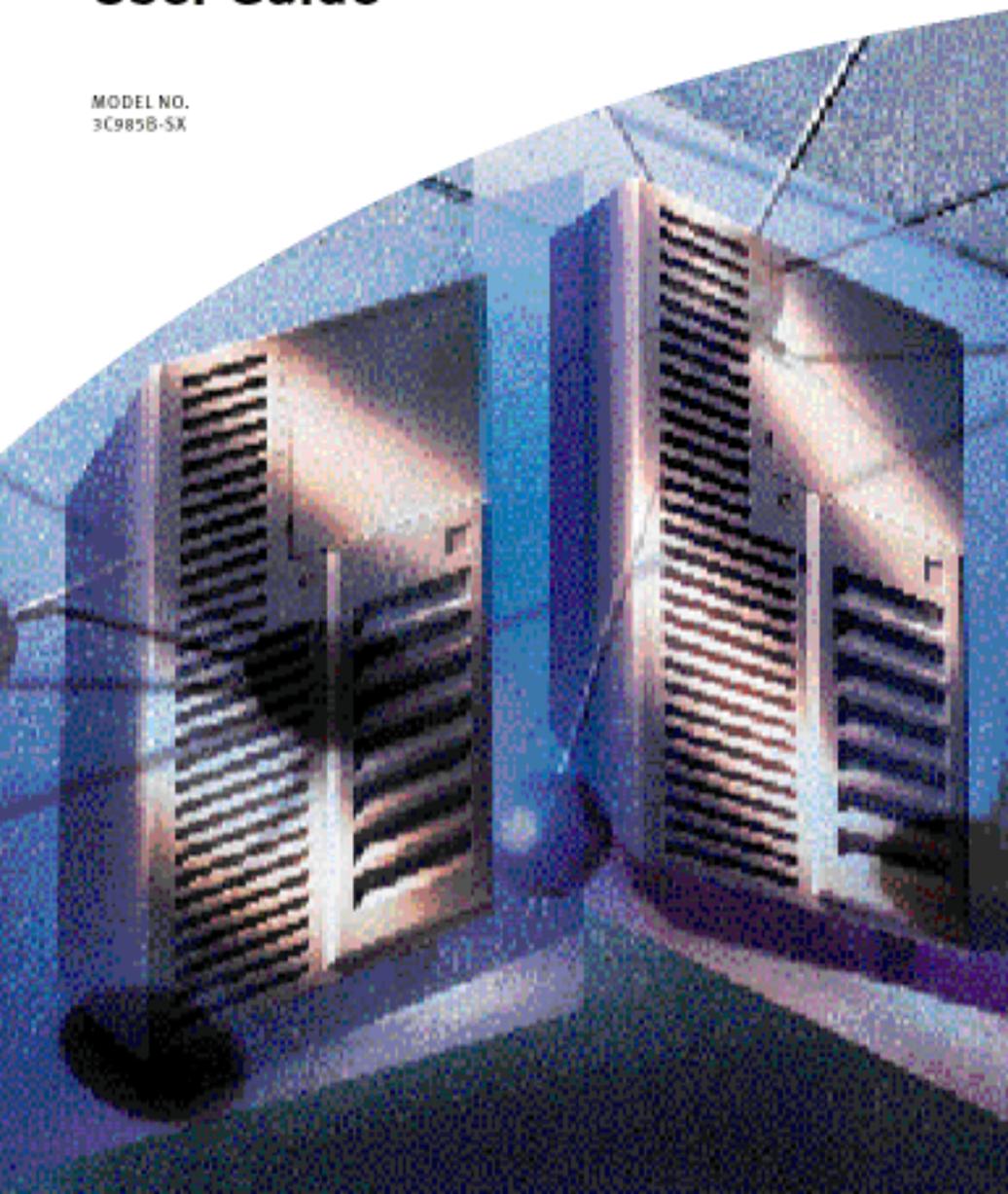


3Com® EtherLink® Server

Gigabit EtherLink Server NIC User Guide



MODEL NO.
3C985B-5X





Gigabit EtherLink[®] Server NIC User Guide

**3C985B-SX 1000 PCI server NIC with
DynamicAccess[®] technology**

<http://www.3com.com/>
<http://www.3com.com/productreg>

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ABOUT THIS GUIDE

This guide describes the installation and configuration of the 3Com® Gigabit EtherLink® 1000 PCI server network interface card (3C985B-SX server NIC).

This guide is intended for the network administrator, network operator, or network hardware installer. Knowledge of Gigabit Ethernet and the server network operating system is required.



If release notes are shipped with your product and the information there differs from the information in this guide, follow the instructions in the release notes.

Most user guides and release notes are available in Adobe Acrobat Reader Portable Document Format (PDF) or HTML on the 3Com World Wide Web site:

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Conventions

Table 1 and Table 2 list conventions that are used throughout this guide.

Table 1 Notice Icons

Icon	Notice Type	Description
	Information note	Information that describes important features or instructions
	Caution	Information that alerts you to potential loss of data or potential damage to an application, system, or device
	Warning	Information that alerts you to potential personal injury

Table 2 Text Conventions

Convention	Description
Screen displays	This typeface represents information as it appears on the screen.
Syntax	<p>The word “syntax” means that you must evaluate the syntax provided and then supply the appropriate values for the placeholders that appear in angle brackets. Example:</p> <p>To enable RIPIP, use the following syntax:</p> <pre>SETDefault !<port> -RIPIP CONTROL = Listen</pre> <p>In this example, you must supply a port number for <port>.</p>
Commands	<p>The word “command” means that you must enter the command exactly as shown and then press Return or Enter. Commands appear in bold. Example:</p> <p>To remove the IP address, enter the following command:</p> <pre>SETDefault !0 -IP NETaddr = 0.0.0.0</pre>
The words “enter” and “type”	When you see the word “enter” in this guide, you must type something, and then press Return or Enter. Do not press Return or Enter when an instruction simply says “type.”
Keyboard key names	<p>If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example:</p> <p>Press Ctrl+Alt+Del</p>
Words in <i>italics</i>	<p>Italics are used to:</p> <ul style="list-style-type: none"> ■ Emphasize a point. ■ Denote a new term at the place where it is defined in the text. ■ Identify menu names, menu commands, and software button names. Examples: <p>From the <i>Help</i> menu, select <i>Contents</i>.</p> <p>Click <i>OK</i>.</p>

Year 2000 Compliance

For information on Year 2000 compliance and 3Com products, visit the 3Com Year 2000 Web page:

<http://www.3com.com/products/yr2000.html>

1

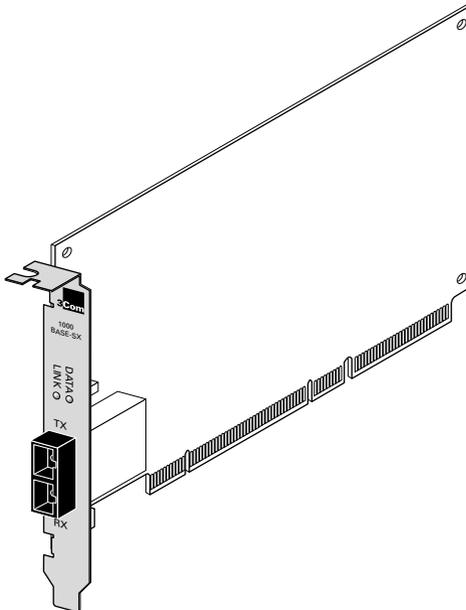
INTRODUCTION

The 3C985B-SX server NIC connects a PCI-compliant server computer to a Gigabit Ethernet network. It is fully interoperable with existing Ethernet equipment and operates at 1 gigabit per second (Gbps) in full-duplex mode when connected to a Gigabit Ethernet port.

The NIC is compatible with both 32-bit and 64-bit PCI bus standards and supports standard Ethernet minimum and maximum frame sizes (64 to 1518 bytes), frame format, and IEEE 802.2 LLC specifications.

Powerful DynamicAccess® technology ensures high performance and maximum bandwidth availability to relieve server congestion.

Figure 1 3C985B-SX Server NIC



Hardware Features

Interoperability	Operates with existing Ethernet equipment
Compliance with <i>PCI Local Bus Specification Version 2.0 and 2.1</i>	Compatible with a 32- or 64-bit, 33/66 MHz PCI bus master slot. As a bus master NIC, the NIC requests access to the PCI bus instead of waiting to be polled by the host. An innovative DMA algorithm enables the 3C985B-SX server NIC to automatically learn and conform to a particular host's PCI bus and memory system requirements, maximizing performance and host efficiency.
Full-duplex Gigabit Ethernet interface	IEEE 802.3z
Frame-based flow control	IEEE 802.3x
Gigabit Ethernet fiber interface	62.5/125 μm or 50/125 μm multimode fiber, using a duplex SC connector
Adaptive interrupt frequency	The 3C985B-SX server NIC driver intelligently adjusts host interrupt frequency based on traffic conditions to increase overall application throughput. In light traffic, the NIC driver interrupts the host for each received packet, minimizing latency. When traffic is heavy, the NIC issues one host interrupt for multiple, back-to-back incoming packets, preserving host CPU cycles.
Dual DMA channels	The PCI interface on the 3C985B-SX server NIC contains two independent DMA channels for simultaneous read and write operations.
ASIC with on-chip MAC and RISC processor	The core control for the 3C985B-SX server NIC resides in a tightly integrated, high-performance ASIC. Embedded RISC processors in the ASIC provide the flexibility to add new features to the NIC and adapt it to future changes in network requirements through software downloads. This embedded RISC processor enables NIC drivers to exploit built-in functions on the NIC that offload operations from the host to the NIC.
Universal dual-voltage signaling	3.3 V and 5 V
Status LEDs	LINK and DATA
Diagnostic support	Diagnostics programs run under DOS or Windows NT.

Software Features

	Windows NT 4.0	NetWare 4.11 and 5.0	UnixWare 7*
DynamicAccess technology provides powerful server features	x		
DynamicAccess technology also provides performance optimization features (IEEE 802.1P traffic prioritization, fast IP, multicast control)	x		
Load balancing spreads transmission over several NICs, thereby increasing outbound bandwidth.	x	x	
Resilient server links (RSLs) keep traffic flowing if a server link fails	x	x	x
IEEE 802.1Q multiple virtual LANs (VLANs) divide network segments into logical partitions that simplify changes or additions to the network.	x		x
Failover to 3Com EtherLink 10/100 PCI NIC (3C980B-TX server NIC) provides cost-effective fault tolerance.	x		

* The UnixWare 7 driver is available from the software downloads page at the 3Com web site (www.3com.com).

2

INSTALLING THE HARDWARE

Follow these instructions to install the NIC hardware.

Safety Precautions

Observe the following safety precautions.



WARNING: Server computers operate with voltages that can be lethal. Before removing the cover, turn off the computer and unplug it. Disconnect all cables that are connected to the main system unit. Remove jewelry from your hands and wrists. Use insulated or nonconductive tools.



CAUTION: The NIC is packed in an antistatic container to protect it during shipment. Do not touch the components or any metal parts on the NIC, except for the backplate. To avoid damaging the NIC or the PC, reduce static electricity on your body by wearing an electrostatic discharge wrist strap attached to the chassis or by touching an unpainted metal part of the chassis before unplugging the computer and before handling the NIC.



CAUTION: Install the NIC in a PCI slot that conforms to PCI 2.0 or higher specifications. Do not attempt to install the NIC in an ISA or EISA slot. Doing so may damage the NIC and the computer.

Installation Requirements

The following items are required for hardware and software installation.

