to any special trunking mode. Only IP traffic is 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)**

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



## Chapter 2

# Broadcom Advanced Control Suite 2 (BACS 2) Applications

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This chapter describes the Broadcom Advanced Control Suite 2 (BACS 2) applications and contains the following sections:

- “Overview” on page 20
- “Installing the BACS 2 Application” on page 23
- “Managing the BACS Application” on page 25
- “Configuring the BACS 2 Application” on page 27
- “Configuring Teaming” on page 42

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### **Note**

There are two BACS 2 versions. One is a 32-bit version located in /BACS/IA32 for standard (32-bit) Windows 2000/2003 operating systems. The other is a 64-bit version located in /BACS/x64 for Windows 2003 64-bit operating systems.

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## Overview

The Broadcom Advanced Control Suite 2 (BACS 2) application is an integrated application (with a graphical user interface) that provides useful information about each network adapter that is installed in your computer. The BACS application also enables you to perform detailed tests, diagnostics, and analyses on each adapter, as well as view traffic statistics and set configuration options for each adapter, as shown in Figure 1. The BACS application is designed to run on the Windows 2000 and Windows 2003 operating systems.

The Broadcom Advanced Server Program (BASP) application, which runs within BACS, is used to configure load balancing, fault tolerance, and virtual local area networks (VLANs). This application is available only on computers that use more than one network adapter.

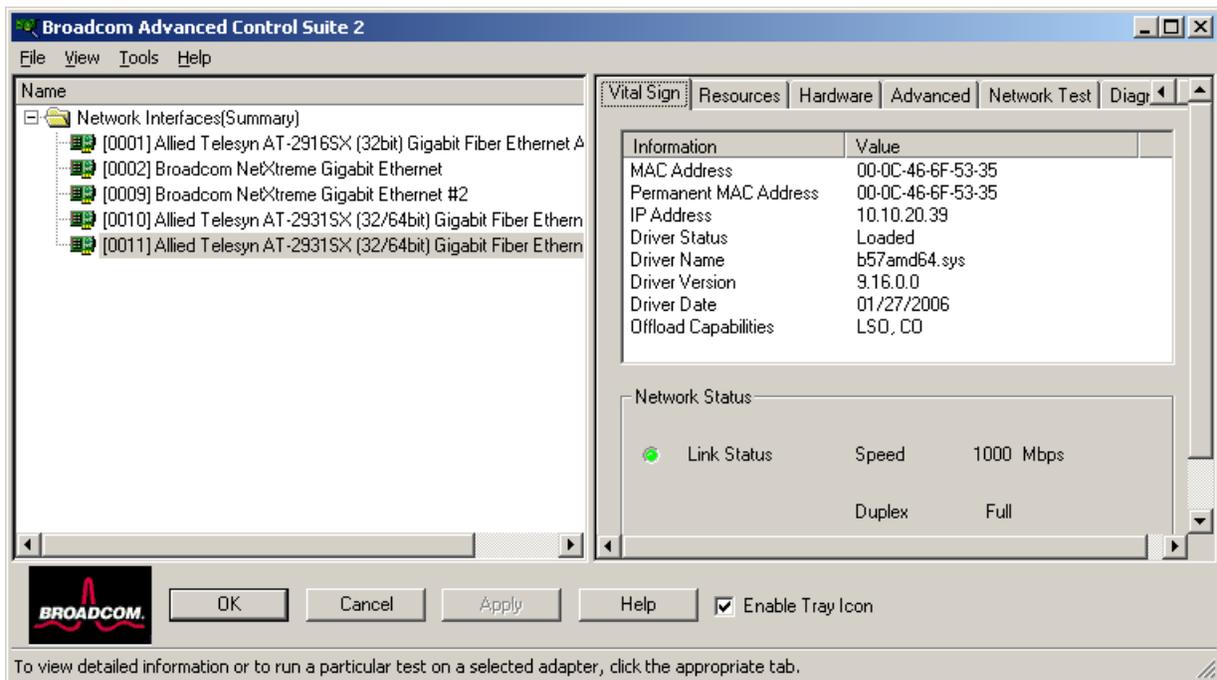


Figure 1. Advanced Control Suite 2 Menu

## Information Provided by the BACS 2 Applications

The Broadcom Advanced Control Suite 2 lists all of the network adapters in your computer and provides the following information, if available, about each device, as shown in Table 1.

Table 1. BACS Application Information

|                  |                   |                          |
|------------------|-------------------|--------------------------|
| Driver Status    | Driver Version    | Frames Rx OK             |
| MAC Address      | Driver Date       | Team Name                |
| Link Status      | Firmware Version  | Team Type                |
| IP Address       | ASIC Version      | VLAN Name                |
| Memory Address   | Bus Type          | VLAN ID                  |
| Physical Address | Bus No.           | BASP Tx Packet           |
| Speed            | Device No.        | BASP Tx Packet Discarded |
| Duplex           | Function No.      | BASP Tx Packet Queried   |
| Slot No.         | Interrupt Request | BASP Rx Packet           |
| Driver Name      | Frames Tx OK      | BASP Rx Packet Discarded |

## BACS 2 Features

The following features are accessible from the BACS 2 application:

- ❑ “Vital Sign Tab” on page 27. Provides at-a-glance status reports on all of the LAN devices in your computer.
- ❑ “Resources Tab” on page 30. Displays the system resources of the selected device.
- ❑ “Hardware Tab” on page 31. Displays the hardware information (the ASIC version and the firmware version) for the selected device.
- ❑ “Advanced Tab” on page 32. Allows you to change the advanced properties.
- ❑ “Network Test Tab” on page 35. Confirms network connectivity to a remote station. The network test sends ICMP packets to remote systems and waits for a response. If a gateway is configured, the test automatically sends packets to that system. If a gateway is not configured or if the gateway is unreachable, the test prompts you for a destination IP address.
- ❑ “Diagnostics Tab” on page 36. Performs comprehensive diagnostics on Broadcom network adapters.
- ❑ “Statistics Tab” on page 38. Provides detailed performance statistics on each selected device.

- ❑ “BASP Statistics Tab” on page 41. Configures the load balance and failover by grouping multiple network adapters.

## Installing the BACS 2 Application

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You can install the BACS 2 software through the GUI or by using the silent install option. See the following procedures:

- “Installing Using the GUI,” next
- “Using Silent Installation” on page 23

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### Note

Before installing the BACS 2 software on a computer running Windows 2000 Advanced Server with Terminal Services, type **change user /install** from the DOS command prompt.

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### Installing Using the GUI

To install the BACS 2 application using the GUI (graphical user interface), perform the following procedure.

---

### Note

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

---

1. Double-click **setup.exe** in the appropriate directory (IA32 or x64).
2. Click **Next** in **Broadcom Management Programs Setup**.
3. Read the license agreement and click **Yes**.
4. In **Select Components**, click the component you want to install:
  - Control Suite**. Installs the Broadcom Advanced Server Control Suite.
  - BASP**. Installs the Broadcom Advanced Server Program.
5. Follow the on-screen instructions.

You can start the Control Suite from the Control Panel by double-clicking **Broadcom Control Suite 2**. Or, click **Start**, point to **Programs**, point to **Broadcom**, and then click the **Broadcom Advanced Control Suite 2**.

### Using Silent Installation

The recommended installation procedure is to copy the installation files to your hard disk before you run the silent install because the **setup /s** command automatically generates a Setup.log file in the directory where it is run.

---

**Note**

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

---

1. Type **setup /s** and press **ENTER**.

## Managing the BACS Application

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This section contains the following procedures for managing the BACS application:

- ❑ “Initializing the BACS 2 Application,” next
- ❑ “Updating the BACS Application” on page 25
- ❑ “Removing the BACS Application” on page 25

### Initializing the BACS 2 Application

To initialize the BACS 2 application on your computer, perform the following procedure.

1. In the Control Panel, double-click **Broadcom Control Suite 2**.

Or, click **Start**, point to **Programs**, point to **Broadcom**, and then click **Broadcom Advanced Control Suite 2**.

---

#### Note

You must install the Allied Telesyn adapters before you initialize the BACS application.

---

### Updating the BACS Application

To update the BACS application on your computer, perform the following procedure.

---

#### Note

Before you begin the update, close all applications, windows, and dialog boxes.

---

1. Double-click **Setup.exe**.
2. Click **Next** in **Broadcom Management Programs Setup**.
3. Read the license agreement and click **Yes**.
4. In **Select Components**, click the component you want to install:
  - ❑ **Control Suite**. Installs the Broadcom Advanced Server Control Suite.
  - ❑ **BASP**. Installs the Broadcom Advanced Server Program.
5. Follow the on-screen instructions.

### Removing the BACS Application

To remove the BACS application from your computer, perform the following procedure.

1. In the Control Panel, double-click **Add/Remove Programs**.

2. Click **Broadcom Management Programs** and click **Change/Remove** (Windows XP) or **Add/Remove** (Windows 2000).
3. Click **Next**.
4. In **InstallShield Wizard**, click **Remove**, and then click **Next**.
5. Click **OK** to remove the application and all of its components.
6. Click **OK**.
7. Restart your computer.

## Configuring the BACS 2 Application

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Start the BACS application and then click the tab on **Broadcom Advanced Control Suite 2** that provides the information of interest or access to the tests, diagnostics, analyses, and configuration functions you want to perform. Or, on the **Tools** menu, click **Create a Team** to start the BASP application. Select from the following tabs:

- “Vital Sign Tab” on page 27
- “Resources Tab” on page 30
- “Hardware Tab” on page 31
- “Advanced Tab” on page 32
- “Network Test Tab” on page 35
- “Diagnostics Tab” on page 36
- “Statistics Tab” on page 38
- “BASP Statistics Tab” on page 41

### **Vital Sign Tab**

The Vital Sign tab contains information about the adapter and other network adapters that are installed, the link status of the network, and network connectivity. To view this information for any installed network adapter, click the name of the device, as shown in Figure 2 on page 28.

**Note**

Information about network adapters made by other vendors is less comprehensive than the information provided about the Allied Telesyn AT-2916 and AT-2931 adapters or other Broadcom-based adapters.

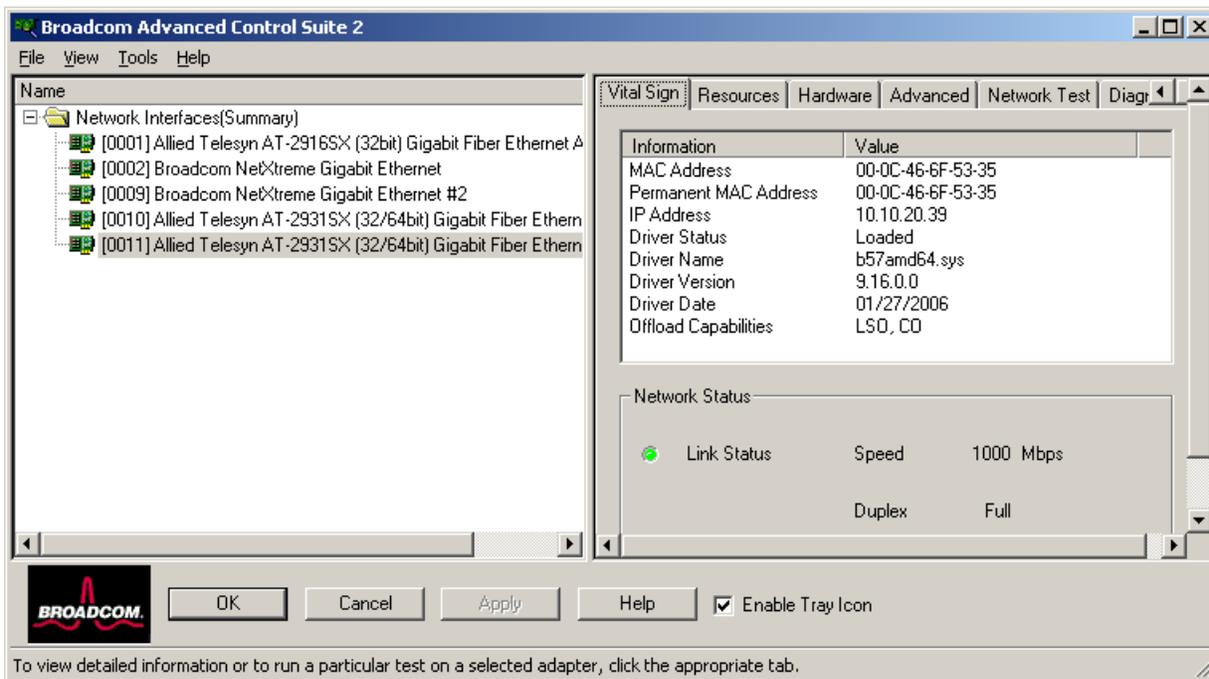


Figure 2. Vital Sign Tab

The Vital Sign Tab contains the following fields:

- ❑ **MAC Address.** This address can either be the permanent MAC address or an address assigned by the Locally Administered Address in the Advanced properties tab.
- ❑ **Permanent MAC Address.** This is a physical MAC (media access control) address that is assigned to the device by the manufacturer. The physical address cannot be all 0s.
- ❑ **IP Address.** The network address that is associated with the device. If the IP address is all 0's, the associated driver has not been bound with the Internet Protocol (IP).
- ❑ **Driver Status.** Information about the status of the driver that is associated with the selected controller.
  - **Driver Loaded.** Normal operating mode. The driver that is associated with the device has been loaded by Windows and is functioning.
  - **Driver Not Loaded.** The driver that is associated with the

device has not been loaded by Windows.

- **Information Not Available.** The value is not obtainable from the driver that is associated with the device.
- ☐ **Driver Name/Version/Date.** The file name, version, and creation date of the software driver that is associated with the device.
- ☐ **Offload Capabilities.** The options are:
  - **LSO** (Large Send Offload). The network adapter performs TCP segmentation.
  - **CO** (Checksum Offload). The adapter computes the TCP/IP checksum.
- ☐ **BASP State.** Information about the status of the BASP application. This information is displayed only when there is a team. See “Configuring Teaming” on page 42
- ☐ **Network Status:** The following network status information is provided:
  - **Link Status.** The indicator is green if a link is established. A red indicator means that a link is not established.
  - **Speed.** The link speed of the device.
  - **Duplex.** The duplex mode in which the device is operating.

## Resources Tab

This section describes the Resources tab, as shown in Figure 3.

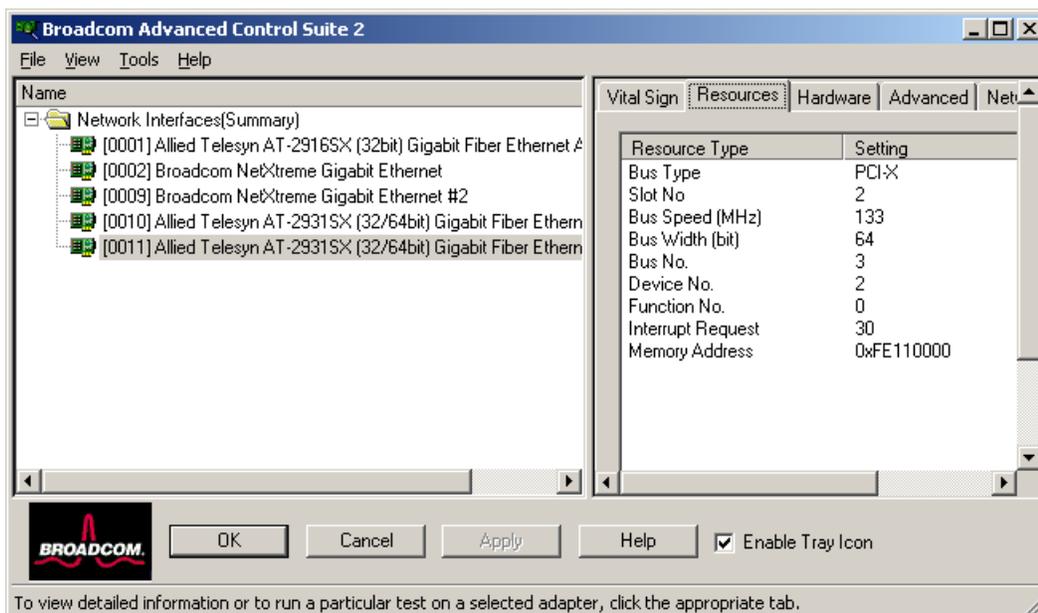


Figure 3. Resources Tab

The Resources tab contains the following fields:

- ❑ **Bus Type.** Indicates the PCI bus type (PCI or PCI-X).
- ❑ **Slot No.** Indicates the PCI slot number of the installed adapter.
- ❑ **Bus Speed (MHz).** Indicates the PCI bus speed (33, 66, 100, or 133 MHz).
- ❑ **Bus Width (bit).** Indicates the PCI bus data width of either 32 or 64 bits.
- ❑ **Bus No.** Indicates the PCI bus number and the device number for the device.
 

**Example:** [0] 14 indicates that the controller resides in PCI bus 0, device 14.
- ❑ **Device No.** The number assigned to the device by the operating system.
- ❑ **Function No.** The port number of the adapter. For a single-port adapter, the function number is 0. For a two-port adapter, the function number for the first port is 0, and the function number for the second port is 1.
- ❑ **Interrupt Request.** The interrupt line number that is associated with the device. Valid numbers range from 2 to 25.
- ❑ **Memory Address.** The memory mapped address that is assigned to the device. This value can never be 0.

**Hardware Tab** This section provides a description of the Hardware tab, as shown in Figure 4.

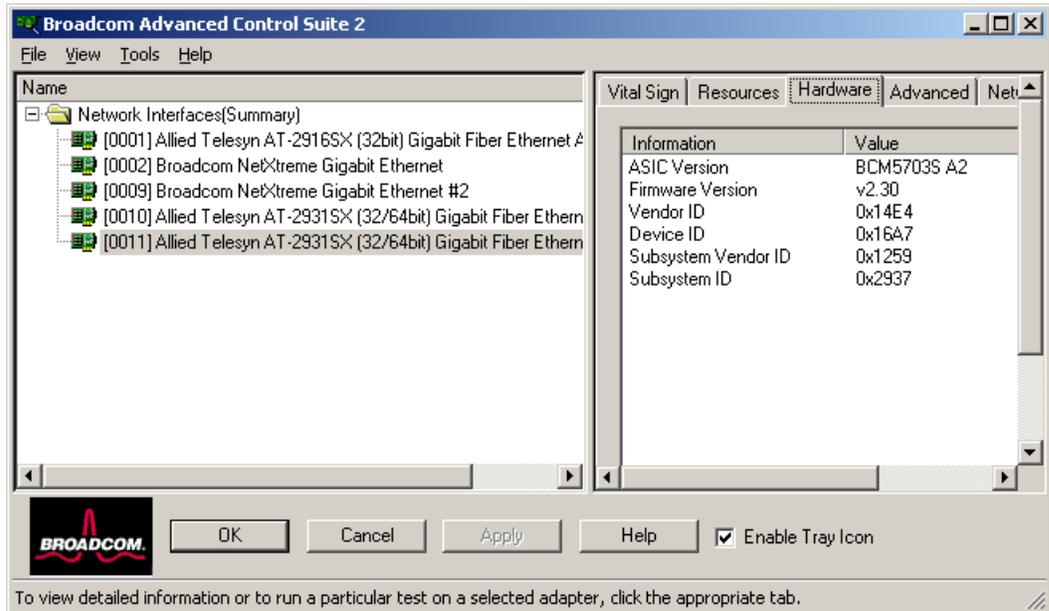


Figure 4. Hardware Tab

The Hardware tab contains the following fields:

- ❑ **ASIC Version.** The chip version of the adapter. This information is not available for devices made by other vendors.
- ❑ **Firmware Version.** The firmware version of the adapter. This information is not available for devices made by other vendors.
- ❑ **Vendor ID.** A unique vendor ID that is registered by the PCI-SIG organization.
- ❑ **Device ID.** A unique device ID that is registered by Broadcom.
- ❑ **Subsystem Vendor ID.** A unique vendor ID that is registered by the PCI-SIG organization.
- ❑ **Subsystem ID.** A unique ID registered by Allied Telesyn, Inc.

**Advanced Tab** This section describes the Advanced tab, as shown in Figure 5

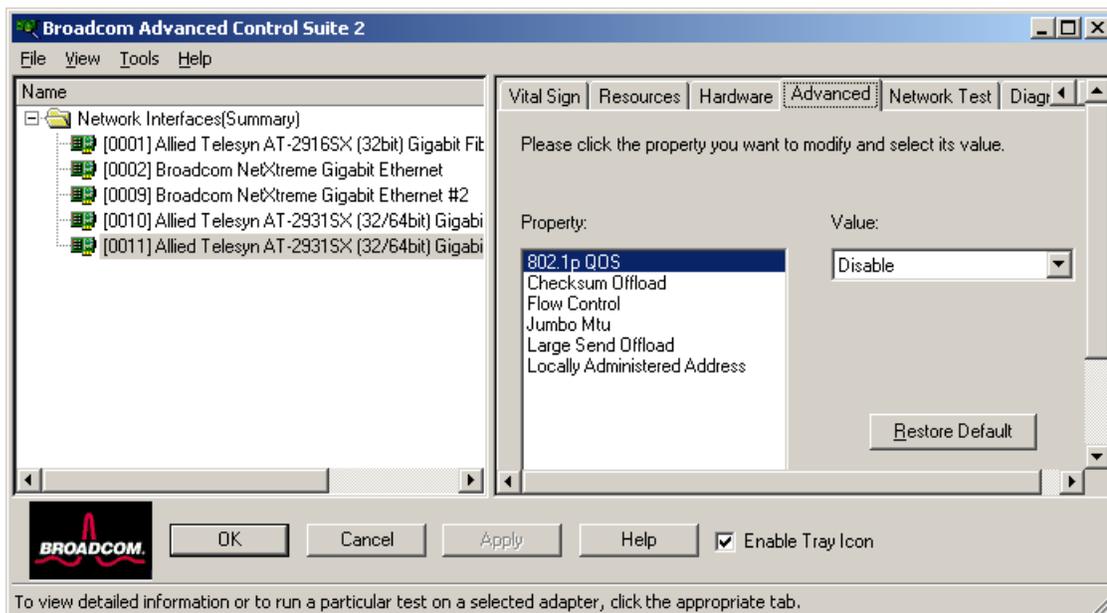


Figure 5. Advanced Tab

The Advanced tab contains the following fields:

- ❑ **802.1p QOS.** The 802.1p QOS property enables quality of service, which is an Institute of Electrical and Electronics Engineering (IEEE) specification that treats different types of network traffic differently to ensure required levels or reliability and latency according to the type of traffic. This property is disabled by default. Unless the network infrastructure supports QoS, do not enable QoS. Otherwise, problems may occur.
- ❑ **Checksum Offload.** Normally the Checksum Offload function is computed by the protocol stack. When you select one of the Checksum Offload property values (other than None), the checksum can be computed by the network adapter.
  - 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.
  - None. Disables checksum offloading.
- ❑ **Ethernet@Wirespeed™.** The Ethernet@Wirespeed property enables a Gigabit Ethernet adapter to establish a link at a lower speed when

only 2 pairs of wires are available in the cabling plant. By default, this property is set to Enable. To disable Ethernet@Wirespeed, change the setting to Disable.

---

**Note**

This parameter is available only for copper devices and is not displayed for the AT-2916SX and AT-2931SX adapters.

---

- Disable. Disables Ethernet@Wirespeed.
  - Enable (default). Enables Ethernet@Wirespeed
- ❑ **Flow Control.** The Flow Control property enables or disables the receipt or transmission of PAUSE frames. PAUSE frames enable the network adapter and a switch to control the transmit rate. The side that is receiving the PAUSE frame momentarily stops transmitting.
- Auto (default). PAUSE frame receipt and transmission are optimized.
  - Disable. PAUSE frame receipt and transmission are disabled.
  - Rx PAUSE. PAUSE frame receipt is enabled.
  - Rx/Tx PAUSE. PAUSE frame receipt and transmission are enabled.
  - Tx PAUSE. PAUSE frame transmission is enabled.
- ❑ **Jumbo Mtu.** The Jumbo Mtu property allows the network adapter to transmit and receive oversized Ethernet frames that are greater than 1514 bytes, but less than 9000 bytes in length. This property requires the presence of a switch that is able to process Jumbo frames.
- Frame size is set at 1500 bytes by default. To increase the size of the received frames, increment the byte quantity in 500-byte increments.
- ❑ **Large Send Offload.** Normally the TCP segmentation is done by the protocol stack. When you enable the Large Send Offload property, the TCP segmentation can be done by the network adapter.
- Disable. Disables Large Send Offload.
  - Enable. (default). Enables Large Send Offload.
- ❑ **Locally Administered Address.** The Locally Administered Address is a user-defined MAC address that is used in place of the MAC address originally assigned to the network adapter. Every adapter in the network must have its own unique MAC address. This locally administered address consists of a 12-digit hexadecimal number.

- Value. Assigns a unique node address for the adapter.
- Not Present (Default). Uses the factory-assigned node address on the adapter.

The appropriate assigned ranges and exceptions for the locally administered address include the following:

\* The range is 0000 0000 0001 to FFFF FFFF FFFD.

\* Do not use a multicast address (least significant bit of the high byte = 1).

\* Do not use all 0s or all F's.

- **Speed & Duplex.** The Speed & Duplex property sets the connection speed and mode to that of the network. Note that Full-Duplex mode allows the adapter to transmit and receive network data simultaneously.

---

**Note**

This parameter is available only for copper devices and is not displayed for the AT-2916SX and AT-2931SX adapters.

---

- 10 Mb Full. Sets the speed at 10 Mbit/s and the mode to Full-Duplex.

- 10 Mb Half. Sets the speed at 10 Mbit/s and the mode to Half-Duplex.

10 Mb Half and 100 Mb Half settings force the network adapter to connect to the network in Half-Duplex mode. The network adapter may not function if the network is not configured to operate at the same mode.

- 100 Mb Full. Sets the speed at 100 Mbit/s and the mode to Full-Duplex.

- 100 Mb Half. Sets the speed at 100 Mbit/s and the mode to Half-Duplex.

10 Mb Full and 100 Mb Full settings force the network adapter to connect to the network in Full-Duplex mode. The network adapter may not function if the network is not configured to operate at the same mode.

- Auto (default). Sets the speed and mode for optimum network connection (recommended). This setting allows the network adapter to dynamically detect the line speed of the network. Whenever the network capability changes, the network adapter automatically adjusts to the new line

speed and duplex mode. A speed of 1 Gbit/s is enabled by selecting Auto, when that speed is supported.

- ❑ **Wake Up Capabilities.** The Wake Up Capabilities property enables the network adapter to wake up from a low-power mode when it receives a network wake-up frame. Two types of wake-up frames are possible: Magic Packet and Wake Up Frame.

---

**Note**

This parameter is available only for copper devices and is not displayed for the AT-2916SX and AT-2931SX adapters.

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- Both (default). Selects both Magic Packet and Wake Up Frame as wake-up frames.
- Magic Packet. Selects 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 and allows the network adapter to wake the system when an event such as a ping or an Address Resolution Protocol (ARP) request is received.

- ❑ **WOL Speed.** The WOL Speed property sets the speed at which the network adapter connects to the network while the network adapter is in Wake on LAN mode. By default, the WOL Speed property is set to Auto.

---

**Note**

This parameter is available only for copper devices and is not displayed for the AT-2916SX and AT-2931SX adapters.

---

- 10 Mb. Sets the speed to 10 Mbit/s. This is the network speed when the system is in a standby mode awaiting a wake-up frame.
- 100 Mb. Sets the speed to 100 Mbit/s.
- Auto (default). Sets the speed for optimum network connection.

## Network Test Tab

In the Network Test tab, you can verify IP network connectivity. This test verifies if the driver is installed correctly and tests connectivity to a gateway or other specified IP address on the same subnet. The Network

test uses TCP/IP, as shown in Figure 6.

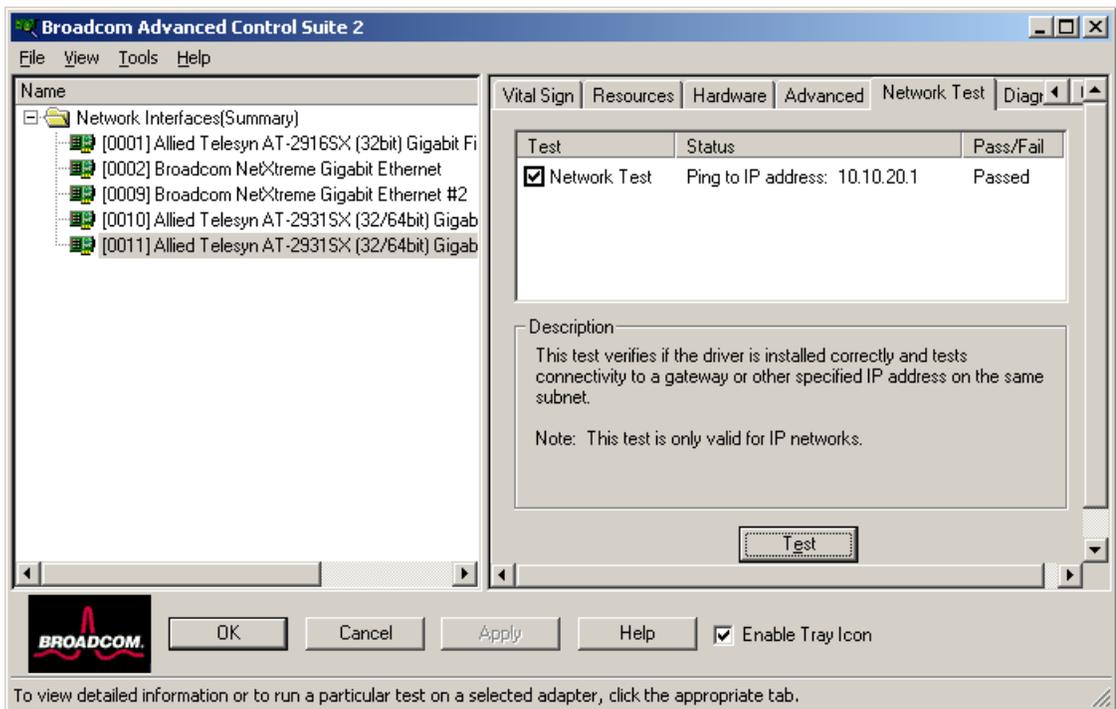


Figure 6. Network Test Tab

### Diagnostics Tab

On the Diagnostics tab you can perform diagnostic tests on Allied Telesyn network adapters. You use this function to test the physical components of the adapter, as shown in Figure 7 on page 37.

**Note**

The network connection is temporarily lost when the diagnostic tests are running.