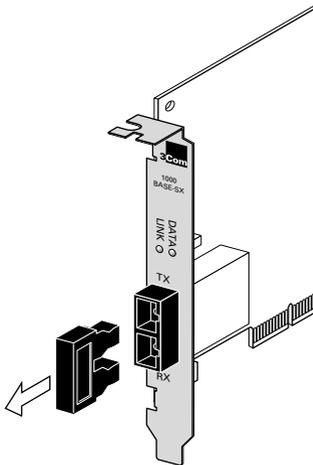
- **Processor** — Pentium-class or higher.
- **Server RAM** — 64 megabytes minimum.
- **PCI slot** — For each NIC, one bus master slot that conforms to PCI 32-bit or 64-bit specifications, revision 2.0 or higher.
- **Drive** — CD-ROM.

- **Cable** — 62.5/125 μm or 50/125 μm multimode fiber-optic.
- **Connector** — SC duplex.
- **Software** — One 3Com EtherLink Server CD with DynamicAccess software for servers and network drivers.
- **Operating system** — One of the following:
 - Microsoft Windows NT version 4.0 with the most recent Service Pack available from Microsoft technical support (www.microsoft.com).
 - Novell NetWare version 4.11 or 5.0 with the most recent patches and updates available from Novell technical support (www.novell.com).
 - SCO UnixWare 7
- **Server BIOS** — Latest version. Contact the PC manufacturer to verify.

Installation Instructions

1 Prepare the NIC and the server:

- a Unpack and inspect the NIC for damage.
- b Remove the optical dust cap from the NIC port.



- c Exit all open applications and user processes.
- d Turn off the power to the server and attached devices.
- e Unplug the power cables from the power source.
- f Remove the computer cover from the server.
- g Locate an empty bus master PCI-bus expansion slot.
- h Write down the MAC address of the NIC and note the relative position of the intended PCI slot.

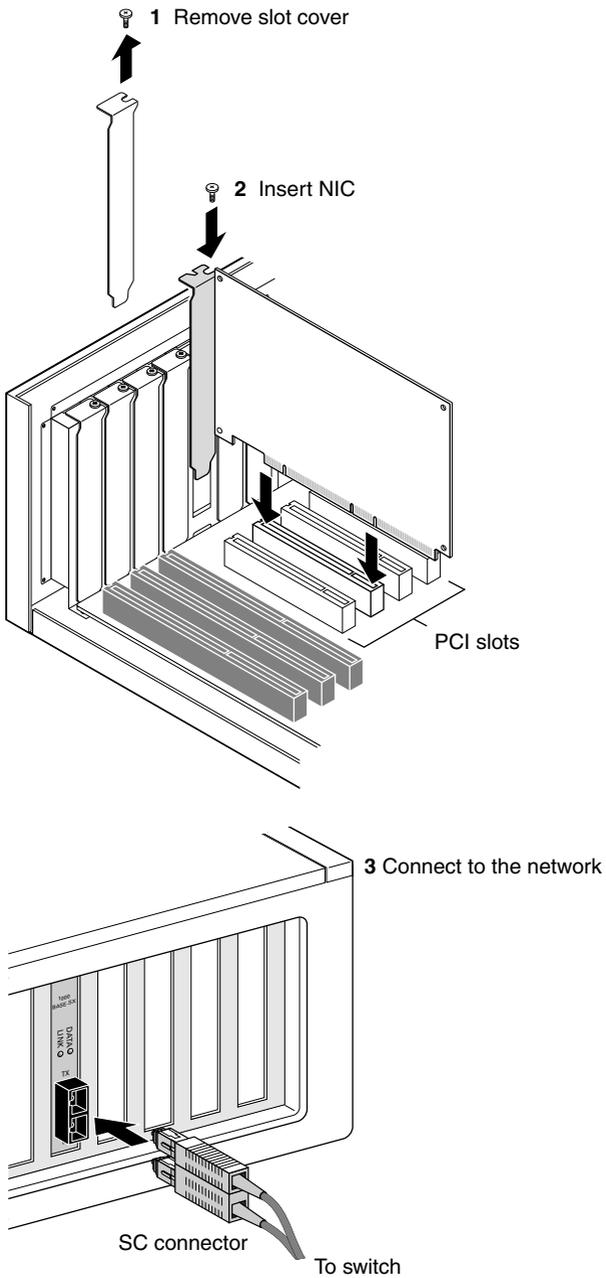
This information is helpful when you are installing the network drivers and connecting the cables to the hub or switch. The MAC address is the 12-digit hexadecimal number printed on the small bar code label on the component side of the NIC.

2 Follow these steps to install the NIC (see [Figure 2](#)):

- a Remove the metal expansion slot cover from the chassis. Save the screw for [step c](#).
- b Insert the NIC in the PCI-bus expansion slot. Press down gently and firmly on the NIC to seat it properly.
- c Use the screw removed in [step a](#) to secure the NIC backplate to the system chassis.
- d Replace the computer cover.
- e Connect the power cables and turn on the power to the server.
- f Connect the NIC to the network.
Use 62.5/125 μm or 50/125 μm multimode fiber-optic cable with SC duplex connectors. (Refer to [Appendix C](#) for cabling details.)



If your site's network installation procedures require you to verify that installed hardware is functional before you install software, run the DOS Configuration and Diagnostics Program before installing the driver. See [Chapter 5](#).

Figure 2 Installing the NIC

3

INSTALLING AND CONFIGURING THE WINDOWS NT DRIVER

Follow the instructions in this chapter to install the NIC driver and DynamicAccess software on a server running Windows NT 4.0.

Software Installation Requirements

- **NIC** — At least one 3Com 3C985B-SX server NIC must be installed in a PCI bus master slot.
- **Operating system** — Microsoft Windows NT version 4.0 must be installed with the most recent Service Pack and patches available from Microsoft technical support (www.microsoft.com).

Installation and Configuration Scenario

The instructions in this guide follow a simple scenario that demonstrates the fundamentals of setting up a sample configuration. Setting up your own configuration may require a slightly different sequence of tasks and different numbers of NICs. The Windows NT scenario described here illustrates a server on which no other NICs are installed and follows this sequence:

- 1 [Installing the Software](#)
This includes installing the driver and installing DynamicAccess software for servers.
- 2 [Creating a Load Balancing/RSL Group](#)
- 3 [Adding NICs to a Group](#)
- 4 [Creating a VLAN](#)
- 5 [Specifying Traffic Priorities](#)

6 Saving the Configuration

Examples are also shown for these maintenance tasks:

- [Disabling Load Balancing for a Group](#)
- [Removing a NIC from a Group](#)
- [Changing the Primary NIC](#)
- [Deleting or Editing a VLAN](#)
- [Displaying NIC Properties](#)
- [Displaying Group Properties](#)
- [Specifying Failover to Fast EtherLink](#)

Getting Help

To display the Help system during the driver installation, click *Help* on any 3Com window.

Installing the Software

Before you begin software installation:

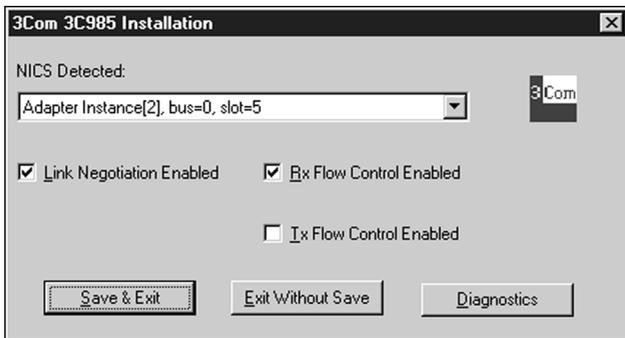
- Make sure that all software installation requirements are met.
- Boot the system under Windows NT.
- Log in to the Windows NT Administrator account.

- 1 Insert the 3Com EtherLink Server CD in the CD-ROM drive.**
- 2 From the Windows *Start* menu, select *Settings/Control Panel*.**
- 3 Double-click the Network icon.**
- 4 In the Network window, click the Adapters tab.**
- 5 In the Adapters tab, click *Add*.**
- 6 In the Select Network Adapter window, click *Have Disk*.**
- 7 In the Insert Disk dialog box, type the letter of the CD-ROM drive and click *OK*. For example:
D:**

8 In the Select OEM Option window, select 3Com Gigabit Ethernet Adapter (3C985) and click OK.

The installation program copies the driver and related files to the system hard disk and then detects the 3Com 3C985B-SX server NICs installed in the system. The 3Com Installation dialog box appears ([Figure 3](#)).

Figure 3 3Com Installation Dialog Box



By default, the 3C985B-SX server NIC auto-negotiates link characteristics, as specified in the IEEE 1000BASE-X standard. If you are connecting the NIC to equipment that has link auto-negotiation turned off, you must disable link negotiation. For more information on auto-negotiation and flow control, see [About Flow Control](#).

9 You can take any of the following actions in the Installation dialog box:

- To disable auto-negotiation, clear the Link Negotiation Enabled check box.
- To enable reception flow control, check the Rx Flow Control check box to allow the NIC to send pause frames to the switch.
- To enable transmission flow control, check the Tx Flow Control check box to allow the NIC to receive pause frames from the switch.
- To run the 3Com NIC Diagnostics program, click Diagnostics. (You must reboot the server to run diagnostics. For more information on the 3Com NIC Diagnostics program, see [Diagnostics and Troubleshooting](#).)

- 10 To save entries and exit the Installation dialog box, click *Save & Exit*.**



*Entries are saved only by clicking *Save & Exit*.*

- 11 In the Network window, click *Close*.**

Bindings messages appear.

If IP services are installed, the TCP/IP Configuration dialog box appears.

- 12 Configure IP parameters as appropriate for the network.**

Refer to the *Microsoft Windows NT System Guide* for information on TCP/IP configuration values. Contact the network administrator for appropriate IP addresses and subnet masks.

- 13 Remove the 3Com EtherLink Server CD from the CD-ROM drive.**



CAUTION: *To avoid system failure on multiprocessor servers running Windows NT Service Pack 4, you must install a Microsoft TCP/IP hot fix patch and reboot the server before installing DynamicAccess software.*

For more information on the patch, see the Gigabit EtherLink Server NIC Release Notes and the README file in the root directory on the Gigabit EtherLink Server CD.

- 14 Restart Windows NT.**

Creating a Load Balancing/RSL and VLAN Configuration

DynamicAccess software allows you to create and edit Load Balancing/RSL groups and VLANs.

Planning the Configuration

Consider these items when planning Load Balancing/RSL groups and VLANs:

- Decide whether you want to use bidirectional load balancing, or transmit-only load balancing.

To use bidirectional load balancing, you must assign a dedicated IP address for each load balancing group. This address must be unique (not used elsewhere on the network.) For details, see [Specifying a Dedicated IP Address](#).

- Decide which NICs are to be part of each Load Balancing/RSL group. Each group must include at least two NICs.
- Decide which NIC is to be the primary NIC in each group.
- Decide whether you want to specify failover to another 3C985B-SX server NIC or to a 3Com 3C980B-TX server NIC. If you choose to failover to the 3C980B-TX server NIC, you must disable load balancing for that group.
- For optimum failover performance, turn the spanning tree feature off at switches that are connected directly to the server. If the spanning tree feature is turned on, a failover may be delayed up to 30 seconds while the switch processes the spanning tree algorithm.
- Plan the cable changes required to connect each primary NIC and all secondary NICs to the same network segment.
- Observe the recommended support limits:
 - Four groups
 - 64 VLANs per server
- Assign a VLAN ID number to each VLAN. If you are not using a DHCP server, each VLAN that is using IP services requires an IP address and subnet mask.