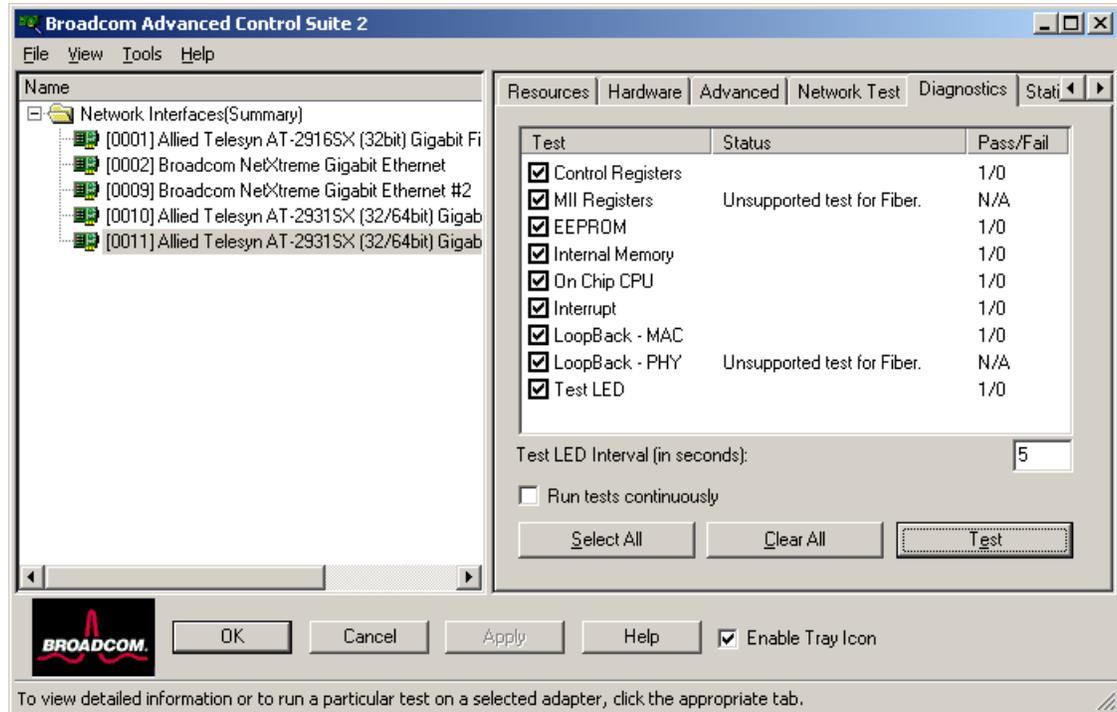


Figure 7. Diagnostics Tab

The Diagnostics tab contains the following fields:

- Control Registers.** This test verifies the read and write capabilities of the network controller registers by writing various values to the registers and verifying the results. The device driver uses these registers to perform network functions such as sending and receiving information. If the test fails, the device may not work properly.
- MII Registers.** This test verifies the read and write capabilities of the registers of the physical layer (PHY). This field is not displayed for fiber adapters.
- EEPROM.** This test verifies the content of the electrically erasable programmable read-only memory (EEPROM) by reading a portion of the EEPROM and computing the checksum. The test fails if the computed checksum is different from the checksum stored in the EEPROM. An EEPROM image upgrade does not require a code change for this test.
- Internal Memory.** This test verifies that the internal memory of the device is functioning properly. The test writes patterned values to the memory and reads back the results. The test fails if an erroneous value is read back. The device cannot function without its internal memory.

- ❑ **On-Chip CPU.** This test verifies the operation of the internal CPUs in the device.
- ❑ **Interrupt.** This test verifies that the NDIS driver is able to receive interrupts from the device.
- ❑ **Loopback MAC.** This test verifies that the Network Device Driver Interface Specification (NDIS) driver is able to send packets to and receive packets from the network microcontroller.
- ❑ **Loopback PHY.** This test verifies that NDIS is able to send packets to and receive packets through the network microcontroller and the integrated PHY chip.
- ❑ **Test LED.** This test causes all of the LEDs to blink 5 times for the purpose of identifying the device.

### Statistics Tab

On the Statistics Tab, shown in Figure 8, you can view traffic statistics for both Allied Telesyn network devices and network devices made by other vendors. Statistical information and coverage are more comprehensive for the Allied Telsyn adapters.

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#### Note

If an adapter is disabled, team statistics are not displayed.

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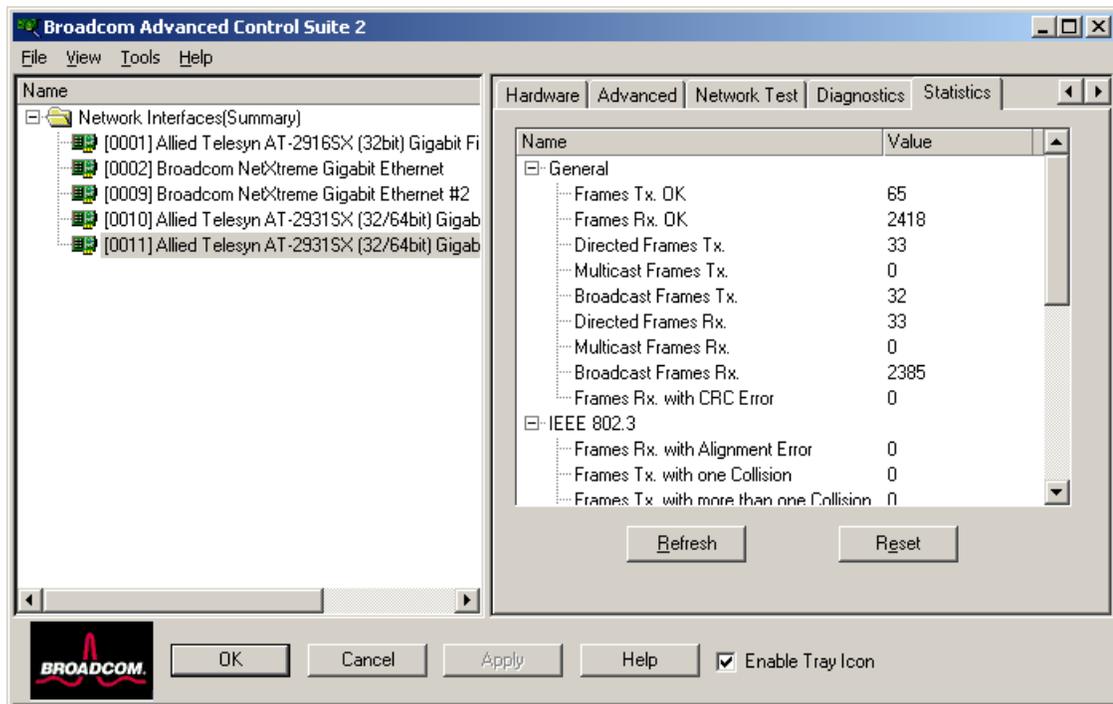


Figure 8. Statistics Tab

## General Statistics

Definitions of the general statistics parameters are provided below.

- ❑ **Frames Tx OK.** A count of frames that are successfully transmitted. This counter is incremented when the transmit status is reported as **Transmit OK**.
- ❑ **Frames Rx OK.** A count of frames that are successfully received (**Receive OK**). This does not include frames received with frame-too-long, frame check sequence (FCS), length or alignment errors, or frames lost due to internal MAC sublayer errors. This counter is incremented when the receive status 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 **Transmit OK**) to a group destination address other than a broadcast address.
- ❑ **Broadcast Frames Tx.** A count of frames that were successfully transmitted (as indicated by the transmit status **Transmit OK**) to the broadcast address. Frames transmitted to multicast addresses are not broadcast frames and, therefore, 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 errors, alignment errors, or frames lost due to internal MAC sublayer errors. This counter is incremented as indicated by the **Receive OK** status.
- ❑ **Broadcast Frames Rx.** A count of frames that are successfully received and are directed to a broadcast group address. This count does not include frames received with frame-too-long, FCS, length errors, alignment errors, or frames lost due to internal MAC sublayer errors. This counter is incremented as indicated by the **Receive OK** status.

## IEEE 802.3 Statistics

Definitions of the IEEE 802.3 statistics parameters are provided 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 receive status is reported as **Alignment Error**.
- ❑ **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 **Transmit OK** 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 transmit status is reported as **Transmit OK**, and the value of the attempts variable is greater than 2 and less or equal to the attempt limit.
- ❑ **Frames Tx after Deferral.** A count of frames whose transmission was delayed on the first attempt because the medium was busy. The frames involved in any collision are not counted.

### Custom Statistics

Definitions of the custom statistics parameters are provided below.

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#### Note

Custom statistics are available only for an enabled adapter.

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- ❑ **Number of Interrupts generated by this adapter.** The number of interrupts generated by the device.
- ❑ **Number of Interrupts avoided by this adapter.** The number of interrupts avoided by the device.
- ❑ **Tx Max Coalesce Frames Threshold hit.** The number of times the *Send Max Coalesce Frames Threshold* was hit.
- ❑ **Rx Max Coalesce Frames Threshold hit.** The number of times the *Receive Max Coalesce Frames Threshold* was hit.
- ❑ **DMA write Queue was full.** The number of times the *DMA write queue* was full.
- ❑ **DMA write High Priority Queue was full.** The number of times the *DMA write high priority queue* was full.
- ❑ **DMA Read Queue was full.** The number of times the *DMA read queue* was full.
- ❑ **DMA Read High Priority Queue was full.** The number of times the *DMA read high priority queue* was full.
- ❑ **Send Data Completion FTQ was full.** The number of times the *send data completion FTQ (flow through queue)* was full.
- ❑ **NIC ran out of the Recv Buffer.** The number of times the network adapter ran out of the Recv Buffer descriptors.
- ❑ **Frames size less than 64-byte with bad FCS.** The number of frames with a size less than 64 bytes with bad FCS.
- ❑ **MAC Rx w/ Pause Command and Length = 0.** MAC control frames with the **pause** command and a length equal to 0.

- MAC Rx w/ Pause Command and Length greater than 0.** MAC control frames with the **pause** command and a length greater than 0.
- MAC Rx w/ no Pause Command.** MAC control frames with no **pause** command.
- MAC Sent X-on.** MAC Transmit with X-on was on.
- MAC Sent X-off.** MAC Transmit with X-on was off.

## BASP Statistics Tab

On the BASP Statistics tab you can view performance information about the network adapters that are on a team. To view this information for any team member adapter, click the name of the device. To view the BASP statistics for the team as a whole, click the name of the team, as shown in Figure 9.

### Note

To see the BASP Statistics Tab, you must have a team.

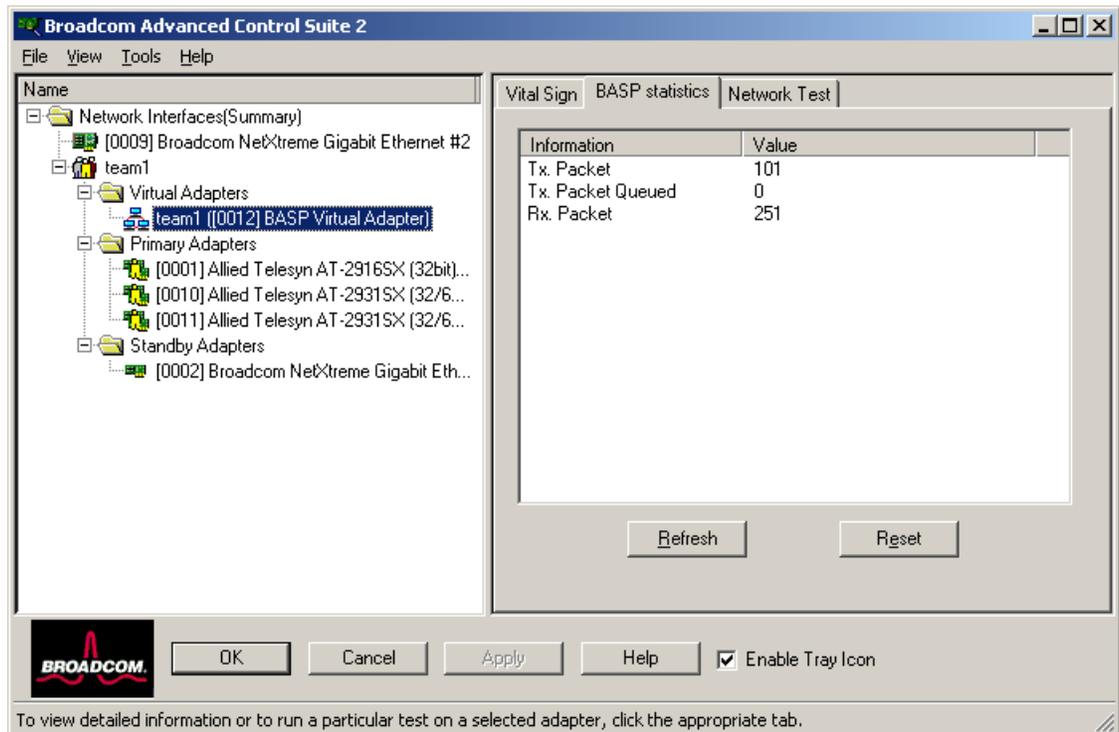


Figure 9. BASP Statistics Tab

The BASP Statistics tab contains the following fields:

- Tx. Packet.** ????????
- Tx. Packet Queued.** ????????
- Rx. Packet.** ????????

## Configuring Teaming

The teaming function allows you to group available network devices together to function as a team. Teaming is a method of creating a virtual LAN (a group of multiple devices that function as a single device). The benefit of this approach is that it enables load balancing and failover. You use BASP to set up teaming. For more information about BASP, see “Overview” on page 20.

### Note

BASP is available only on computers that use at least one Allied Telesyn Gigabit Ethernet adapter or other Broadcom NetXtreme devices.

An example of teaming is shown in Figure 10. This example shows three network adapters in the **Available Adapters** list. When these adapters are moved to the **Load Balance Members** list, they function as a single adapter—that is, each member shares the traffic burden.

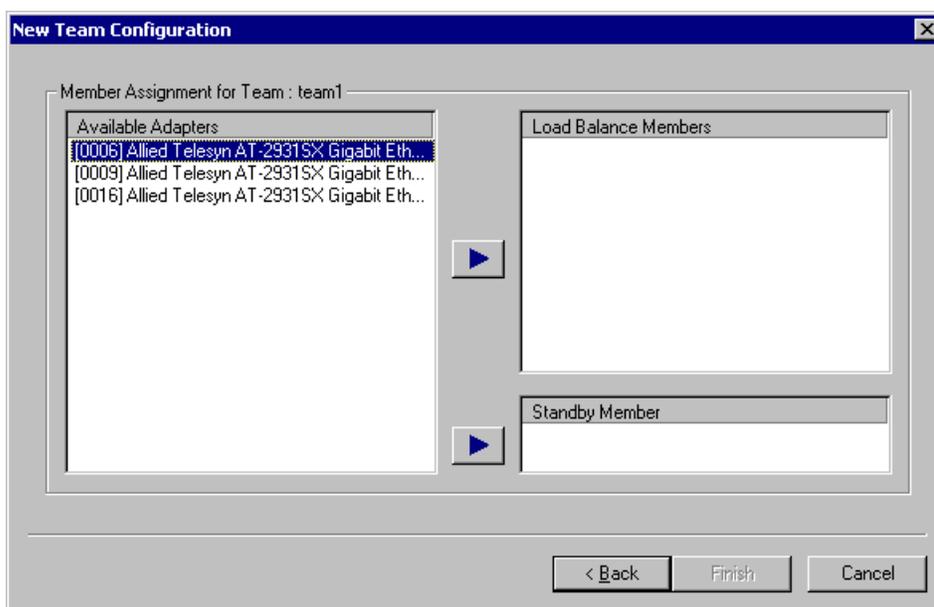


Figure 10. New Team Configuration Window

There are four types of load balance teams:

- ❑ **Smart Load Balance and Failover.** In this type of team, a standby member handles the traffic if all of the load balance members fail (a failover event). All load balance members have to fail before the standby member takes over. When one or more of the load balance members is restored (fallback), the restored team member(s) resumes the handling the traffic.

- ❑ **Link Aggregation.** In this type of team, you can dynamically configure the network adapters that have been selected to participate in a given team. If the link partner is not correctly configured for IEEE 802.3ad link configuration, errors are detected and noted. All adapters in the team are configured to receive packets for the same MAC address. The outbound load balancing scheme is determined by the BASP driver. The team's link partner determines the load balancing scheme for inbound packets. In this mode, at least one of the link partners must be in active mode.
- ❑ **Generic Trunking.** This type of team is very similar to the Link Aggregation type in that all of the adapters in the team need to be configured to receive packets for the same MAC address. However, this mode, does not provide Link Aggregation Control Protocol (LACP) or marker protocol support. This mode supports a variety of environments where the link partners are statically configured to support a proprietary trunking mechanism. Generic trunking supports load balancing and failover for both outbound and inbound traffic.
- ❑ **SLB (Auto-Fallback Disable).** This team is identical to Smart Load Balance and Failover, with the following exception—when the standby member is active, if a primary member comes back on line, the team continues using the standby member instead of switching to the primary member. This type of team is supported only for situations in which the network cable is disconnected and reconnected to the network adapter. It is not supported when the adapter is removed or installed via the Device Manager or a Hot-Plug PCI application.

## Creating a Team Using the Wizard

To create a team using the wizard, perform the following procedure.

1. From the **Tools** menu, click **Create a Team**.

The Welcome page of the Broadcom Teaming Wizard is shown in Figure 11.

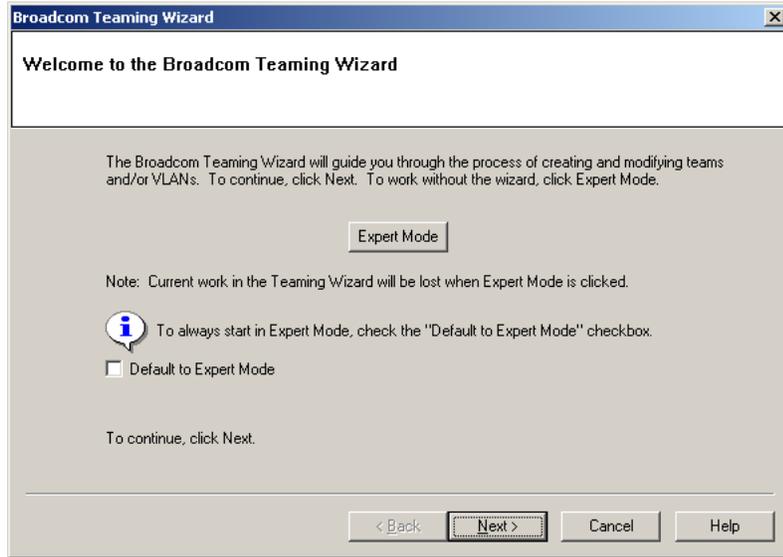


Figure 11. Broadcom Teaming Wizard Welcome Page

2. Click **Next**.

The Team Name page asks for a name for the team, as shown in Figure 12.

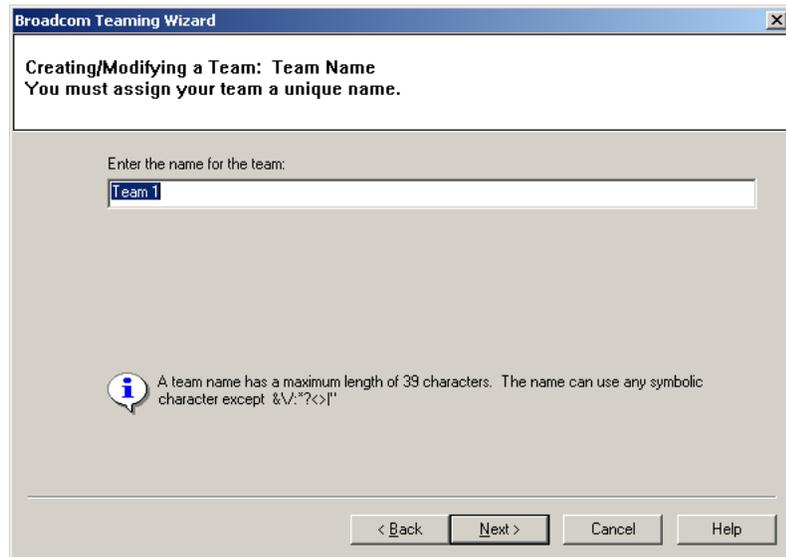


Figure 12. Team Name Page

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**Note**

The number of characters that can be used in a team name is a minimum of 1 and a maximum of 39.

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---

**Note**

A team name cannot begin with spaces or contain the character "&".

---

---

**Note**

Team names must be unique. If you attempt to use a team name more than once, an error message appears indicating that the name already exists.

---

---

**Note**

The maximum number of members in a team is 8.

---

---

**Note**

When team configuration has been correctly performed, a Virtual Team adapter driver is created for each configured team.

---

3. Type a name for the team and click **Next**.

The Team Type page, shown in Figure 13, asks you to choose what type of team you want to create.

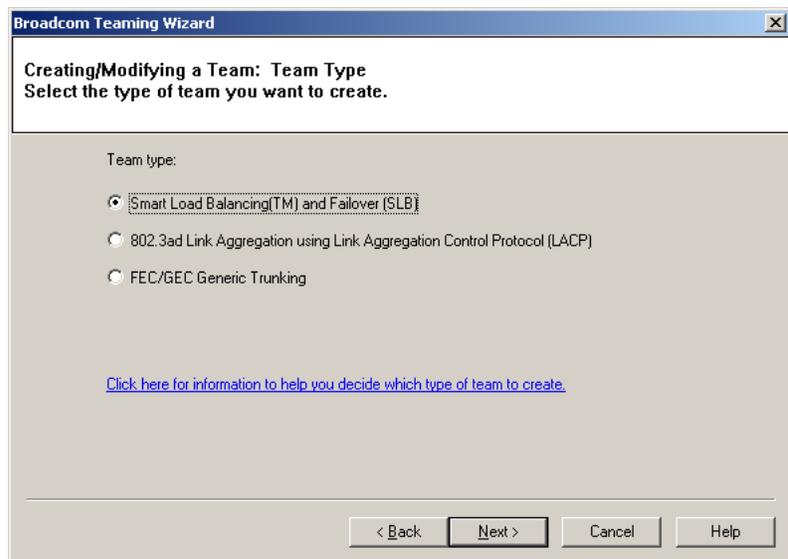


Figure 13. Team Type Page

The options are:

- ❑ **Smart Load Balancing and Failover.** In this type of team, a standby member handles the traffic if all of the load balance members fail (a failover event). All load balance members have to fail before the standby member takes over. When one or more of the load balance members is restored (fallback), the restored team member(s) resumes the handling the traffic.
  - ❑ **802.3ad Link Aggregation using Link Aggregation Control Protocol (LACP).** In this type of team, you can dynamically configure the network adapters that have been selected to participate in a given team. If the link partner is not correctly configured for IEEE 802.3ad link configuration, errors are detected and noted. All adapters in the team are configured to receive packets for the same MAC address. The outbound load balancing scheme is determined by the BASP driver. The team's link partner determines the load balancing scheme for inbound packets. In this mode, at least one of the link partners must be in active mode.
  - ❑ **FEC/GEC Generic Trunking.** This type of team is very similar to the Link Aggregation type in that all of the adapters in the team need to be configured to receive packets for the same MAC address. However, this mode, does not provide Link Aggregation Control Protocol (LACP) or marker protocol support. This mode supports a variety of environments where the link partners are statically configured to support a proprietary trunking mechanism. Generic trunking supports load balancing and failover for both outbound and inbound traffic.
4. Select the team type you want to use and click **Next**.

The Assigning Team Members page asks you to specify which adapters you want to include in the team, as shown in Figure 14.

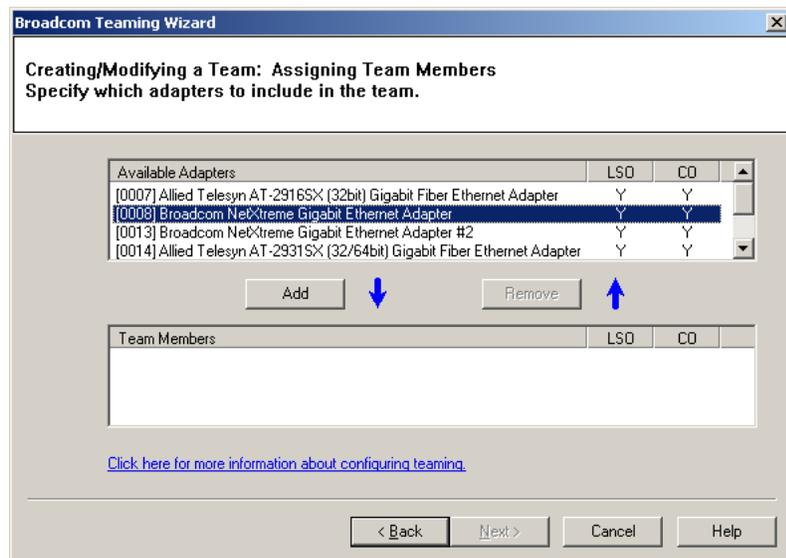


Figure 14. Assigning Team Members Page

5. Add or remove team members from the Available Adapters list to the Team members list, as shown in Figure 15, until you have all the members of the team identified.

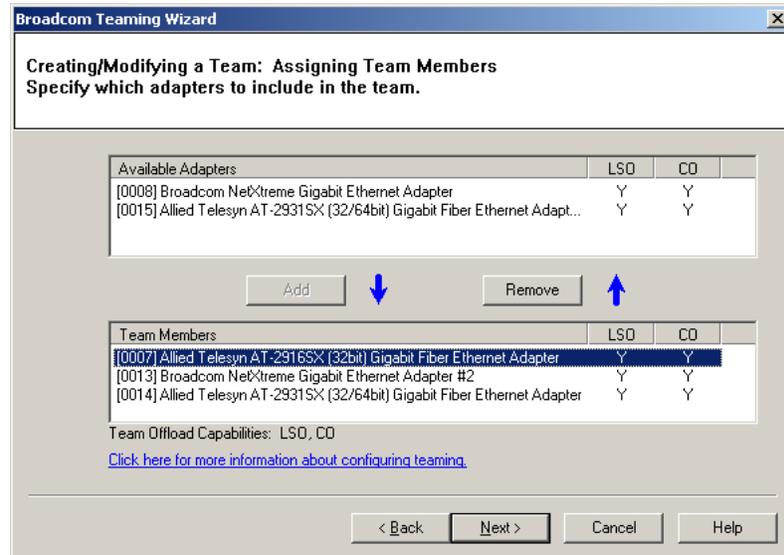


Figure 15. Team Member Selection

6. Click **Next**.

The Designating a Standby Member page asks if you want to identify a standby member of the team, as shown in Figure 16.

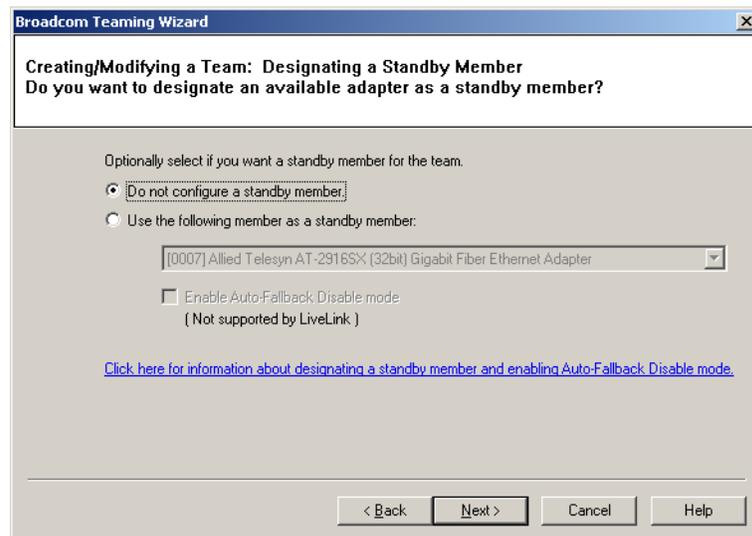


Figure 16. Team Standby Member Page

The options are:

- Do not configure a standby member

- ❑ Use the following member as a standby member
  - ❑ **Enable Auto-Fallback Disable Mode.** When this option is enabled, a standby member handles the traffic if all of the load balance members fail (a failover event). All load balance members have to fail before the standby member takes over. When one or more of the load balance members is restored (fallback), the restored team member(s) resumes the handling the traffic.
7. If you want a standby member, click **Use the following member as a standby member** and select one from the list, as shown in Figure 17.

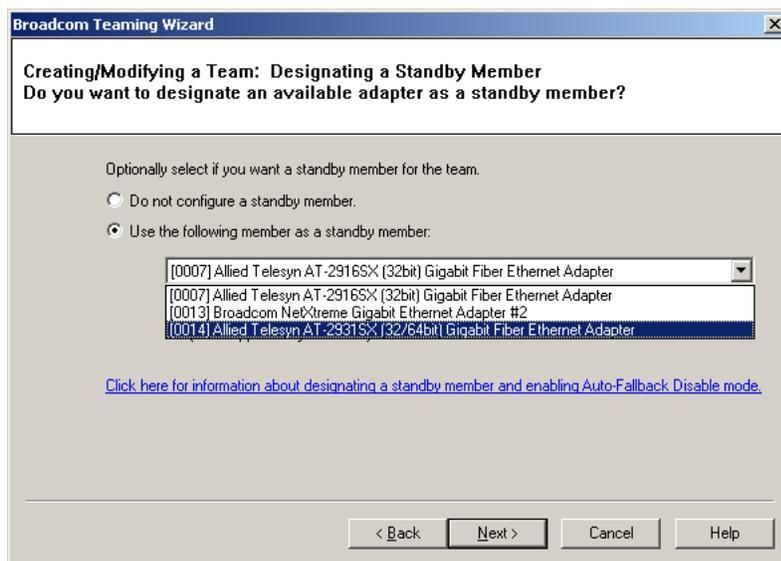


Figure 17. Standby Member Selection

8. Click **Next**.

The Configuring LiveLink page asks if you want to configure LiveLink, as shown in Figure 18.

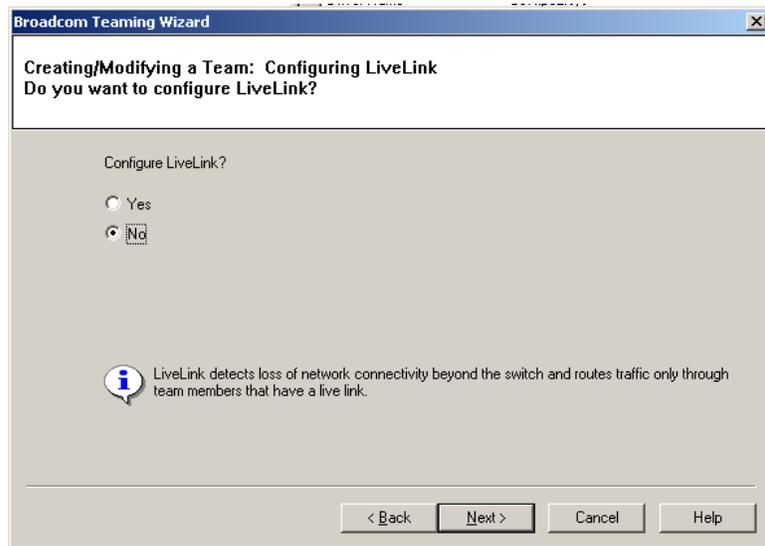


Figure 18. Configuring LiveLink Page

The options are:

- Yes.** When you select this option, another page opens where you configure this feature.
- No.** This option does not allow you to configure LiveLink. This is the default and the setting that Allied Telesyn recommends.