Starting DynamicAccess Software

- 1 Log in to the Windows NT Administrator account.**
- 2 From the Windows Start menu, select Settings/Control Panel.**
- 3 Double-click the DynamicAccess SW Server icon.**

The Resilient Server Link/Load Balance/VLAN Configuration window appears. It contains tabs for these windows:

- In the Load Balance/RSL window, you can create and change Load Balancing/RSL groups. The NICs in a group work together to route traffic efficiently and to recover from failures.
- In the VLANs window, you can set up virtual LANs. All groups listed on the Load Balance/RSL window also appear as groups in the VLAN window. Any ungrouped NICs in the Load Balance/RSL window are also listed in the VLAN window.

Creating a Load Balancing/RSL Group

See [Figure 4](#) and follow these steps:

- 1 **Click the Load Balance/RSL tab.**
- 2 **In the Load Balance/RSL window, click *Create Group*.**
- 3 **In the Create Group dialog box, type a group name.**
- 4 **Set the load balancing:**

The default setting is bidirectional load balancing and a dedicated Class C IP address of 253.

- **To enable transmit-only load balancing** — Clear the *Receive Load Balance Enabled* check box and check the *Transmit Load Balance Enabled* box.
- **To enable bidirectional load balancing** — Check both the *Transmit Load Balance Enabled* box and the *Receive Load Balance Enabled* box. Enter only the bytes required for a dedicated IP address:

Class Specify only bytes

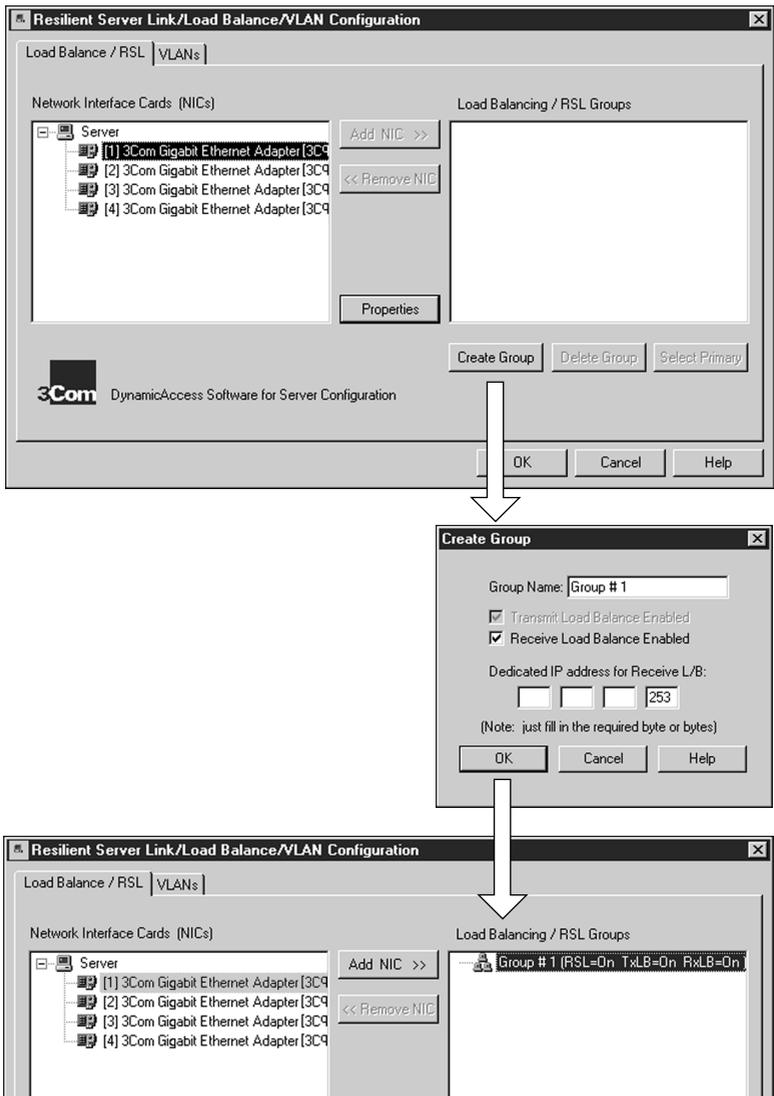
- A 2, 3, and 4 (the three rightmost boxes).
- B 3 and 4 (the two rightmost boxes).
- C 4 (the rightmost box).

See [Specifying a Dedicated IP Address](#) for more information on the dedicated IP address.

- **To disable all load balancing** — Clear the *Receive Load Balance Enabled* and the *Transmit Load Balance Enabled* check boxes.
- 5 **Click *OK*.**

The name of the new NIC group appears in the Load Balancing/RSL Groups list box.

Figure 4 Creating a Load Balancing/RSL Group



Adding NICs to a Group

See [Figure 5](#) and follow these steps:

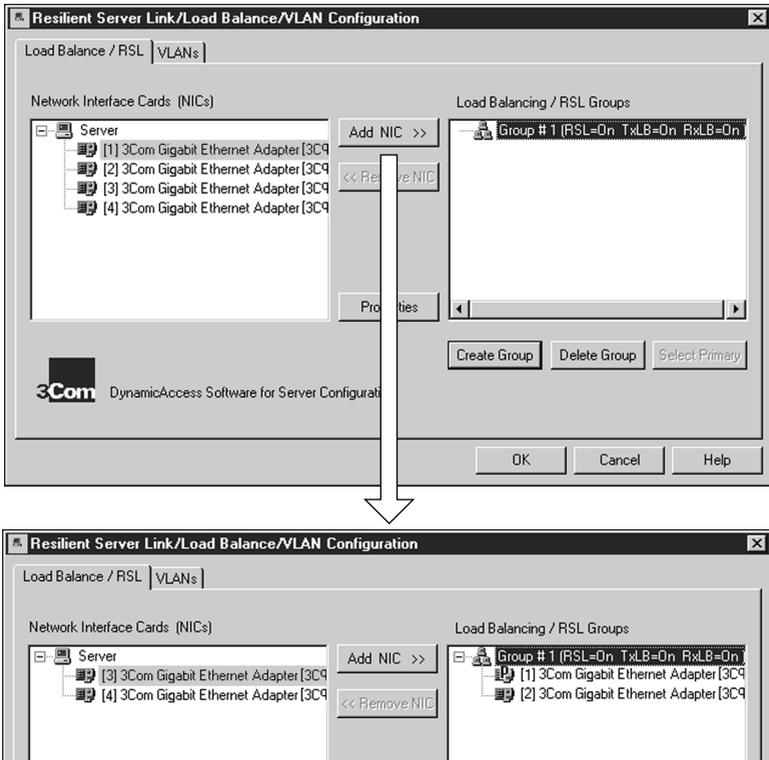
- 1 **Click the Load Balance/RSL tab.**
- 2 **In the Load Balance/RSL window:**
 - a Select a group from the Load Balancing/RSL Groups list.
 - b Select a NIC from the Network Interface Cards list.
- 3 **Click *Add NIC*.**

The NIC appears as part of the group in the Load Balancing/RSL list box.

If you click *Add NIC* repeatedly, NICs are added to the group in the order that they are listed after the first NIC you selected.

In [Figure 5](#), NICs 1 and 2 are added to Group 1.

Figure 5 Adding NICs to a Group



Creating a VLAN

See [Figure 6](#) and follow these steps:

- 1 Click the VLANs tab.**
- 2 In the VLANs window, select a NIC or group from the VLANs list and click *Create VLAN*.**
- 3 In the VLAN ID dialog box, type a VLAN ID number and click *OK*.**

Legal VLAN ID numbers are from 1–511 and from 768–4095. Numbers in the range 512–767 are reserved. The new VLAN is added to the VLANs list.

Restart Windows NT when the software prompts you to do so.

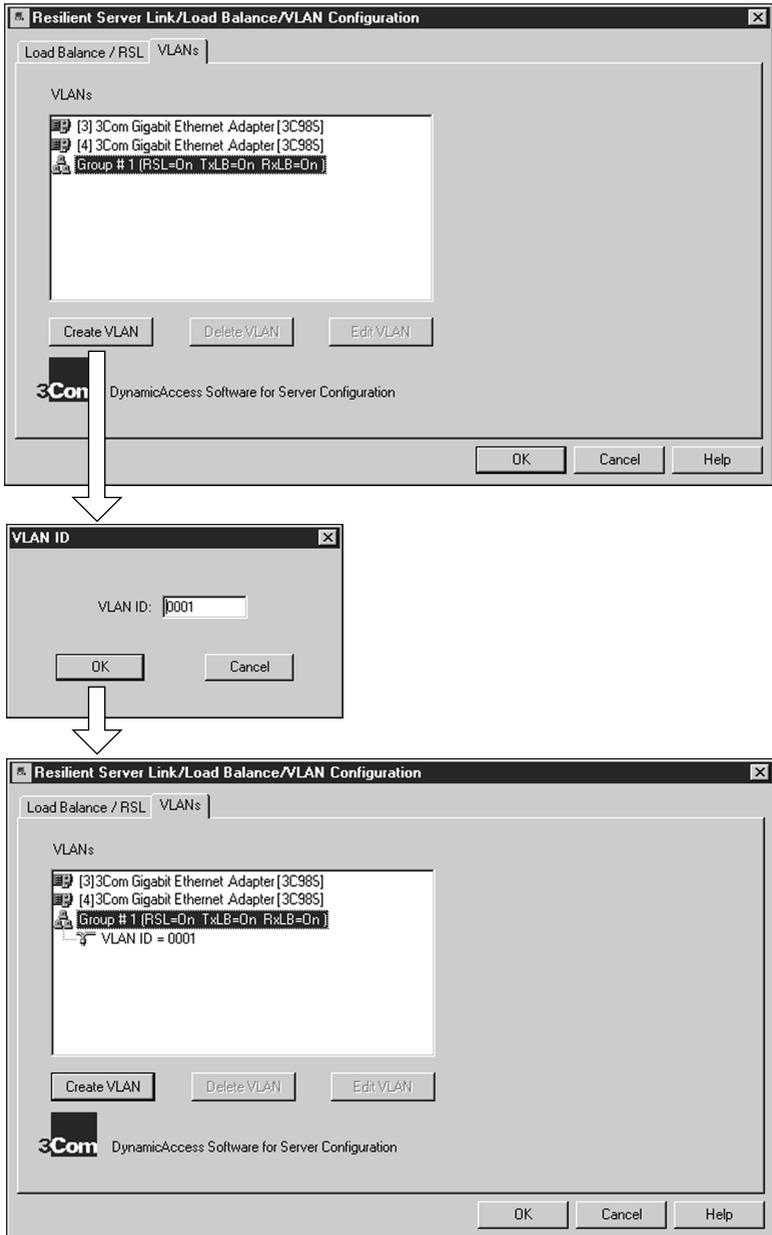
Observe these VLAN configuration guidelines:

- DynamicAccess software supports as many as 64 VLANs per server.
- A unique VLAN ID must be specified for each VLAN in a group.
- Each VLAN bound to TCP/IP must exist on a separate IP subnet. DHCP servers used to allocate IP addresses must be located on the same IP subnets as the VLANs.
- Each VLAN bound to the IPX/SPX protocol must use a unique network number.
- To avoid problems associated with blocked multicast streams, configure end stations that support the IEEE 802.1p GARP Multicast Registration Protocol specification (GMRP) on separate switch segments from stations that do not support it.

These memory requirements are for multiple VLAN configurations. You can improve overall system performance with VLANs by increasing the physical RAM, the virtual memory page size, or both.

Number of VLANs	Minimum RAM Size (MB)
up to 16	128
17–32	256
33–48	384
49–64	512

Figure 6 Creating a VLAN



Specifying Traffic Priorities

You can use the DynamicAccess Software Setup screen to specify traffic priorities.