9. Click **Next**.

The Configure VLAN Support page, as shown in Figure 19, allows you to create a VLAN.

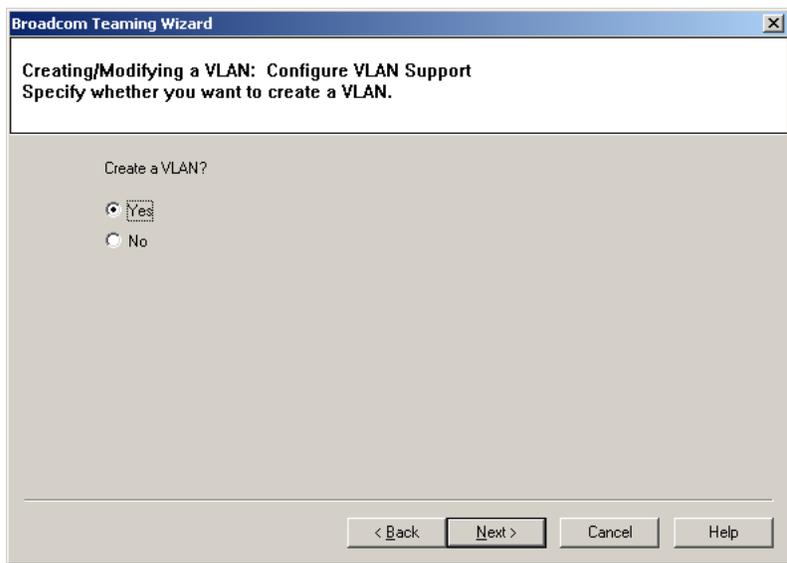


Figure 19. Configure VLAN Support Page

The options are:

- Yes.** Allows you to configure a VLAN. Proceed to step 10.
- No.** Skips the VLAN creation process. Proceed to step 13.

10. Click **Next**.

The VLAN Naming page, as shown in Figure 20, asks for a name for the VLAN.

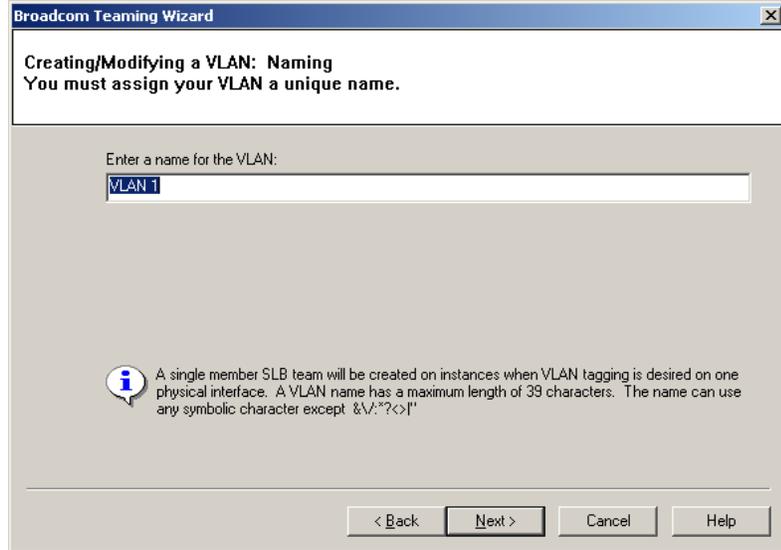


Figure 20. VLAN Naming Page

11. Enter a name for the VLAN and click **Next**.

The VLAN Tagging page, as shown in Figure 21, asks you to specify the VLAN type.

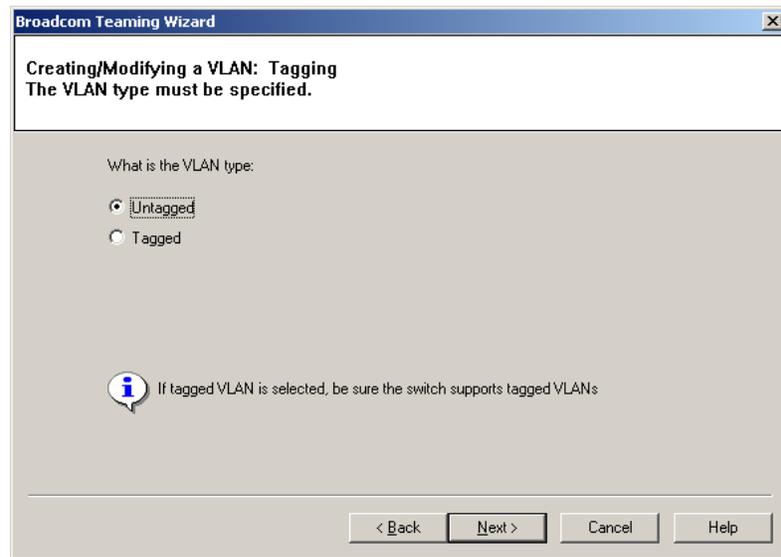


Figure 21. VLAN Tagging Page

The options are:

- Untagged.** This option does not insert a VLAN tag ID into the Ethernet packet, but relies on the switch configuration for VLAN membership.
- Tagged.** This option inserts the VLAN tag ID into the Ethernet packet to identify its VLAN ID or membership.

12. Select **Untagged** or **Tagged** and click Next.

The Additional VLANs page, as shown in Figure 22, asks if you want to create additional VLANs.

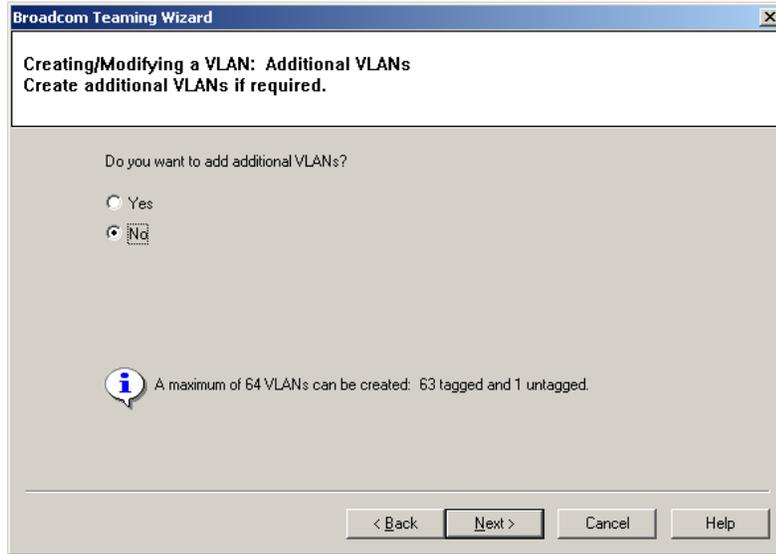


Figure 22. Additional VLANs Page

13. Click **Yes** if you want to create more VLANs and you will be repeating steps 11 and 12. or **No** if you do not want to create another VLAN.

When you click **No**, the final wizard page is displayed, as shown in Figure 23.

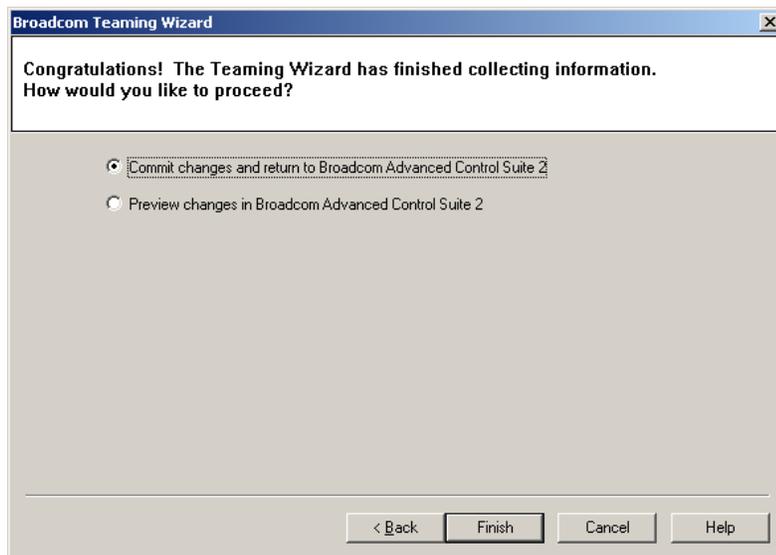


Figure 23. Final Teaming Wizard Page

14. Select one of the following:

- Commit changes and return to Broadcom Advanced Control**

**Suite 2.** A warning message is displayed, as shown in Figure 24.

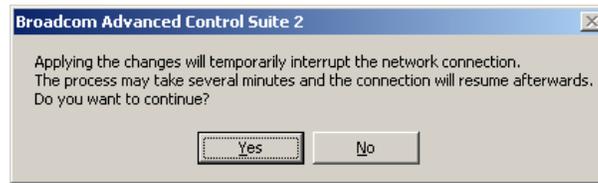


Figure 24. Commit Changes Warning Message

Click Yes to complete the process and return to the Broadcom Advanced Control Suite main window, or No to not save the changes.

- **Preview changes in Broadcom Advanced Control Suite 2.** This option shows the Team Properties tab where you can verify that the settings are correct for the named team, as shown in Figure 25.

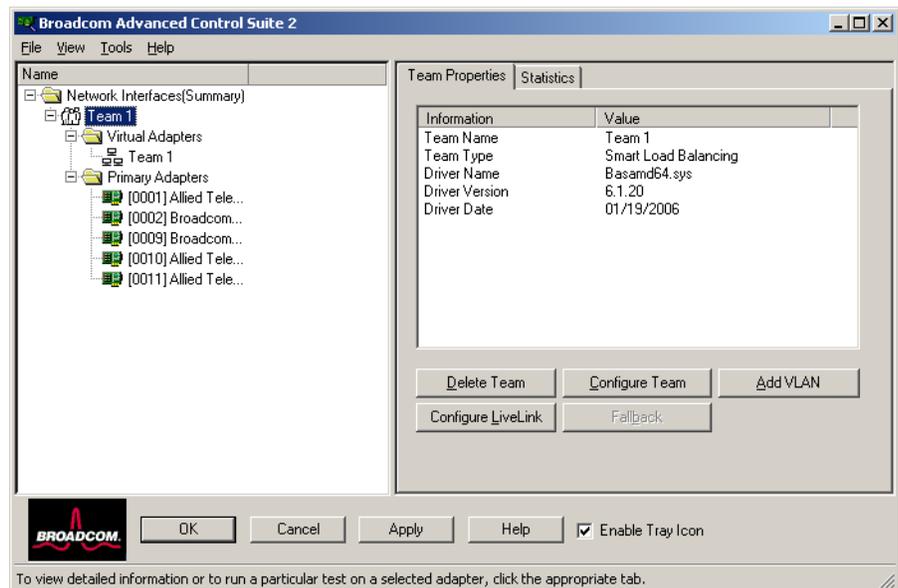


Figure 25. Team Properties Tab

Review your changes and click **Apply** to complete the process and return to the Broadcom Advanced Control Suite 2 main window.

## Creating a Team Using the Expert Mode

To create a team, perform the following procedure.

1. From the **Tools** menu, click **Create a Team**.

The Welcome page of the Broadcom Teaming Wizard is shown in Figure 26.

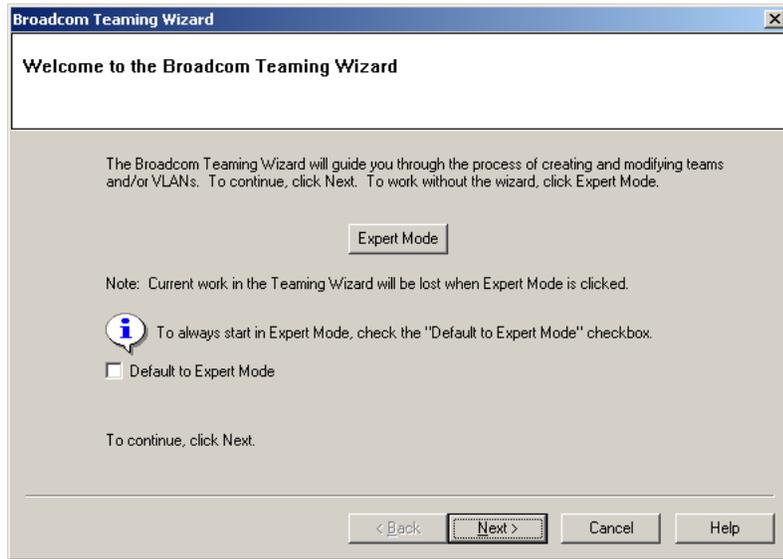


Figure 26. Broadcom Teaming Wizard Welcome Page

2. Click **Expert Mode**.

The New Team Configuration window opens, as shown in Figure 27 on page 54.

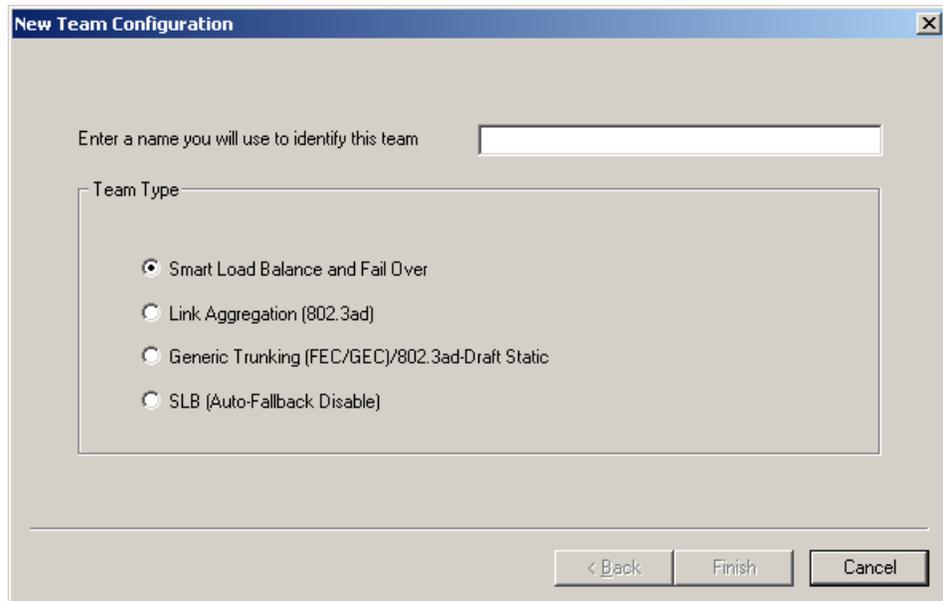


Figure 27. New Team Configuration

3. Type a team name in the **Enter a name you will use to identify this team** box.

---

**Note**

The number of characters that can be used in a team name is a minimum of 1 and a maximum of 39.

---

---

**Note**

A team name cannot begin with spaces or contain the character "&".

---

---

**Note**

Team names must be unique. If you attempt to use a team name more than once, an error message appears indicating that the name already exists.

---

---

**Note**

The maximum number of members in a team is 8.

---

---

**Note**

When team configuration has been correctly performed, a Virtual Team adapter driver is created for each configured team.

---

4. Click the type of team and click **Next**.

The New Team Configuration window opens, as shown in Figure 28.