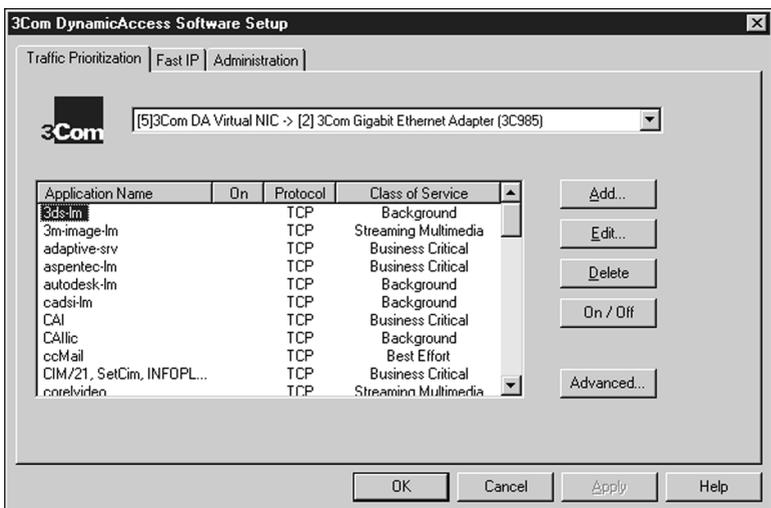
1 Double-click the 3Com DynamicAccess icon in the Windows Control Panel.

The DynamicAccess Software Setup windows appear.

2 Click the appropriate tab:

- Traffic Prioritization — (Figure 7) Prioritize applications to ease bottlenecks in the network and allow critical applications to take network precedence. You can turn traffic prioritization on or off independently for:
 - Each NIC that is not in a group and does not have VLANs
 - Each group that does not have VLANs
 - Each VLAN
 - Each virtual NIC (NIC, group, or VLAN) shown in the Traffic Prioritization control panel
- Fast IP — Enable and configure Fast IP.
- Administration — Set DynamicAccess control panel access, set VLAN options, enable efficient multicast control, and enable the prioritizing of multicast traffic.

Figure 7 DynamicAccess Traffic Prioritization Window



Saving the Configuration

To save and exit, click *OK*.

A prompt asks whether you want to configure traffic prioritization. If you click *Yes*, *DynamicAccess Software Setup* windows appear.



For detailed information on DynamicAccess software, go to:

<http://www.3com.com/dynamicaccess>

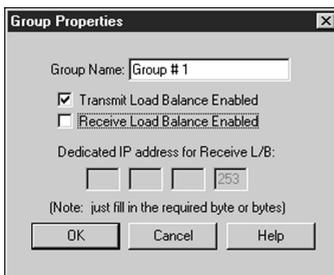
To exit without saving the configuration, click *Cancel*.

Other Procedures

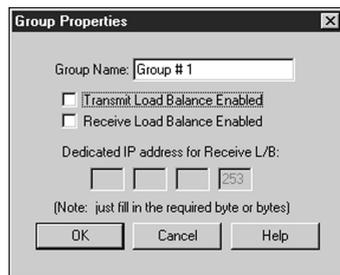
Use the following procedures as needed to maintain the configuration.

Disabling Load Balancing for a Group

- 1 Click the **Load Balance/RSL** tab ([Figure 5](#)).
- 2 In the **Load Balance/RSL** window:
 - a Select a group from the *Load Balancing/RSL Groups* list.
 - b Click *Properties*.
- 3 In the **Group Properties** dialog box:
 - **To disable receive load balancing only** — Clear the *Receive Load Balance Enabled* check box.
 - **To disable all load balancing** — Clear the *Receive Load Balance Enabled* and the *Transmit Load Balance Enabled* check boxes.



To disable receive load balancing



To disable all load balancing

- 4 Click **OK**.

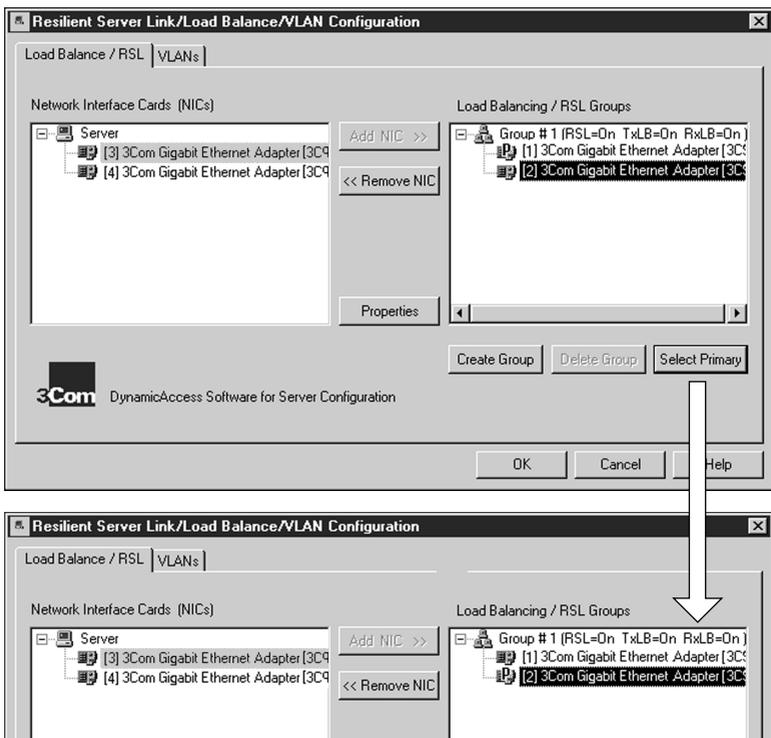
Changing the Primary NIC

The first NIC added to an empty group is automatically designated the *primary* NIC. NICs added subsequently are designated as *secondary* NICs. Primary status is indicated by a P icon at the beginning of the NIC name. When there are more than one NIC in a group, you can change the primary NIC as follows (see [Figure 8](#)):

- 1 **Click the Load Balance/RSL tab.**
- 2 **In the Load Balance/RSL window, select a secondary NIC from the Load Balance/RSL Groups list.**
- 3 **Click *Select Primary*.**

The NIC you selected becomes the primary NIC.

Figure 8 Changing the Primary NIC



Removing a NIC from a Group

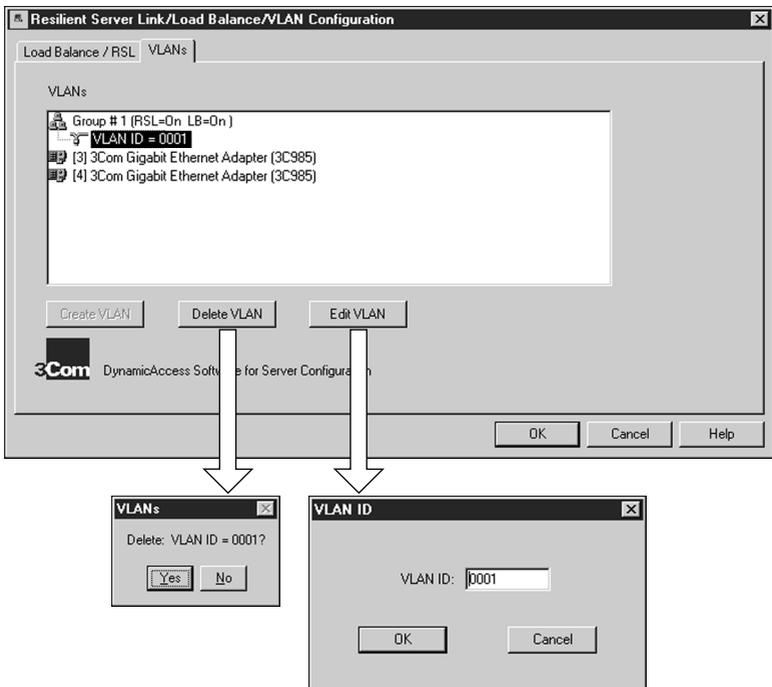
- 1 Click the **Load Balance/RSL** tab.
- 2 In the **Load Balance/RSL** window, select a NIC from a group in the **Load Balancing/RSL Groups** list.
- 3 Click **Remove NIC**.

Deleting or Editing a VLAN

When a VLAN is selected (as shown in [Figure 9](#)), you can delete it or edit its properties.

- 1 Click the **VLANs** tab.
- 2 In the **VLANs** window, select a VLAN.
 - To delete the selected VLAN, click *Delete VLAN*.
 - To edit the selected VLAN's VLAN ID, click *Edit VLAN*.

Figure 9 Deleting or Editing a VLAN



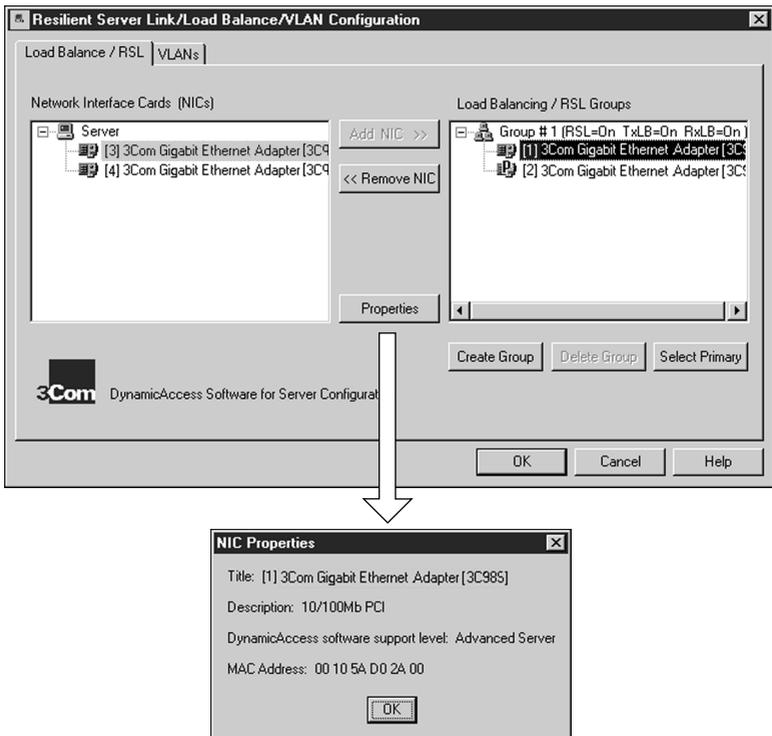
Displaying NIC Properties

See [Figure 10](#) and follow these steps:

- 1 Click the **Load Balance/RSL** tab.
- 2 In the **Load Balance/RSL** window, select a **NIC**.
- 3 Click **Properties**.

The **NIC Properties** window appears, showing the properties of the selected NIC.