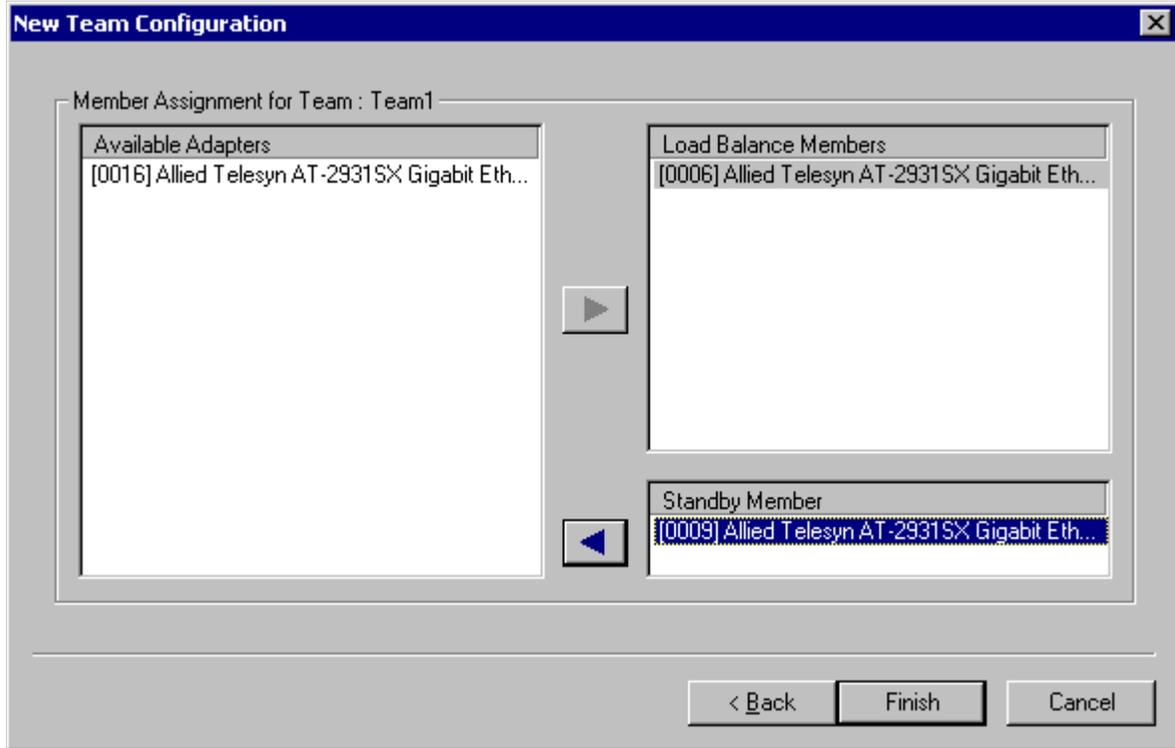


Figure 28. New Team Configuration Menu

5. Assign any available device or devices to the team by moving the device from the **Available Adapters** list to the **Load Balance Members** list.

There must be at least one device in the **Load Balance Members** list.

---

**Note**

There must be at least one Allied Telesyn Gigabit Ethernet adapter assigned to the team.

---

6. Click **Finish**.
7. Click **Apply**.
8. Click **Yes** when you see the message indicating that the network connection will be temporarily interrupted.

---

**Note**

If you disable a virtual team and later want to reenoble it, you must first disable and reenoble all team members before you reenoble the virtual team.

---

---

**Note**

When you create Generic Trunking and Link Aggregation teams, you cannot designate a Standby Member. Standby members work only with Smart Load Balance and Failover and SLB (Auto-Fallback Disable) types of teams.

---



---

**Note**

For an SLB (Auto-Fallback Disable) team, when you want to restore traffic to the load balance members from the standby member, click the **Fallback** button on the **Team Properties** Tab.

---



---

**Note**

Not all network devices made by other vendors are supported or fully certified for teaming.

---

9. Configure the Team IP address if necessary by choosing **Start > Settings > the team name > Properties**.

If other network devices in your computer use TCP/IP bindings, the **TCP/IP Properties** windows is displayed.

10. Configure the IP address and any other necessary TCP/IP configuration for the team and click **OK** when finished.

## Modifying a Team

After you have created a team, you can modify the team in the following ways:

- Change the type of team
- Change the members assigned to the team
- Add a VLAN
- Remove a team or a VLAN

To modify a team, perform the following procedure.

1. Select the team name.
2. From the **Tools** menu, click **Configure a Team**.

The Welcome page of the Broadcom Teaming Wizard is shown in Figure 11 on page 44.

3. Click **Next**.

The Team Name page asks for a name for the team, as shown in Figure 12 on page 44.

4. Type the name of the team you want to modify and click **Next**.

The Team Properties tab is displayed with the properties of the team you selected, as shown in Figure 29.

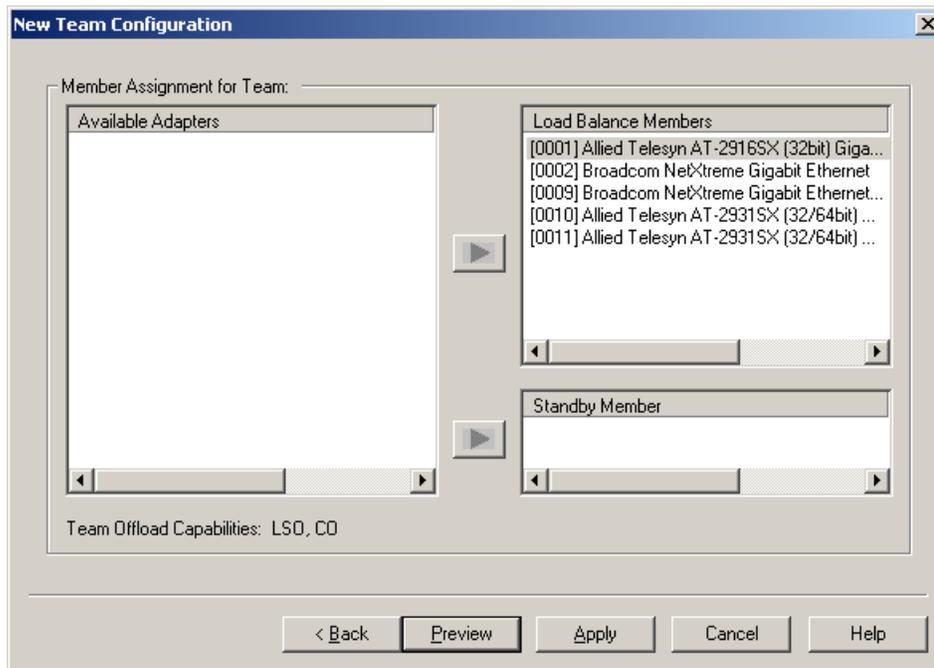


Figure 29. Team Properties Tab

5. In the list of adapters in the team shown on the left, right-click the name of the team you want to modify and click **Configure Team, Add VLAN, Configure LiveLink, or Fallback**.
6. When you are done with your changes, click **Apply**.
7. Click **Yes** when you see the message indicating that the network connection will be temporarily interrupted.

### Adding a VLAN

You also 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 is that your server can have one network adapter 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 (63 tagged and 1 untagged). VLANs can only be created when all members are Allied Telesyn adapters. If you try to create a VLAN with another type of adapter, an error message appears.

---

**Note**

Disabled adapters are not recognized and they prevent the creation of a VLAN. If you attempt to create a VLAN with a disabled adapter, an error message is displayed.

---

To configure a team with a VLAN, perform the following procedure.

---

**Note**

To maintain optimum adapter performance, your system must have 64 MB of system memory for each of the 8 VLANs created per adapter.

---

1. Select the team name.

The Team Properties tab opens as shown in Figure 25 on page 53.

2. In the list of adapters in the team shown on the left, right-click the name of the team you want to modify and click **Add VLAN**.

The Add VLAN dialog box opens, as shown in Figure 30

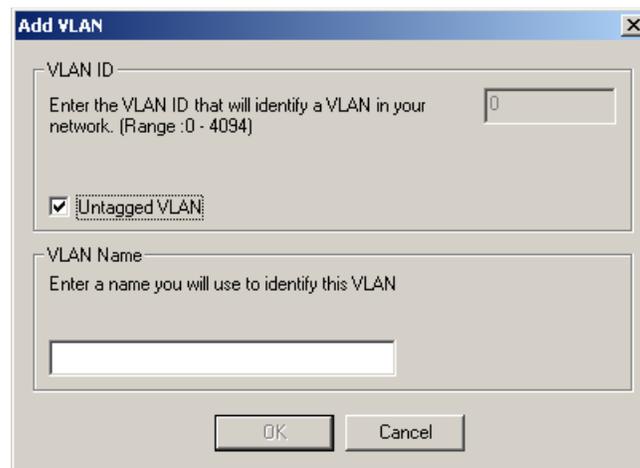


Figure 30. Add VLAN Dialog Box

3. Type the *VLAN ID* and *VLAN name*, then click **OK**.

The **Untagged VLAN** check box is exclusively used by the VLAN ID field. To use VLAN ID 0, simply click this check box. If you type a VLAN name or ID and the name already exists, an Input Error message appears.

4. When you are finished adding VLANs to this team, click **OK**.

A new virtual adapter is created for each VLAN.

5. Click **Apply**.
6. Click **Yes** when you see the message indicating that the network connection will be temporarily interrupted.

The available adapters are listed (these adapters are not currently members of any team).

### Displaying VLAN Properties and Statistics and Running VLAN Tests

The procedures in this section describe how to display VLAN properties and statistics as well as how to run VLAN tests and delete a VLAN.

To display VLAN properties and statistics and to run VLAN tests, perform the following procedure.

1. In BACS2, click the VLAN name in the team's Virtual Adapters folder, as shown in Figure 31.

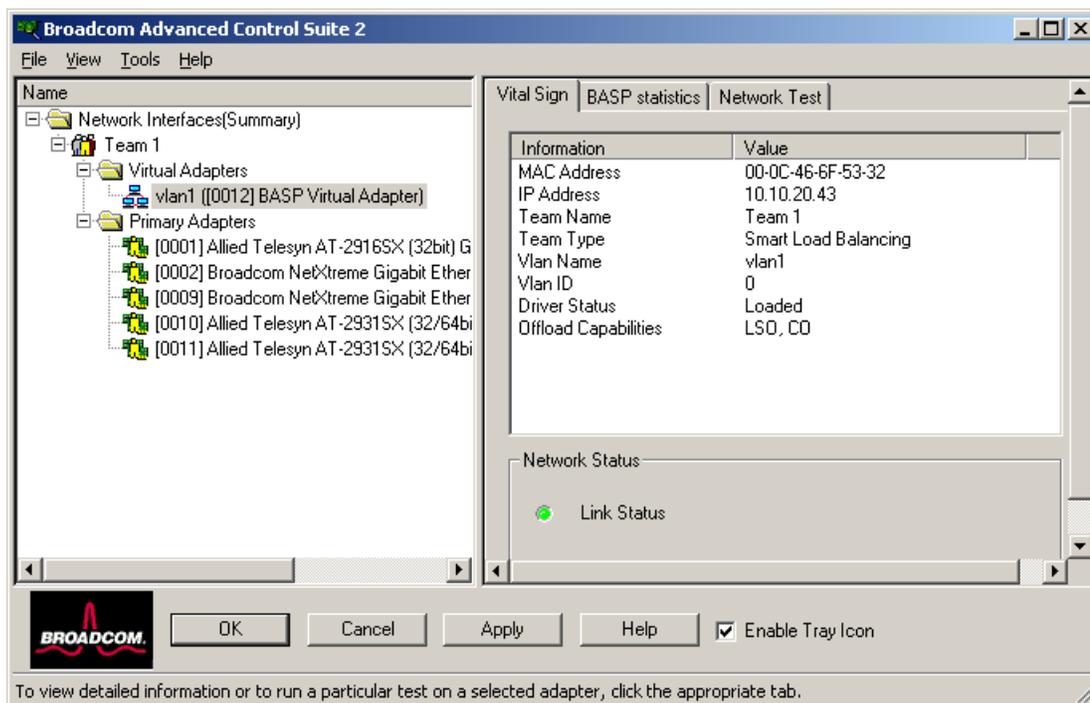


Figure 31. VLAN Name Selected

2. Click the **Vital Sign** tab to view the properties of the VLAN adapter.
3. Click the **BASP Statistics** tab to view the statistics for the VLAN adapter.
4. Click the **Network Test** tab to run a network test on the VLAN adapter.

To delete a VLAN, perform the following procedure.

1. In BACS2, select the VLAN name in the team's Virtual Adapters folder, as shown in Figure 31 on page 60.
2. Right-click the VLAN name and select click **Remove VLAN**.
3. Click **Apply**.
4. Click **Yes** when you see the message indicating that the network connection will be temporarily interrupted.

---

**Note**

When you delete a team, the VLANs configured for that team are also deleted.

---

### Saving and Restoring a Configuration

The configuration file is a text file that can be viewed with any text editor. The file contains information about both the adapter and the team configuration. To save and restore a configuration file, see the following procedures.

To save a configuration, perform the following procedure.

1. From the **File** menu, click **Team Save As**.

The is Save As dialog box is shown in Figure 31.

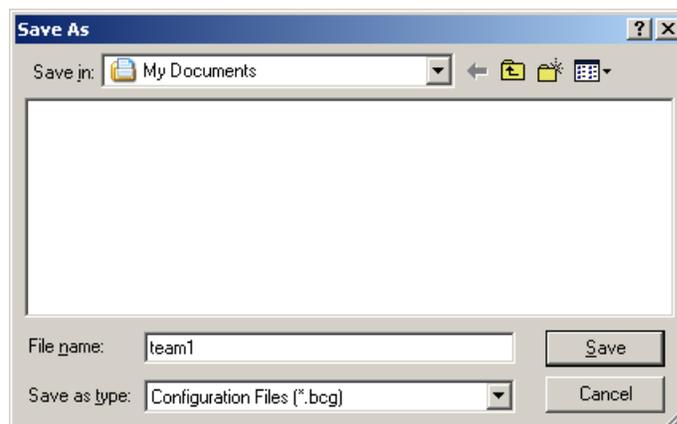


Figure 32. Save As Dialog Box

2. Type the path and file name of the new configuration file and click **Save** (a .bcg extension is added).

To restore a configuration, perform the following procedure.

1. From the **File** menu, click **Team Restore**.

The is Open dialog box is shown in Figure 31.

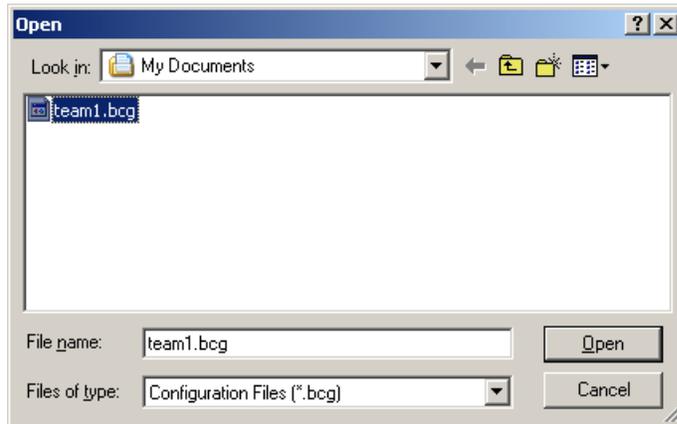


Figure 33. Save As Dialog Box

2. Click the name of the file to be restored and click **Open**.

---

**Note**

You may need to navigate to the folder where the file is located.

---

If a configuration is already loaded, a message appears asking if you want to save your current configuration. Click **Yes** to save the current configuration. Otherwise, the configuration data that is currently loaded is lost.

3. Click **Apply** to enable the Save Configuration feature.

### **Viewing the Team Properties and Statistics**

To view the team properties and statistics, perform the following procedure.