Figure 10 Displaying NIC Properties



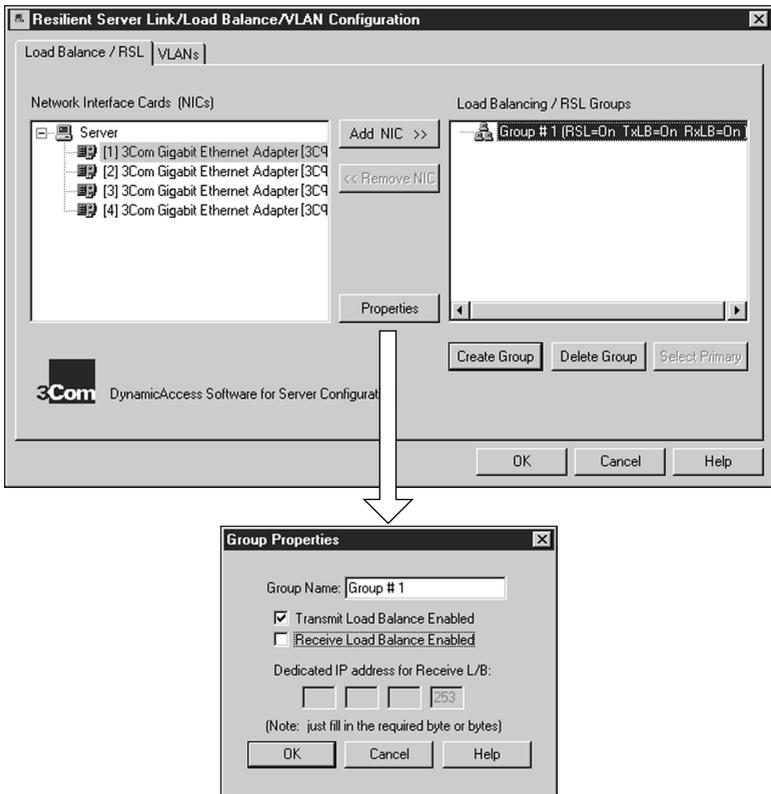
Displaying Group Properties

See [Figure 11](#) and follow these steps:

- 1 Click the **Load Balance/RSL** tab.
- 2 In the **Load Balance/RSL** window, select a group in the **Load Balancing/RSL Groups** list box.
- 3 Click **Properties**.

The Group Properties window appears, showing the properties of the selected group.

Figure 11 Displaying Group Properties



Specifying Failover to Fast EtherLink

You can specify failover from 3Com Gigabit EtherLink to 3Com EtherLink 10/100 PCI (3C985B-SX server NIC to 3C980B-TX server NIC). To ensure optimal performance, this type of failover requires that you disable load balancing for the group.

1 Create a group.

See [Creating a Load Balancing/RSL Group](#).

2 Add 3Com server NICs to the group.

Add at least one 3C985B-SX server NIC and at least one 3Com 3C980B-TX server NIC to the group. Designate the 3C985B-SX server NIC as the primary NIC.

See [Adding NICs to a Group](#).

3 Disable load balancing for the group.

See [Disabling Load Balancing for a Group](#).

About Flow Control

IEEE 802.3x flow control prevents a device's input buffers from overflowing. Flow control uses *pause frames* to communicate buffer status between linked transmitting and receiving devices (transmitters and receivers). A receiver sends a pause frame to tell a transmitter to stop transmitting data frames for a specified period, allowing the receiver's input port buffers to empty.

Pause Frames

When a transmitter receives pause frames, it suspends transmission for the specified period. When the receiver's input buffers can store packets again, it can either send another pause frame to tell the transmitter to resume transmission, or wait for transmission to resume.

With *asymmetric* flow control, only one of two linked devices can receive pause frames. With *symmetric* flow control, both linked devices can send and receive pause frames.

Link Negotiation

Related to flow control is the auto-negotiation capability, in which linked devices advertise their flow control capabilities and automatically select the best common mode of communication.

Rare cases (for example, linking to a device that does not support auto-negotiation) may require that auto-negotiation be disabled on a port, thereby enabling *forced link* on that port. When forced link is enabled, linked devices must have matching flow control capabilities. For example, a port that is set for forced link and reception flow control can connect successfully only with a port that is set for forced link and transmission flow control.

4

INSTALLING AND CONFIGURING THE NETWARE DRIVER

Follow the instructions in this chapter to install the NIC driver and Load Balancing/RSL software on a server that is already running NetWare 4.11 or 5.0.

To install the 3Com software while you are installing the NetWare network operating system, see [Installing 3Com Software During NetWare Installation](#).

Software Installation Requirements

- **NIC** — At least one 3Com 3C985B-SX server NIC must be installed in a PCI bus master slot.
- **Operating system** — Novell NetWare version 4.11 or 5.0 must be installed with the most recent patches and updates available from Novell technical support (www.novell.com).
- **Netware Packet Receive Buffers** — Follow these guidelines for both NetWare 4.11 and NetWare 5.0: The driver requires 512 packet receive buffers for each installed NIC. You must increase the minimum and maximum packet receive buffers values by 512 for each installed NIC. For example, if you install two NICs, increase the parameters in the STARTUP.NCF file by 1024 as follows:

Before installing NICs	SET MINIMUM PACKET RECEIVE BUFFERS = 1000 SET MAXIMUM PACKET RECEIVE BUFFERS = 2500
-------------------------------	--

After installing two NICs	SET MINIMUM PACKET RECEIVE BUFFERS = 2024 SET MAXIMUM PACKET RECEIVE BUFFERS = 3524
----------------------------------	--

A Packet Receive Buffer is equal to the MAXIMUM PHYSICAL RECEIVE PACKET SIZE. To calculate the minimum and maximum memory consumed by the receive buffers, multiply the number of buffers by the maximum physical receive packet size. For example, if the MAXIMUM PHYSICAL RECEIVE PACKET SIZE = 4202 (bytes), then the minimum memory usage is 4202 bytes x 2024 buffers = 8.1 MB of RAM. The maximum memory usage is 4202 bytes x 3524 buffers = 14.1 MB of RAM.

- **Slot numbers for multiple NICs** — If you are installing more than one NIC on a server, you must know which NIC corresponds to a given PCI slot to connect a cable from the NIC to the appropriate port on the hub or switch. You can correlate slots with physical NICs by the NIC MAC addresses. (The MAC address is written on a bar code label on the top component side of the NIC.) See [Obtaining Slot Numbers](#) for more information.

Planning NIC Groups

- Plan the cable changes required to connect each primary NIC and all secondary NICs to the same network segment.
- For optimum failover performance, turn the spanning tree feature off at switches that are connected directly to the server. If the spanning tree feature must be turned on, a failover may be delayed up to 30 seconds while the switch processes the spanning tree algorithm.
- Decide which NICs are to be part of each Load Balancing/RSL group.
- Decide which NIC is to be the primary NIC in each group.
- Obtain the slot numbers of the NICs. You need these numbers if you are installing more than one NIC. See [Obtaining Slot Numbers](#) for instructions.

Obtaining Slot Numbers

If you are installing more than one NIC on a server, you must know which NIC corresponds to a given PCI slot to connect a cable from the NIC to the appropriate port on the hub or switch. The NetWare driver installation program requires you to enter a PCI *slot number* for each NIC. In older versions of NetWare software, the term slot number referred to the physical slot in which the NIC was installed in the server. Now, the slot number is a combination of the bus number, bus type, and the physical slot number.

The slot numbers can range from 1 to 10001 or larger.

Follow this procedure to obtain slot numbers for a two-NIC installation:

- 1 Install only one 3C985B-SX server NIC.**
- 2 Follow the installation instructions in this chapter to load the 3Com EtherLink Server CD, copy the driver, and load the driver.**

You need not specify a slot number when only one NIC is installed.
- 3 In the Netware Console, issue a CONFIG command.**
- 4 Write down the slot number that is listed for the installed 3C985B-SX server NIC.**
- 5 Install the second 3C985B-SX server NIC.**
- 6 Follow the installation instructions in this chapter to install the driver on the second NIC.**

When you load the driver again, the installation program displays the slot numbers for all the 3C985B-SX server NICs in the system. The slot number that did not appear when you installed the driver for the first NIC is the slot number for the second NIC.

Installation and Configuration Scenario

The instructions in this guide follow a simple scenario that demonstrates the fundamentals of setting up a sample configuration. Setting up your own configuration may require a slightly different sequence of tasks and different numbers of NICs. The NetWare scenario described here illustrates a server on which no other NICs are installed and follows this sequence:

- 1 Install two server NICs.**
- 2 Install the driver on both NICs.**
- 3 Install Load Balancing/RSL software.**
- 4 Make one group of two NICs.**
- 5 Add a NIC to the group, making one group of three NICs.**
- 6 Add a group to the configuration.**

Installing and Configuring the Software

With NetWare installed and the server up and running, complete the following steps to install and configure the driver and Load Balancing/RSL software on a NetWare file server. In NetWare screens, use the arrow keys to select an item and then press Enter. The major steps are listed below and described in detail in the rest of this section.

- 1 Loading the 3Com EtherLink Server CD**
- 2 Copying the Driver**
- 3 Specifying the Slot Number**
- 4 Loading the Driver**
- 5 Setting Up Another NIC**
- 6 Installing Load Balancing/RSL Software**
- 7 Configuring Load Balancing/RSL Groups**
- 8 Verifying the Load Balancing/RSL Configuration**
- 9 Verifying the Installation and Configuration**

Loading the 3Com EtherLink Server CD

NetWare 4.11

Insert the CD in the CD-ROM drive and enter these commands:

```
load cdrom
cd mount 3C985B_SX
```

NetWare 5.0

Insert the CD in the CD-ROM drive and enter this command:

```
load cdrom
```

Wait for the message that states the CD is mounted successfully, and then proceed to copy the driver.

Copying the Driver

1 Enter this command at the prompt:

NetWare 4.11: `load install`

NetWare 5.0: `load nwconfig`

2 In the Installation Options screen, select *Driver options*.

3 In the Driver Options screen, select *Configure network drivers*.

4 In the Additional Driver Actions screen, select *Select a driver*.

The Select a Driver screen appears, listing all previously saved drivers in the system.

If this is the first installation of the 3Com server NIC driver, it does not appear in this list.

5 Press Insert.

A system message for selecting a disk drive appears.

6 Press F3.

7 Enter the path to the driver. For example:

```
3C985B_SX:\netware
```

The Select a Driver to Install screen appears with the 3C985B-SX server NIC driver name highlighted.

8 Press Enter to select the driver.

9 Select Yes at the prompt to confirm the name of the driver to copy.

The installation program copies the driver to the appropriate server subdirectory. The Configuration screen appears.

Specifying the Slot Number

You need not specify the slot number if you are installing only one NIC.

- 1 In the Configuration screen, select *Slot Number*.**
- 2 Enter the slot number of the NIC that you want to install. For example:**

1

See [Changing Driver Configuration Parameters](#) for instructions on changing other parameters in this screen.

Loading the Driver

- 1 Select *Save parameters and load driver*.**

The installation program loads the configured driver and then writes the appropriate LOAD and BIND commands to the AUTOEXEC.NCF file.

The system assigns a network number.

- 2 Enter a network number, or press Enter to select the system-assigned number.**

If no errors are encountered, the installation program asks whether you want to select an additional network driver.

- 3 Select Yes to set up another NIC.**

Setting Up Another NIC

- 1 Follow the prompts for another NIC:**

- Select the driver
- Enter the slot number
- Save parameters and load the driver

- 2 Repeat the process for all NICs to be set up.**

- 3 After all NICs are set up, press Esc several times to return to the Installation Options screen.**

Installing Load Balancing/RSL Software

- 1 From the Installation Options screen select **Product options**.

- 2 Select **Install a product not listed**.

The following message appears:

```
Product will be installed from A:\. If you are
installing from floppy, insert the first
diskette of the product you want to install
into the drive and verify that the path above
is correct.
```

```
Press <F3> to specify a different path;
```

```
Press <ENTER> to continue.
```

- 3 Press **F3**.

- 4 Enter the path to the software:

```
3C985B_SX:\netware
```

The following message appears:

```
Product "3Com Load Balancing/RSL Server
Software vX.X" was found. Verify that this is
the product you want to install before
proceeding.
```

```
Press <ENTER> to continue.
```

```
Press <ESC> to abort installation.
```

- 5 Press **Enter**.

The system copies the Load Balancing/RSL software to the SYS volume.

Configuring Load Balancing/RSL Groups

- 1 Press **Esc** to return to the Installation Options screen.
- 2 From the Installation Options screen, select **NCF files options (create/edit server startup files)**
- 3 Select **Edit AUTOEXEC.NCF file**.
- 4 Make the following changes to the AUTOEXEC.NCF file:

- a Add a command to load the EL985LB driver before any commands to load LAN drivers. For example:

```
load e19851b
```

```
load 3C985
```

- b Add or verify the LOAD commands for the LAN drivers for all slot-frame instances.
- c In each Load Balancing/RSL group, load the same protocols and frame types on the primary and all secondary NICs.
- d On the primary NIC only, bind a protocol to each slot-frame instance.
- e Remove any BIND commands from each secondary NIC.
- f For each Load Balancing/RSL group, add an EL985LB BIND command to bind the primary and all secondary NICs together. Place this command after the LAN driver LOAD commands or the SYS:ETC\NITSYS.NCF command. There can be only one EL985LB BIND command per group, and it must list the primary and all secondary NICs. (See [Load Balancing/RSL Commands](#) for the EL985LB BIND command syntax.)

5 Save the AUTOEXEC.NCF file and return to the server prompt.

The sample AUTOEXEC.NCF file in [Figure 12](#) shows a group of two NICs. The primary NIC in slot 1 is bound to a secondary NIC in slot 2.

Figure 12 AUTOEXEC.NCF File for One Group of Two NICs

```
load el985lb

;Define primary NIC slot-frame instances
load 3c985 slot=1 frame=ethernet_802.2 name=p1_802.2
load 3c985 slot=1 frame=ethernet_ii name=p1_ii

;Define secondary NIC slot-frame instances
load 3c985 slot=2 frame=ethernet_802.2 name=p2_802.2
load 3c985 slot=2 frame=ethernet_ii name=p2_ii

;Bind protocols to primary NIC
bind ipx to p1_802.2 net=FF02
bind ip to p1_ii address=192.1.1.1 mask=ff.ff.ff.00

;Create a group with NIC 1 primary
;and NIC 2 secondary
el985lb bind 1 2
```

Verifying the Load Balancing/RSL Configuration

1 Boot the server and ignore these messages:

```
IN LAN Hello L1 Packet Received in Circuit  
3c985_1_E82 from DL411
```

This message appears if you load `ipxrtr` and the 3Com server NIC driver:

```
A mismatched source node/data-link address  
addr/addr in CSNP L1 packet received on  
circuit board_name from server_name.
```

2 If other error messages appear, make corrections in the appropriate .NCF files and reboot.

Verifying the Installation and Configuration

To verify that the 3Com server NIC driver has been properly loaded on the NetWare server, perform the following procedure:

1 At the system prompt, enter:

```
load monitor
```

The NetWare Monitor screen appears.

2 From the *Available Options* menu, select *LAN/WAN Information*.

The *Available LAN Driver* menu appears. If the driver has been properly loaded, the driver, slot number, and frame types associated with the driver appear on this menu.

3 Select a driver to view its associated statistics.

A functioning driver displays packets being sent and received.

To verify that the server is communicating over the network, complete the following procedure:

1 Set up a NetWare client on a LAN supported by the server to be tested.

2 Log in or map to the server.

If you cannot log in or map to the server, the link is not functional.

If the link is functional, the following message appears:

```
Link integrity test for primary slot # xxxxx  
passed.
```

Maintaining a Load Balancing/RSL Configuration

The examples in this section illustrate typical actions you might take in the course of maintaining a Load Balancing/RSL configuration. They show how to add NICs and groups to a server where Load Balancing/RSL software is already installed and configured.

Adding a Secondary NIC to a Load Balancing/RSL Group

1 Install the new secondary NIC.

Follow the procedures in [Chapter 2](#).

Connect the new secondary NIC to the network used by the Load Balancing/RSL group.

2 Make the following changes to the AUTOEXEC.NCF file:

- a Add or verify the LOAD commands for the LAN drivers for all slot-frame instances.
- b Load the same protocols and frame types on the new secondary NIC.
- c Add the slot number of the new secondary NIC to the EL985LB BIND command.

Figure 13 AUTOEXEC.NCF File for One Group of Three NICs

```
load el985lb

;Define primary NIC slot-frame instances
load 3c985 slot=1 frame=ethernet_802.2 name=p1_802.2
load 3c985 slot=1 frame=ethernet_ii name=p1_ii

;Define secondary NIC slot-frame instances
load 3c985 slot=2 frame=ethernet_802.2 name=p2_802.2
load 3c985 slot=2 frame=ethernet_ii name=p2_ii
load 3c985 slot=3 frame=ethernet_802.2 name=p3_802.2
load 3c985 slot=3 frame=ethernet_ii name=p3_ii

;Bind protocols to primary NIC
bind ipx to p1_802.2 net=FF02
bind ip to p1_ii address=192.1.1.1 mask=ff.ff.ff.00

;Create a group with NIC 1 primary and
;NICs 2 and 1003 secondary
el985lb bind 1 2 3
```

3 Reboot the server.

The sample AUTOEXEC.NCF file in [Figure 13](#) shows a group of three NICs. The primary NIC in slot 1 is bound to two secondary NICs in slot 2 and slot 3.

Adding a Load Balancing/RSL Group

1 Install the NICs.

Follow the procedures in [Chapter 2](#).

Connect all NICs in the Load Balancing/RSL group to the same network.

2 Make the following changes to the AUTOEXEC.NCF file:

- a Add or verify the LOAD commands for the LAN drivers for all slot-frame instances.
- b In each Load Balancing/RSL group, load the same protocols and frame types on the primary and all secondary NICs.
- c On the primary NIC only, bind a protocol to each slot-frame instance.
- d Remove any BIND commands from each secondary NIC.
- e For each Load Balancing/RSL group, add an EL985LB BIND command to bind the primary and all secondary NICs together. Place this command after the LAN driver LOAD commands or the SYS:ETC\NITSYS.NCF command. There can be only one EL985LB BIND command per group, and it must list the primary and all secondary NICs. (For the EL985 BIND command syntax, see [Load Balancing/RSL Commands](#) in this chapter.)

3 Reboot the server.

The sample AUTOEXEC.NCF file in [Figure 14](#) shows one group of three NICs and one group of two NICs. The primary NIC in slot 1 is bound to two secondary NICs in slot 2 and slot 3. The primary NIC in slot 10004 is bound to the secondary NIC in slot 10005.

Figure 14 AUTOEXEC.NCF File for Two Groups of NICs

```
load e1985

;Define Group 1 primary NIC slot-frame instances
load 3c985 slot=1 frame=ethernet_802.2 name=p1_802.2
load 3c985 slot=1 frame=ethernet_ii name=p1_ii

;Define Group 1 secondary NIC slot-frame instances
load 3c985 slot=2 frame=ethernet_802.2 name=p2_802.2
load 3c985 slot=2 frame=ethernet_ii name=p2_ii
load 3c985 slot=3 frame=ethernet_802.2 name=p3_802.2
load 3c985 slot=3 frame=ethernet_ii name=p3_ii

;Define Group 2 primary NIC slot-frame instances
load 3c985 slot=10004 frame=ethernet_802.2 name=p4_802.2
load 3c985 slot=10004 frame=ethernet_ii name=p4_ii

;Define Group 2 secondary NIC slot-frame instances
load 3c985 slot=10005 frame=ethernet_802.2 name=p5_802.2
load 3c985 slot=10005 frame=ethernet_ii name=p5_ii

;Bind protocols to primary NICs
bind ipx to p1_802.2 net=FF02
bind ip to p1_ii address=192.1.1.1 mask=ff.ff.ff.00
bind ipx to p4_802.2 net=FF04
bind ip to p4_ii address=192.1.2.1 mask=ggff.ff.ff.00

;Create Group 1 with NIC 1 primary
;and NICs 2 and 3 secondary
e1985lb bind 1 2 3
;Create Group 2 with NIC 10004 primary
;and NIC 10005 secondary
e1985lb bind 10004 10005
```

Changing Driver Configuration Parameters

You can change parameters from the installation program Configuration screen. [Table 3](#) lists the parameters shown on the Configuration screen. Default values are shown in bold.

Table 3 NetWare Installation Program Configuration Parameters

Parameter	Range of Values (Defaults in Bold)	Description
Slot Number	All PCI slot numbers valid to the system	Represents the PCI slot number of the physical NIC to be configured.
Node Address	Default is factory-assigned MAC address.	Leave blank to use factory-assigned default.
Link	Auto Off	Determines whether auto-negotiation is enabled (Auto) or off. Off defaults to link signal detection only.
Rx Flow Control	Allow Off	Determines whether reception flow control is enabled (Allow) or disabled (Off).
Tx Flow Control	Allow Off	Determines whether transmission flow control is enabled (Allow) or disabled (Off).
FDR Filtering	Off On	Determines whether the full duplex repeater filter is enabled (On) or disabled (Off).

Follow these steps to change parameters:

- 1 From the Configuration screen, select *Select/Modify driver parameters and protocols*.**
The Select a Protocol box is selected.
- 2 To add a network protocol, select the desired protocol from the Protocols box and press Enter.**
IPX is the default protocol. If you select TCP/IP, supply the TCP/IP addresses as follows:
 - a** Type the IP address.
 - b** Type the IP subnet mask.
 - c** Press F10 to continue.

3 Enter the slot number.

The slot number is the PCI slot number of the physical NIC. The following fields appear:

- Node Address
- Log Message Level



When multiple NICs are installed, you must determine which physical NIC corresponds to which PCI slot to correctly connect the cables to the hub or the switch.

4 Press F3 to set the frame types.

Use the arrow keys to select frame types. Select as many of the supported frame types as required. Adding frame types after exiting the installation program is best done by editing the AUTOEXEC.NCF file. The default is 802.2 only. Ethernet_802.3, Ethernet_II, and Ethernet_SNAP frame types are also supported.

5 To use the default MAC address of the NIC, leave the Node Address field blank.

The default MAC address is recommended for most installations.

6 Select *Log Message Level* and press Enter.

7 Select which messages to log from the pop-up box and press Enter.

All messages are printed to the system console screen and to the SYS:\SYSTEM\SYSTEMS\$LOG.ERR file. All messages are logged by default.

8 When you have set all the configuration values, select *Save parameters and load driver*.

The installation program loads the configured driver and then writes the appropriate LOAD and BIND commands to the AUTOEXEC.NCF file. The system assigns a network number.

9 Enter a network number, or press Enter to select the system-assigned number.

If no errors are encountered, the installation asks whether you want to select an additional network driver.

10 Continue with the installation:

- If you are installing only one NIC, select *No* to finish loading and exit.
- If you are installing more than one NIC, select *Yes* to set up another NIC.

Load Balancing/RSL Commands

Load Balancing/RSL commands can be used to create sophisticated configurations or for troubleshooting. You can enter them at the server command line or add them to the appropriate NCF file. The commands are summarized below.

bind

This command creates Load Balancing/RSL groups by specifying slot parameters of primary and secondary NICs.

Syntax	el980lb bind <i>pri_slot sec_slot</i> where: <i>pri_slot</i> is the PCI slot number of the primary NIC. <i>sec_slot</i> is the PCI slot number of a secondary NIC.
Example	el980lb bind 10001 10002
Default	None
Messages	For all successfully created groups, Load Balancing/RSL displays: Group has been created for Primary Slot # <i>xxxxx</i> If a group already exists, Load Balancing/RSL displays: Load Balancing/RSL group for primary slot # <i>xxxxx</i> already exists. If Load Balancing/RSL is unable to create a group for at least one frame type supported by the NIC, the following is displayed: Failed to create a group, probably boards do not exist. Error conditions: No valid primary or secondary NIC. Primary does not have any bound protocol stack. Secondary has a protocol stack bound.