1. Select the team name.

The Team Properties tab opens as shown in Figure 25 on page 53.

## Chapter 3

# Installing BACS on Windows 2000 and Windows 2003 Systems

---

This chapter provides procedures for installing the BACS application and configuring teaming on Windows 2000 and Windows 2003 systems. It contains the following sections:

- ❑ “Installing the BASP” on page 64
- ❑ “Uninstalling the BASP” on page 65

## **Installing the BASP**

---

For BASP installation procedures, refer to Chapter 2, “Broadcom Advanced Control Suite 2 (BACS 2) Applications” on page 19.

## Uninstalling the BASP

---

To uninstall the Broadcom Advanced Server Program Driver Properties (BASP), perform the following procedure:

1. Open the Control Panel
2. Double-click the **Add or Remove Programs** button.
3. Select Broadcom Management Programs and click **Change/Remove**.
4. Click **Next**.

The InstallShield Wizard screen appears.

5. Click the **Modify** radio button and click **Next**.
6. The Select Components screen opens.

Four install/uninstall selections are available from this screen.

7. Deselect the **BASP** checkbox, then click **Next**.
8. A question box appears indicating that removing BASP will uninstall your configured adapter team/VLAN. Click **Yes** to continue.
9. When complete, an information screen notifies you that the files were successfully uninstalled.
10. Click **OK** to complete the uninstall.



## Chapter 4

# Installing BACS on a Linux System

---

This chapter describes the installation and configuration of the BASP driver on Linux. It includes the following section:

- ❑ “BASP Driver for Linux” on page 68
- ❑ “Packaging” on page 69
- ❑ “Installing BASP” on page 70
- ❑ “Installing the BASP Source RPM Package for Red Hat and United Linux” on page 71
- ❑ “Installing the BASP TAR Archive” on page 72
- ❑ “BASP Files” on page 73
- ❑ “BASP Configuration for Red Hat and United Linux Distributions” on page 74
- ❑ “BASP Configuration and Startup for Other Linux Distributions” on page 76
- ❑ “BASP Configuration Scripts for Red Hat Distributions” on page 78
- ❑ “Broadcom NICE Patches” on page 79
- ❑ “Uninstalling the RPM Package” on page 80
- ❑ “Removal of Physical Interface in Generic Trunking and 802.3ad Mode” on page 81
- ❑ “BASP SNMP Agent for Linux” on page 82
- ❑ “Known Problems” on page 84

## BASP Driver for Linux

---

On newer Distributions and Kernels, it may be necessary to remove the BASP Driver for Linux

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 as primary or hot-standby (SLB team only). All primary NIC interfaces in a team participate in Load-balancing operations by sending and receiving a portion of the total traffic. Hot-standby interfaces take over in the event that all primary interfaces have lost their links. In addition, VLANs can be added to a team to allow multiple VLANs with different VLAN IDs. A virtual device is created for each VLAN added.

There are three BASP modes:

- ❑ SLB mode. This mode works with all Ethernet switches without configuring the switch ports to any special trunking mode. BASP supports Smart Load Balance (SLB™), Generic Trunking and IEEE 802.3ad Link Aggregation. In SLB and 802.3ad modes, all NICE drivers must support Broadcom NIC Extension (NICE).
- ❑ Generic trunking mode. This 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. This mode requires NICE drivers and Ethernet switches supporting IEEE 802.3ad Link Aggregation. This mode is protocol-independent and all traffic is 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 that all of the member NICs support NICE. All of 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. This package is installed separately (see “BASP SNMP Agent for Linux” on page 82).

## Packaging

---

BASP is released in two packaging formats: source RPM and compressed tar formats. The file names for the two packages are `basplnx-<version>.src.<arch>.rpm` and `basplnx-<version>.<arch>.tgz`. Identical source files to build the driver are included in both the RPM and TAR source packages.

## Installing BASP

---

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.

For users of Red Hat or United Linux-based distributions, follow the instructions in “Installing the BASP Source RPM Package for Red Hat and United Linux” on page 71.

For users of other Linux i386 distribution, follow instructions in the “Installing the BASP TAR Archive” on page 72.

## Installing the BASP Source RPM Package for Red Hat and United Linux

---

To install the BASP RPM source package for Red Hat and United Linux 1.x based distributions, perform the following procedure.

1. To install the RPM source package, run

```
% rpm -i basp1nx-{version}.src.{arch}.rpm
```

2. Change directory to the RPM path and build the binary driver for the kernel (use rpmbuild for Red Hat 8.0 or later)

```
% cd /usr/src/{redhat or packages}  
% rpm -bb SPECS/basp1nx.spec or rpmbuild -bb SPECS/  
basp1nx.spec
```

---

**Note**

Each Linux distribution has a unique RPM path.

---

3. Install the newly built package

```
% rpm -i RPMS/i386/basp1nx-{version}.{arch}.rpm
```

The driver and other required files are installed automatically.

4. To load the driver

```
% insmod basp
```

5. To set up the teams, refer to "BASP Configuration for Red Hat and United Linux Distributions" on page 74.

## Installing the BASP TAR Archive

---

Use the procedures in this section to install Linux i386 distributions that are neither Red Hat nor United Linux distributions. Installing the BASP TAR archive involves both uncompressing the archive and then installing it.

To uncompress and expand the tar archive, run:

```
% tar xvfz basp1nx-{version}.{arch}.tgz
```

To install the BASP TAR archive, perform the following procedure:

1. After extraction, change to the directory where the BASP source files are located.

```
% cd basp1nx-{version}
```

2. To build a kernel module, "basp.o":

```
% make
```

---

**Note**

The Make process automatically builds the correct module for different kernel options, for example, symbol versioning and SMP support. Do not define -DMODVERSIONS in the Makefile.

---

3. To create device file and to copy files:

```
% make install
```

4. To update the module reference:

```
% depmod -a
```

5. To load the driver:

```
% insmod basp
```

6. To set up the teams, see "BASP Configuration and Startup for Other Linux Distributions" on page 76.

## BASP Files

---

See Table 2 for a list of the BASP files.

Table 2. Contents of the release.txt File

| Filename            | Description                                       |
|---------------------|---|
| Makefile            | makefile  |
| baspcfg             | precompiled configuration utility                 |
| bcmtyp.h            | commonly used type header file                    |
| blf.c               | BASP module entry points                          |
| blf.h               | ioctl interface                                   |
| blfcore.h           | core interface                                    |
| blfcore.o           | precompiled core object                           |
| blfopt.h            | automatically generated header file from the Make |
| blfver.h            | version header file                               |
| nicext.h            | NICE header file                                  |
| pal.c               | platform abstraction implementation               |
| pal.h               | header for platform abstraction                   |
| release.txt         | this file   |
| nice-2.2.16         | NICE enabled driver for 2.2 kernel                |
| nice-2.4.16         | NICE enabled driver for 2.4 kernel                |
| scripts             | contains sample scripts                           |
| scripts/basp        | init script, goes to /etc/rc.d/init.d             |
| scripts/baspteam    | start/stop script, goes to /etc/basp              |
| scripts/baspif      | start/stop network, i/f, goes to /etc/basp        |
| scripts/team-sample | sample script of SLB team with three NICs         |
| scripts/team-gec    | sample script of GEC team with three NICs         |
| scripts/team-vlan   | sample script of SLB team with 2 VLANs            |
| basp.4              | man page  |

Table 2. Contents of the release.txt File (Continued)

| Filename  | Description                  |
|-----------|------------------------------|
| baspcfg.8 | man page for baspcfg utility |

## BASP Configuration for Red Hat and United Linux Distributions

---

This section describes the BASP Configuration for Red Hat and United Linux 1.x based distributions. The BASP distribution includes a utility program and several scripts for team configuration. Most of the steps are only required after the first time installation. In the following procedure, perform Step 2 "Modify the configuration script," whenever you change the team configuration.

Since Linux distributions do not automatically load drivers for network devices unless the device is configured with an IP address, you must manually configure a network-script file for all of the physical adapters that will be team members. Network script files are located under `/etc/sysconfig/network-scripts` (Red Hat) or `/etc/sysconfig/network` (United Linux 1.x). The file name must be prefixed with "ifcfg-" then the physical adapter alias. For interface eth0, you create a file with the name `ifcfg-eth0` and then add the content below.

---

### Note

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

---



---

### Note

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

---

Example:

```
DEVICE=eth0
BOOTPROTO=static
ONBOOT=yes
```

For users of other Linux distributions, follow instructions in the "BASP Configuration and Startup for Other Linux Distributions" on page 76.

To configure BASP, perform the following procedure:

1. Copy a configuration script from the "/etc/basp/samples" directory to the "/etc/basp" directory.

---

**Note**

The configuration script name must be prefixed with "team-".

---

2. Modify the following parameters of the configuration script:

- (a) change the team type
- (b) add or delete the physical network interfaces
- (c) add or delete the virtual network interfaces
- (d) assign IP address to each virtual network interface.

The syntax of the configuration script can be found in "BASP Configuration Scripts for Red Hat Distributions" on page 78 or in the /etc/basp/sample/team-sample script file itself. 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 starts automatically on subsequent reboots.

---



---

**Note**

If not all of the virtual network interfaces are configured with an IP address, an error message is displayed when starting the BASP team. If this happens, repeat step 2 to configure an IP address for all of the virtual network interfaces.

---



---

**Note**

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**

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

---

## BASP Configuration and Startup for Other Linux Distributions

---

BASP Configuration (baspcfg) is a command line tool that is used 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 distributor's startup procedures.

Following is an example of this tool:

```
baspcfg v3.0.14 - Broadcom Advanced Server Program
Configuration Utility Copyright (c) 2000-2002 Broadcom
Corporation. All rights reserved.
```

```
usage: baspcfg <commands>
```

### commands

The commands are listed in Table 3.

Table 3. Commands

| Command                                    | Description                           |
|--|---------------------------------------|
| addteam <tid> <type> <tname>               | create a team                         |
| delteam <tid>                              | delete a team                         |
| addva <tid> <vlan_id><br><vname> [macaddr] | add a virtual adapter to a team       |
| delva <tid> <vlan_id>                      | delete 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

The where options are listed in Table 4.

Table 4. Parameter Descriptions

| Parameter | Description                                 |
|-----------|---|
| tid       | An unique ID for each team, starting from 0 |

Table 4. Parameter Descriptions (Continued)

| Parameter | Description   |
|-----------|---|
| type      | Team type: 0=SLB, 1=FEC/<br>GEC, 2=802.3ad                |
| tname     | ASCII string of the team                                  |
| vlan_id   | VLAN ID: from 1 to 4094,<br>0=untagged or no VLAN         |
| vname     | ASCII string of the virtual<br>device                     |
| macaddr   | MAC address (optional), for<br>example, 00:10:18:00:11:44 |
| role      | Role of the physical device:<br>0=primary, 1=hot-standby  |
| device    | ASCII string of the physical<br>device, for example, eth0 |

**Note**

You can only execute Baspcfg in Super User mode. Attempting to use baspcfg as a standard user displays the following error message, "Error in communicating to BASP Module. Is it loaded?".

When you configure Teaming, one Primary Adapter is required.

## BASP Configuration Scripts for Red Hat Distributions

---

Both *team-sample* and *team-gec* are configuration scripts that follow the same syntax. See Table 5 for more information.

Table 5. Configuration Scripts

| Script            | Description   |
|-------------------|---|
| 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.<br>For untagged virtual interface, that is, without VLAN enabled, set it to 0. The valid VLAN ID can be 0 to 4094. |
| TEAM_VAx_IP:      | IP address of the virtual interface x. The format should be aa.bb.cc.dd.  |
| TEAM_VAx_NETMASK: | Subnet mask of the virtual interface x. The format should mm.nn.oo.pp.  |

---

### Note

Teaming scripts are intended for Red Hat and United Linux-based distributions ONLY. Use with other Linux distributions may 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, perform the following procedure.

1. Copy the NICE header file, "nicext.h", to the appropriate Linux kernel include directory, for example:

```
% 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 source directory, 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, go to step 7. If the patched drivers are configured as modules, go to 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. Go to 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 a RPM package, perform the following procedure.

```
% rpm -e basp1nx
```

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. If the first physical interface is removed dynamically from the team using the "baspcfg" tool and bounded to the protocol directly, this could lead to a duplicate MAC address problem on the network. To properly remove a physical interface, perform the following procedure.

1. Back up the original team configuration script

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

---

**Note**

"team-gec" is the name of the configuration script.

---



---

**Note**

"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 BASP driver. The BASP SNMP agent is available in two packaging formats: TAR archive and RPM. Both packages include the same script and MIB files.

### Installing the TAR Archive

To uncompress and expand the tar archive, run:

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

To install BASP SNMP agent for Linux, perform the following procedure.

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 usually located in one of the following directories:

```
/etc/snmp
```

```
/usr/lib/snmp
```

```
$HOME/.snmp
```

4. 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
```

5. Stop the snmpd daemon and restart it again.

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

6. 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.

7. 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 are installed. The *snmpd.conf* configuration file is modified to add support for the BASP SNMP agent.

2. Follow steps 4 - 6 in the “Installing the TAR Archive” on page 82.

---

### Note

The current RPM installation fails to append the additional directives needed to the *snmpd.conf* file to support Basp objects. Therefore, follow the instruction (3) in the Install - TAR archive to modify the *snmpd.conf* file.

---

## SNMP Files

See Table 6 for a list of supported SNMP files.

Table 6. SNMP Files

| Filename                | Description                                  |
|-------------------------|--|
| 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          |

Table 6. SNMP Files (Continued)

| Filename    | Description |
|-------------|-------------|
| release.txt | this file   |

**Uninstalling the RPM Package (Both Source and Binary)**

To uninstall RPM package, run:

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

and to reboot the system,

```
% reboot
```

**Known Problems**

---

The 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 more than 2 members on the server and connecting to an HP2524 switch, with LACP enabled as passive or active. The HP switch shows an LACP channel brought up successfully with only 2 members. All other member's links disconnect and reconnect. This issue does not occur with a Cisco Catalyst 6500.

## Chapter 5

# Key Protocols and Interfaces

---

This chapter describes the key protocols and interfaces. It contains the following sections:

- ❑ “Adapter Teaming” on page 86
- ❑ “Failover Teaming” on page 88
- ❑ “VLANs Overview” on page 89

## Adapter Teaming

---

Teaming provides traffic load balancing and redundant adapter operation in the event that a network connection fails. When multiple Allied Telesyn adapters are installed in the same server, they can be grouped into teams. Each team can be configured on the server with up to 8 ports. 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 that all of the primary adapters are down, the hot standby adapter becomes active. Existing sessions are maintained, causing no user impact.

BASP supports four schemes of load balancing: Smart Load Balancing, Link Aggregation (802.3ad), Generic Link Aggregation (Trunking), and Smart Load Balance Auto-Failback Disable. These schemes are described in the following sections.

### **Smart Load Balancing (SLB)<sup>™</sup>**

The implementation of load balancing is based on IP flow. This feature supports balancing IP traffic across multiple adapters (that is, 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 members or to a hot standby member. This is done independently of the layer 3 protocol (IP, IPX, or Net Beui). It works with existing layer 2 and 3 switches.

### **Link Aggregation (802.3ad)**

This mode supports Link Aggregation and conforms to the IEEE 802.3ad (LACP) specification. Configuration software allows you to dynamically configure which adapters you want to participate in a given team. If there are 4 adapters in the system, you can select between 2 and 4 adapters to participate in the team.

If the link partner is not correctly configured for 802.3ad link configuration, errors are detected and noted. With this mode, all adapters in the team are configured to receive packets for the same MAC address. The outbound load-balancing scheme is determined by our BASP driver. The team's link partner determines the load-balancing scheme for inbound packets. In this mode, at least one of the link partners must be in the active mode.