(continued)

```
Link integrity check for primary slot
# xxxxxx (0xHH) Failed - Setting board
status to Inactive.
```

```
Link integrity check for primary slot
# xxxxxx Passed.
```

display status

This command displays information about all Load Balancing/RSL groups, or if a primary slot parameter is specified, only about the specified group.

Syntax	e1980lb display status <i>pri_slot</i> where: <i>pri_slot</i> is the PCI slot number of the primary NIC.
Example	e1980lb display status 10001
Messages	A separate message is displayed for each loaded frame type. Board numbers are also displayed. Information about the relationship between the board numbers and the frame types is shown in the NetWare 5 Console Monitor; on the Available Options screen, select LAN/WAN drivers for this information.

help

This command displays a list of the Load Balancing/RSL commands.

Syntax	e1980lb help
--------	--------------

link tmo

When a group is being created, Load Balancing/RSL waits the number of seconds specified by this command for the link/topology check to finish.

Syntax	e1980lb link tmo <i>value_in_seconds</i> where: <i>value_in_seconds</i> is any positive integer.
Example	e1980lb link tmo 10
Default	5
Messages	Displays the timeout information.

load sharing

This command toggles outbound load sharing individually for each Load Balancing/RSL group.

Syntax	e1980lb load sharing <i>pri_slot</i> where: <i>pri_slot</i> is the PCI slot number of the primary NIC.
Example	e1980lb load sharing 10001
Default	On
Messages	Displays the current state. A separate message is displayed for each loaded frame type.

namebind

This command creates a Load Balancing/RSL group by specifying the slot-frame instance name of the primary and secondary NICs (for example, p1_802.2 and p2_802.2).

Like the BIND command, the NAMEBIND command affects all protocols and all frame types on the primary NIC. (See [bind](#) for other properties.)

Syntax	e1980lb namebind <i>primary_name secondary_name</i> where: <i>primary_name</i> is the name of the primary slot. <i>secondary_name</i> is the name of a secondary slot.
Example	e1980lb namebind p1_802.2 p2_8022
Default	See bind .
Messages	See bind .

receive tmo

This command sets the receive timeout individually for each Load Balancing/RSL group.

Syntax	e1980lb receive tmo <i>pri_slot in_ticks</i> where: <i>pri_slot</i> is the PCI slot number of the primary NIC. <i>in_ticks</i> is the time in ticks (18 ticks = 1 second).
Example	e1980lb receive tmo 10001 1
Default	18 ticks This default may have to be set higher for some network configurations.
Messages	A separate message is displayed for each loaded frame type.

retry count

This command sets the number of retries that Load Balancing/RSL software attempts when a probe packet fails to appear at the receive end, before the software puts a board in Wait mode.

Syntax	e1980lb retry count <i>number_of_retries</i> where: <i>number_of_retries</i> is any positive integer
Example	e1980lb retry count 2
Default	5
Messages	If no argument is specified or the specified argument is invalid, the current value is displayed. Otherwise, the new value is displayed.

send tmo

This command sets the timeout value, in seconds, that Load Balancing/RSL software waits before retransmitting a probe packet when a send request to the link support layer (LSL) is not acknowledged.

Syntax	e1980lb send tmo <i>pri_slot value_in_seconds</i> where: <i>pri_slot</i> is the PCI slot number of the primary NIC. <i>value_in_seconds</i> is any positive integer.
Example	e1980lb send tmo 1001 20
Default	10
Messages	A separate message is displayed for each loaded frame type.

set probe interval

This command sets the probe packet interval.

Syntax	e1980lb set probe interval <i>in_ticks</i> where <i>in_ticks</i> is the time in ticks (18 ticks = 1 second).
Example	e1980lb set probe interval 60
Default	18 If the delay is longer than 1 second, NIC or link failures are not recognized as quickly.
Messages	If no argument is specified or the specified argument is invalid, the current value is displayed. Otherwise, the new value is displayed.

unbind

This command deletes a Load Balancing/RSL group (the LAN driver for the group cannot be loaded).

Syntax	e1980lb unbind <i>pri_slot</i> where: <i>pri_slot</i> is the PCI slot number of the primary NIC.
Example	e1980lb unbind 10001
Default	None
Messages	If successful, Load Balancing/RSL software displays this message for all frame types that the NIC supports: Cleaning up resources for group associated with Primary Slot # xxxx.

wait tmo

This command sets the timeout value, in seconds, that Load Balancing/RSL waits before marking a NIC that is in wait mode as failed (see [retry count](#)).

Syntax `el980lb wait tmo value_in_seconds`

where:

value_in_seconds is any positive integer.

Example `el980lb wait tmo 2`

Default 1

Messages If no argument is specified or the specified argument is invalid, the current value is displayed. Otherwise, the new value is displayed.

5

DIAGNOSTICS AND TROUBLESHOOTING

Topics:

- [LED Operation](#)
- [Using the 3Com NIC Diagnostics Program](#)
- [Using the 3Com DOS Diagnostics Program](#)
- [Uninstalling 3Com Software](#)
- [Troubleshooting Tips](#)
- [Constructing Loopback Plugs](#)



The 3Com World Wide Web site offers the latest drivers, troubleshooting information, and software updates in the Support area:

<http://www.3com.com/>

LED Operation

Two status LEDs are located above the cable connector. After the driver is installed, the LEDs operate as follows:

LED	Action	Meaning
DATA	On or flashing	NIC is detecting network data. Frequency of the flashes varies with the amount of network traffic.
	Off	No connection between NIC and switch.
LINK	On	Connection between NIC and switch is good.
	Flashing	Software has disabled the port.
	Off	No connection between NIC and switch.

Using the 3Com NIC Diagnostics Program

The 3Com NIC Diagnostics program, which is installed when you install the Windows NT driver, provides utilities for working with the 3Com NICs installed in the server.

The program has these windows:

- *General* shows configuration setting details for the 3Com NICs installed on the server.
- *Diagnostics* allows you to run diagnostic tests.
- *Support* gives access to diagnostics and support information, and lets you create a problem report about the NIC that you can e-mail to 3Com.

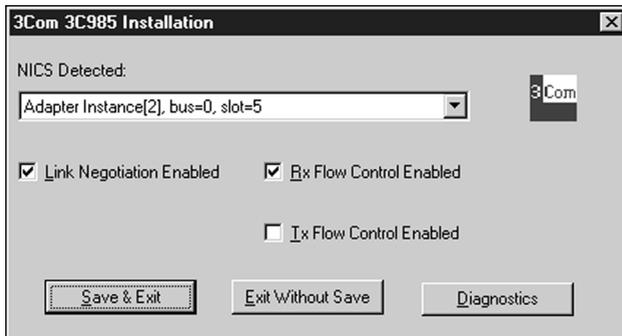
Starting the 3Com NIC Diagnostics Program

Make sure the 3C985B-SX server NIC and the Windows NT driver are installed.

- 1 **From the Windows *Start* menu, select *Settings/Control Panel*.**
- 2 **Double-click the *Network* icon.**
- 3 **In the *Network* window, click the *Adapters* tab.**
- 4 **In the *Adapters* tab, click *Properties*.**

The 3Com Installation dialog box appears ([Figure 15](#)).

Figure 15 3Com Installation Dialog Box



- 5 **Click *Diagnostics*.**
- 6 **Click *OK* in response to the warning message that appears on your screen.**

After Windows NT restarts, the General tab of the 3Com NIC Diagnostics program appears.

Accessing the 3Com Help System

To display the entire Help system, click *Help* on any 3Com NIC Diagnostics program window.

To display information about any item on a window, click the question mark (?), drag it to the item, and click. The pop-up box displays information about the selected item.

Using the General Window

From the General window, you can select installed NICs and view their configuration setting details.

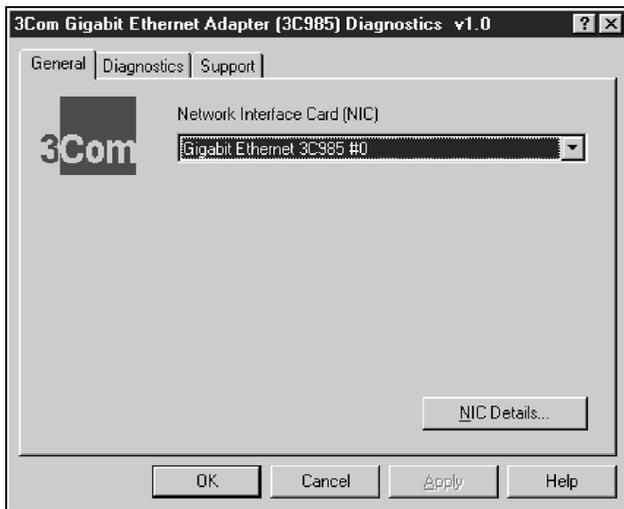
Displaying the General Window

To display the General window ([Figure 16](#)), start the 3Com NIC Diagnostics program.

Selecting a NIC

To select a NIC, use the Network Interface Card (NIC) list box in the General window.

Figure 16 General Window



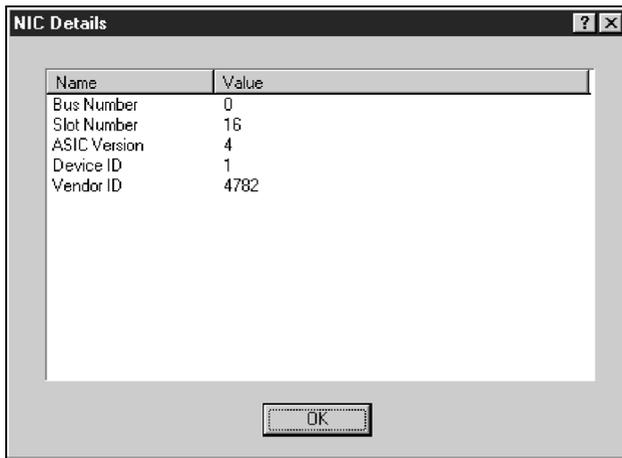
Viewing NIC Details

To view the details about NIC configuration settings:

- 1 **Select a NIC from the Network Interface Card list box.**
- 2 **Click *NIC Details*.**

The NIC Details window ([Figure 17](#)) appears. Each configuration setting is shown with its current value. When you are finished viewing NIC details, click *OK*.

Figure 17 NIC Details Window



Using the Diagnostics Window

From the Diagnostics window, you can run the diagnostic tests summarized in [Table 4](#).

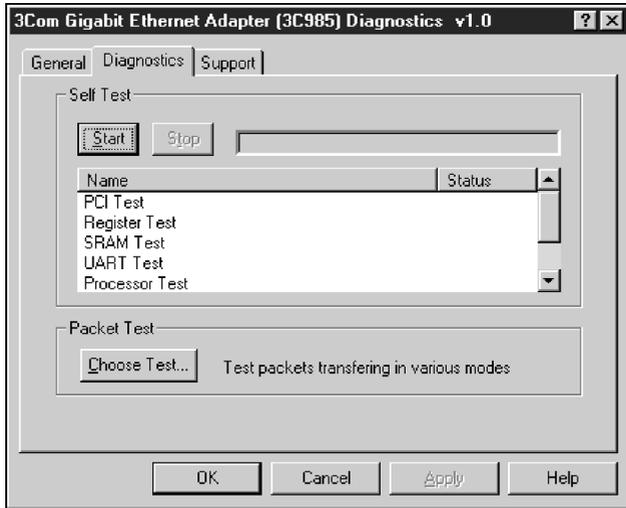
Table 4 3Com NIC Diagnostic Tests

Test	Description
NIC self-test	These tests check the physical components, circuitry, and connectors on the NIC.
Packet tests	These tests check the NIC's ability to transfer packets.

To display the Diagnostics window (Figure 18), start the 3Com NIC Diagnostics program and click the Diagnostics tab.