### **Generic Link Aggregation (Trunking)**

This mode is very similar to 802.3ad in that you need to configure all of the adapters in the team to receive packets for the same MAC address. However, generic link aggregation 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, generic link aggregation mode is a "light" version of the 802.3ad link aggregation and is often referred to as 802.3ad static. This approach is much simpler because 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 the outbound and inbound traffic.

**Smart Load  
Balance Auto-  
Failback Disable**

This team is almost identical to Smart Load Balance and Failover with one exception. If a primary member comes back on line when the standby member is active, the team continues using the standby member rather than switching to the primary member.

## Failover Teaming

---

Failover Teaming provides a 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 the adapter, cable, or switch port fails, the secondary team member becomes active. In this case, the secondary team member redirects both the inbound and outbound traffic originally assigned to the primary adapter. Sessions are maintained; consequently, there is no impact to the user.

---

### **Note**

Allied Telesyn recommends disabling STP when you use the teaming and fault tolerance features.

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## VLANs Overview

VLANs allow you to split your physical LAN into logical subparts, to create logical segmentation of workgroups, and to enforce security policies among each logical segment. Each defined VLAN behaves as its own separate network, with its traffic and broadcasts isolated from the others, increasing bandwidth efficiency within each logical group. Up to 64 VLANs (63 tagged and 1 untagged) can be defined for each Allied Telesyn Gigabit Ethernet adapter in your server, depending on the amount of available memory 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. The adapters support multiple VLANs on a per-port or per-team basis, allowing very flexible network configurations.

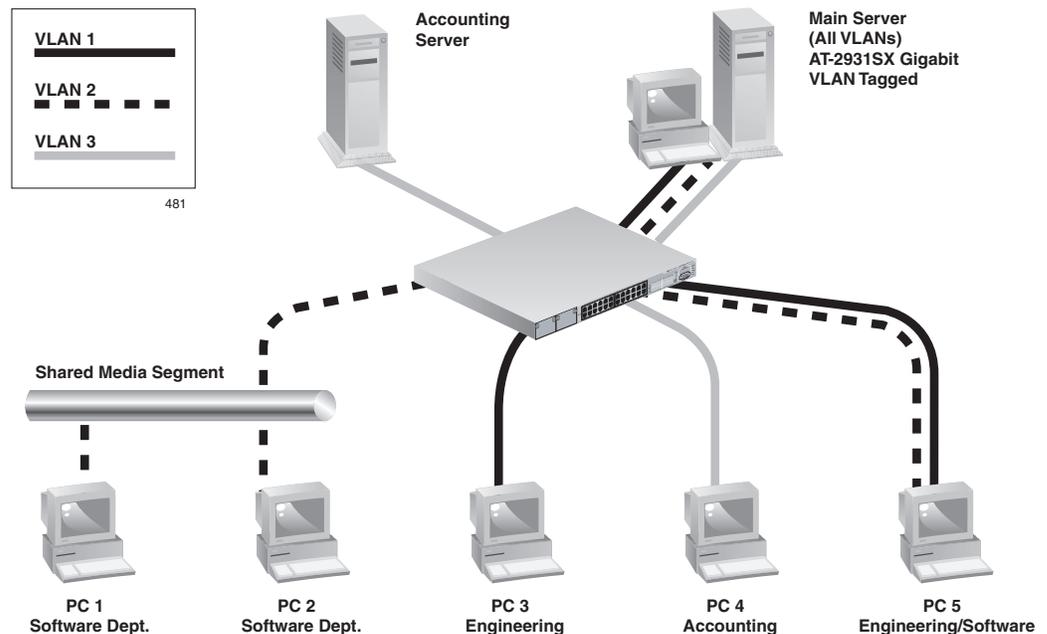


Figure 34. Example of Servers Supporting Multiple VLANs with Tagging

Figure 34 on page 89 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 Table 7.

Table 7. Example VLAN Network Topology

| Component         | Description  |
|-------------------|--|
| VLAN #1           | An IP subnet consisting of the Main Server, PC #3, and PC #5. This subnet represents an engineering group.   |
| VLAN #2           | Includes the Main Server, PCs #1 and #2 via shared media segment, and PC #5. This VLAN is a software development group.  |
| VLAN #3           | Includes the Main Server, the Accounting Server and PC #4. This VLAN is an accounting group.   |
| Main Server       | A high-use server that needs to be accessed from all of the VLANs and IP subnets. The Main Server has an Allied Telesyn adapter installed. All three IP subnets are accessed via the single physical adapter interface. The server is attached to one of the switch ports, which is configured for VLANs #1, #2, and #3. Both the adapter and the connected switch port have tagging turned on. Because of the tagging VLAN capabilities of both devices, the server is able to communicate on all three IP subnets in this network, but continues to maintain broadcast separation between all of them. |
| Accounting Server | Available to VLAN #3 only. The Accounting Server is isolated from all traffic on VLANs #1 and #2. The switch port connected to the server has tagging turned off.  |
| PCs #1 and #2     | Attached to a shared media hub that is then connected to the switch. PCs #1 and #2 belong to VLAN #2 only, and are logically in the same IP subnet as the Main Server and PC #5. The switch port connected to this segment has tagging turned off.   |
| PC #3             | A member of VLAN #1, PC #3 can communicate only with the Main Server and PC #5. Tagging is not enabled on PC #3's switch port.   |
| PC #4             | A member of VLAN #3, PC #4 can only communicate with the servers. Tagging is not enabled on PC #4's switch port.   |

Table 7. Example VLAN Network Topology (Continued)

| Component | Description  |
|-----------|--|
| PC #5     | A member of both VLANs #1 and #2, PC #5 has an Allied Telesyn 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. It is also required on ports connected to tag-capable end-stations, such as servers or workstations with 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 the Allied Telesyn 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.

**Adaptive Interrupt Frequency**

Based on traffic conditions, the adapter driver intelligently adjusts host interrupt frequency 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 the 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 a 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.

## Chapter 6

# Troubleshooting

---

This chapter describes troubleshooting procedures and contains the following sections:

- ❑ “Verifying the Correct Drivers are Loaded” on page 94
- ❑ “Software Problems and Solutions” on page 96

## Verifying the Correct Drivers are Loaded

The following section describes how to check if the correct drivers are loaded for Windows and Linux.

**Windows** The Broadcom Advanced Control Suite, Vital Sign tab allows you to view vital adapter information, network status, and network connectivity. Active adapters are listed on the Vital Sign tab.

1. On the Vital Sign tab, select the adapter you want to test.
2. Press **Refresh** to display the driver status of the selected adapter.

---

### Note

The information for other adapters is less comprehensive than the information listed for an Allied Telesyn Gigabit Ethernet adapter.

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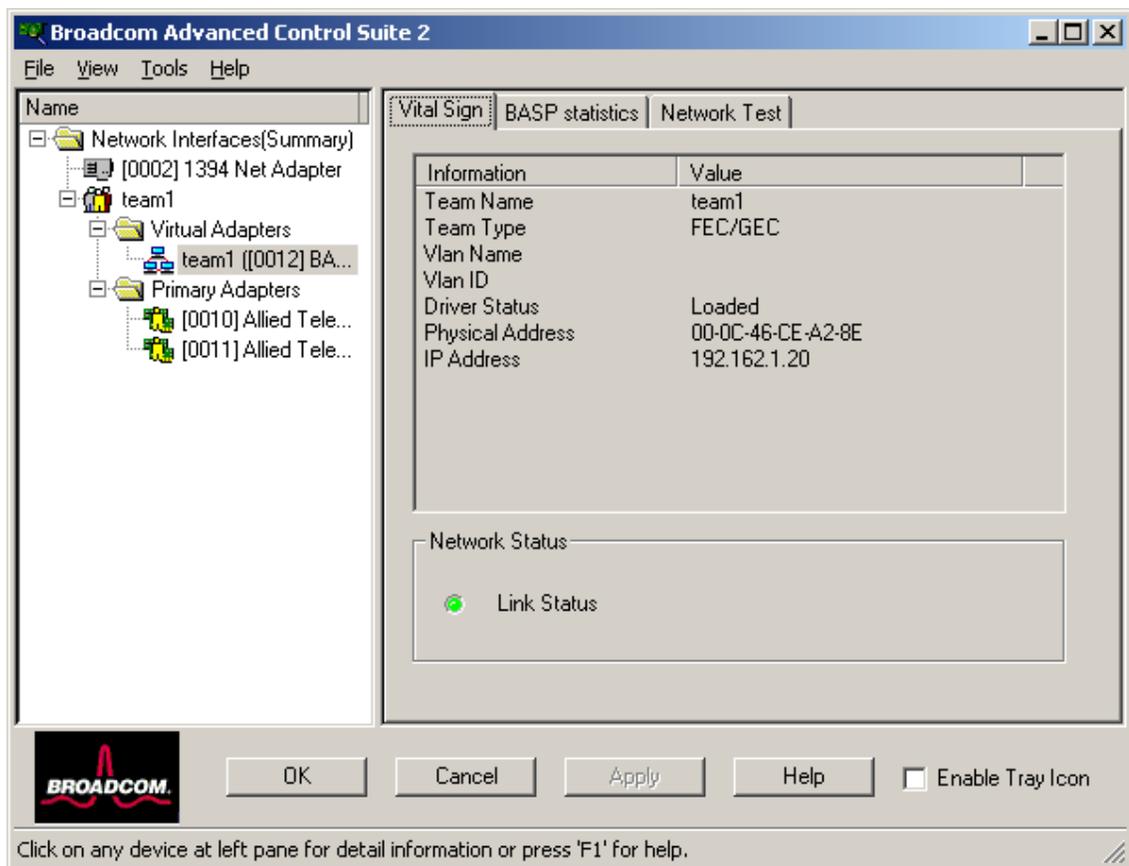


Figure 35. Vital Sign Tab, Troubleshooting

## Linux

To verify that the Linux Driver software is loaded correctly, perform the following procedure.

1. 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, as shown in Table 8.

Table 8. Linux Driver Software Information

| Module  | Size                | Used by          |
|---------|---------------------|------------------|
| BCM5700 | <i>&lt;size&gt;</i> | <i>&lt;n&gt;</i> |

## Software Problems and Solutions

---

This section describes common software problems and solutions and contains the following subsections:

- “Windows 2000” on page 96
- “Linux-BASP” on page 97
- “Broadcom Advanced Server Program (BASP)” on page 98

### Windows 2000

This section lists known problems and solutions when using Windows 2000.

**Problem:** When uninstalling the BASP software, you are prompted to reboot early.

**Solution:** After configuring a BASP team, the Windows 2000 system may sometimes prompt you to reboot. This is because Plug and Play on W2k may fail to commit any change in the network protocol binding. You can choose not to reboot and continue configuring the intermediate driver without causing any side effects. When you have finished the configuration, you must reboot the system.

**Problem:** Cannot enable VLAN after it is disabled.

**Solution:** The BASP application creates additional network connections in the "Network Connection and Dial-up" Window. Similar to physical network connections, these virtual connections can be disabled via the context menu. However, if these virtual connections are re-enabled, the system reports a "connection failed!" error. This is a known problem with the Windows 2000 system. When this happens, rebooting the system reenables the virtual connection.

**Problem:** Able to configure Internet Connection Sharing (ICS) when there aren't any unassigned adapters.

**Solution:** Windows 2000 networking is shipped with the Internet Connection Sharing (ICS) application, which is designed to allow multiple computers to access the Internet via a Windows 2000 system. To configure the ICS application, you need to select a network connection as an "outside" connection and another network connection as an "inside" connection. However, the ICS application allows you to select any available network connection as an "outside" or "inside" connection, regardless of the BASP team configuration. Allied Telesyn recommends that you do not select any network connection that is part of the BASP team to be "outside" or "inside."

**Problem:** Team configuration is not retained when you edit it.

**Solution:** In configuring BASP team configuration, the actual changes of the configuration are not committed until you click "OK" in the "Network Properties" window. If you do not click "OK" and, instead, return to the BASP team configuration window, all the previous uncommitted changes are lost. This requires you to reenter the configuration. As a workaround, always click "OK" in the "Network Properties" window after making changes.

**Problem:** IP address is configurable on a member of the team.

**Solution:** When a team is created, the TCP/IP properties for the adapters are unselected. You can select and configure the TCP/IP properties of the adapters and configure an IP address manually. This issue is a limitation of the Windows 2000 network installation paradigm where this invalid configuration is still allowed.

**Problem:** When creating 64 VLANs, all virtual adapters are displayed as disconnected or one of the 64 VLANs is displayed as 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 the 63 tagged VLANs show links, while the 64th VLAN is disabled.

## Linux-BASP

This section lists known problems and solutions using 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>/`.

**Broadcom  
Advanced Server  
Program (BASP)**

This section lists known BASP problems and solutions that apply to all operating systems.

**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 more than 2 members on the server and connecting an HP2524 switch, with LACP enabled as passive or active. The HP switch shows an LACP channel being brought up successfully with only 2 members. All other member's links disconnect and reconnect.

---

**Note**

This issue does not occur with a Cisco Catalyst 6500.

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## Chapter 7

# Manageability Features

---

This chapter describes the manageability features and contains the following sections:

- “CIM” on page 100
- “SNMP” on page 101

## 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 and Windows Server 2003 systems. Allied Telesyn supports CIM on the Windows 2000 and the Windows Server 2003 platforms.

Allied Telesyn's implementation of CIM provides various classes that provide information to users through CIM client applications. (Please note that the Broadcom CIM data provider provides data only.) You can choose your preferred CIM client software to browse the information provided by the Broadcom CIM provider.

The Broadcom CIM provider provides information through the `BRCM_NetworkAdapter` and `BRCM_ExtraCapacityGroup` classes. The `BRCM_NetworkAdapter` class provides network adapter information pertaining to a group of adapters including the adapter and other vendors' controllers. The `BRCM_ExtraCapacityGroup` class provides team configuration for the BASP feature. Current implementation provides team information as well as information about physical network adapters in the team.

BASP provides events through event logs. You can use the Event Viewer provided by Windows 2000 and Windows Server 2003. Or, you can use CIM to inspect or monitor these events. BASP provider also provides event information through the CIM's generic event model. These events are `__InstanceCreationEvent`, `__InstanceDeletionEvent` and `__InstanceModificationEvent`. These events are defined by CIM. In addition, 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_ActsAS Spare"
SELECT * FROM __InstanceDeletionEvent where
TargetInstance ISA "BRCM_ActsAS Spare"
```

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

## SNMP

---

There are two SNMP agents for manageability:

- ❑ BASP Sub-agent
- ❑ BASP Extensible-agent

See the following sections.

### **BASP Sub-agent**

The BASP sub-agent, `baspmgmt.dll`, is designed for the Windows 2000 and Windows Server 2003 SNMP service. It is required to install the SNMP service before installing BASP subagent.

The BASP subagent allows the SNMP manager software to actively monitor the configurations and performance of the BASP 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. 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.

---

#### **Note**

Non-teamed NIC adapters are not monitored at this time

---

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 configuration changes to 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 BASP MIB database files to allow monitoring of the information described above. These files are shown below:

```
basconfig.mib
baspstat.mib
basptrap.mib
```

## **BASP Extensible-agent**

The Broadcom SNMP extensible-agent, bcmif.dll, is designed for the Windows 2000 and Windows Server 2003 SNMP service. The software requires that a 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 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 an Allied Telesyn adapter, such as:

- MAC address
- 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 the information listed above, a SNMP manager needs to load the MIB file.

The monitored workstation requires the installation of the Broadcom SNMP extensible-agent, bcmif.dll, and requires that the Microsoft Windows 2000 or Windows Server 2003 SNMP service be installed and loaded.