To see all the available tests, use the Name list box in the Diagnostics window.

Figure 18 Diagnostics Window



Running the NIC Self-Test

Run the NIC self-test to check the physical components, connectors, and circuitry on the NIC.

Make sure the 3C985B-SX server NIC is installed and connected to the network, and that the Windows NT driver is installed.

To run the NIC self-test:

- 1 Start the 3Com NIC Diagnostics program.**
- 2 Click the Diagnostics tab.**
- 3 Click *Start* in the Self-Test area.**

The tests run in sequence to completion or until you click *Stop*.

Running the Packet Tests

Run the packet tests to check the NIC's ability to transfer packets. [Table 5](#) describes the packet tests.

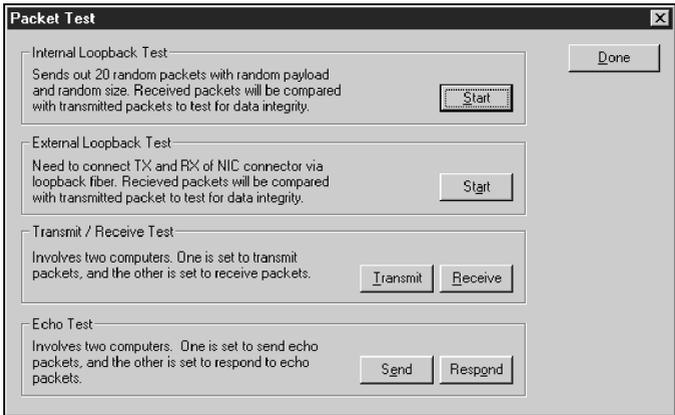
Table 5 Packet Tests

Test	Description	Statistics Collected (All Tests)
Internal Loopback	Checks on-board circuitry of the NIC by writing, and then reading, data to and from internal memory registers.	Packets transmitted Packets received
External Loopback	Checks port and transceiver integrity by comparing transmitted and received packets. Requires an external loopback plug. For more information on building an external loopback plug, see Constructing Loopback Plugs near the end of this chapter.	Errors detected rxBadCRC rxCollDet rxLinkLost rxPhyDecode rxOddNybl
Transmit/Receive	Tests the ability of the NIC to transmit or receive packets from another computer. Requires two connected computers.	rxMacAbort rxShort rxTrunc
Echo	Checks system connectivity by testing the ability of the NIC to send and respond to echo packets. Requires two connected computers.	

To run the packet tests:

- 1 Start the 3Com NIC Diagnostics program.**
- 2 Click the Diagnostics tab.**
- 3 Click *Choose Test*.**

The Packet Test window appears ([Figure 19](#)).

Figure 19 Packet Test Window

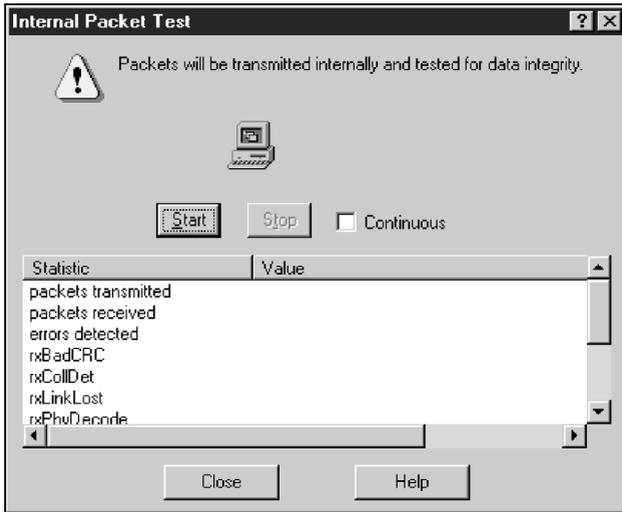
Running the Internal Loopback Test

The internal loopback test verifies the integrity of the NIC's on-board circuitry by writing, and then reading, data to and from internal memory registers.

To run the internal loopback test:

- 1 Bring up the Packet Test window (Figure 19):**
 - a Start the 3Com NIC Diagnostics program.
 - b Click the Diagnostics tab.
 - c Click *Choose Test*.
- 2 In the Internal Loopback Test area, click *Start*.**

The Internal Packet Test window appears (Figure 20).
- 3 In the Internal Packet Test window:**
 - a To run the test continuously, click the *Continuous* check box. To run the test just once, clear the *Continuous* check box.
 - b Click *Start*.
 - c If you chose to run the test continuously, click *Stop* to halt the test.
 - d To exit the Internal Packet Test window, click *Close*.

Figure 20 Internal Packet Test Window

Running the External Loopback Test

The external loopback test checks the integrity of the on-board transceiver and cable connectors.

To run the external loopback test, you must use a loopback plug.



CAUTION: Do not run the External Loopback Test when the 3C985B-SX server NIC is cabled to another device.

To run the external loopback test:

- 1 Insert the loopback plug into the 3C985B-SX server NIC.**

For instructions on constructing a loopback plug, see [Constructing Loopback Plugs](#) in this chapter.

- 2 Bring up the Packet Test window (Figure 19):**

- Start the 3Com NIC Diagnostics program.
- Click the Diagnostics tab.
- Click *Choose Test*.

- 3 In the External Loopback Test area, click *Start*.**

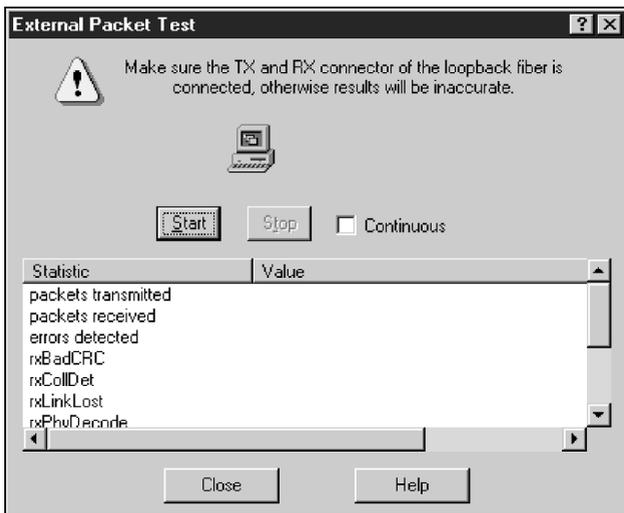
The External Packet Test window appears ([Figure 21](#)).

4 In the External Packet Test window:

- a To run the test continuously, click the *Continuous* check box. To run the test just once, clear the *Continuous* check box.
- b Click *Start*.
- c If you chose to run the test continuously, click *Stop* to halt the test.
- d To exit the External Loopback Test window, click *Close*.

5 When the test is finished, remove the loopback plug from the NIC and insert the network cable.

Figure 21 External Packet Test Window



Running the Transmit/Receive Test

The transmit/receive test checks the NIC's ability to transmit or receive packets from another computer. To run the transmit/receive test, two servers with 3C985B-SX server NICs installed are required. One server sends data and the other receives data. Both servers must be running Windows NT 4.0.



CAUTION: *Running the transmit/receive test while connected to an active network can cause intermittent failures. Connect to an inactive network on which only the PCs being tested are operating.*

To run the transmit/receive test:

- 1 Install a 3C985B-SX server NIC and the network driver in each of two different servers and connect both to the same inactive network.**

The server that contains the NIC being tested is the *transmitting server*. The echo server is the *receiving server*.



You must start the test on the receiving PC before starting the test on the transmitting PC.

- 2 On both servers:**

- Start the 3Com NIC Diagnostics program.
- Click the Diagnostics tab to display the Diagnostics window ([Figure 18](#)).
- Click *Choose Test* to display the Packet Test window ([Figure 19](#)).

- 3 On the receiving server:**

- In the Packet Test window, click *Receive* to display the Receiver window ([Figure 22](#)). (The option to run the test continuously or for a certain number of iterations is determined by configuring the transmitting PC. You cannot modify the selection here.)
- Click *Start*.

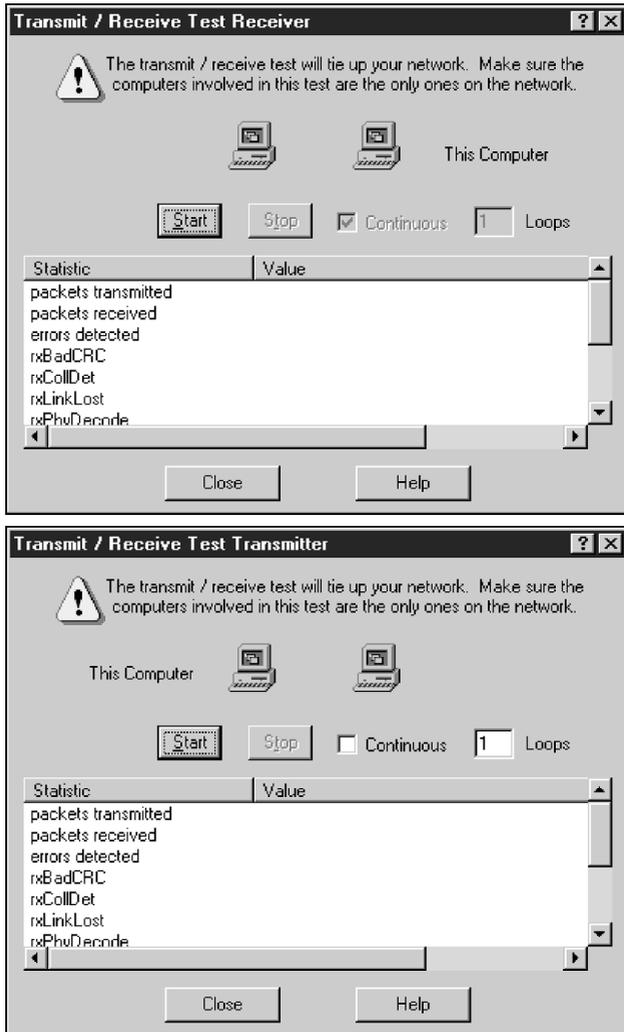
- 4 On the transmitting server:**

- In the Packet Test window, click *Transmit* to display the Transmitter window.
- To run the test continuously, click the *Continuous* check box, or enter the number of times you want the test to run by typing the number in the Loops field.
- Click *Start*.

- 5 If you have selected *Continuous*, click *Stop* on the transmitting server, and then click *Stop* on the receiving server to halt the test.**

- 6 To exit the Transmit/Receive Test, click *Close*.**

Figure 22 Transmit/Receive Windows



Running the Echo Test

The echo test verifies the ability of the 3C985B-SX server NIC to transmit and receive data on the network.

You must have two servers with 3C985B-SX server NICs and network drivers installed to run an echo test. One server sends data and the other receives data. Both servers must be running Windows NT 4.0.

Before running the echo test, connect to an inactive network on which only the server being tested and the echo server are operating.



CAUTION: *Running the echo test while connected to an active network can cause intermittent failures. Connect to an inactive network on which only the servers being tested are operating.*

To run the echo test:

1 Install a 3C985B-SX server NIC and the network driver in each of two different servers and connect both to the same inactive network.

The server that contains the NIC being tested is the *sending server*. The echo server is the *responding server*.

2 On both servers:

- a Start the 3Com NIC Diagnostics program.
- b Click the Diagnostics tab to display the Diagnostics window (Figure 18).
- c Click *Choose Test* to display the Packet Test window (Figure 19).

3 On the responding server:

- a In the Packet Test window, click *Respond* to display the Responder window (Figure 23). (The option to run the test continuously or for a certain number of iterations is determined by configuring the transmitting PC. You cannot modify the selection here.)
- b Click *Start*.



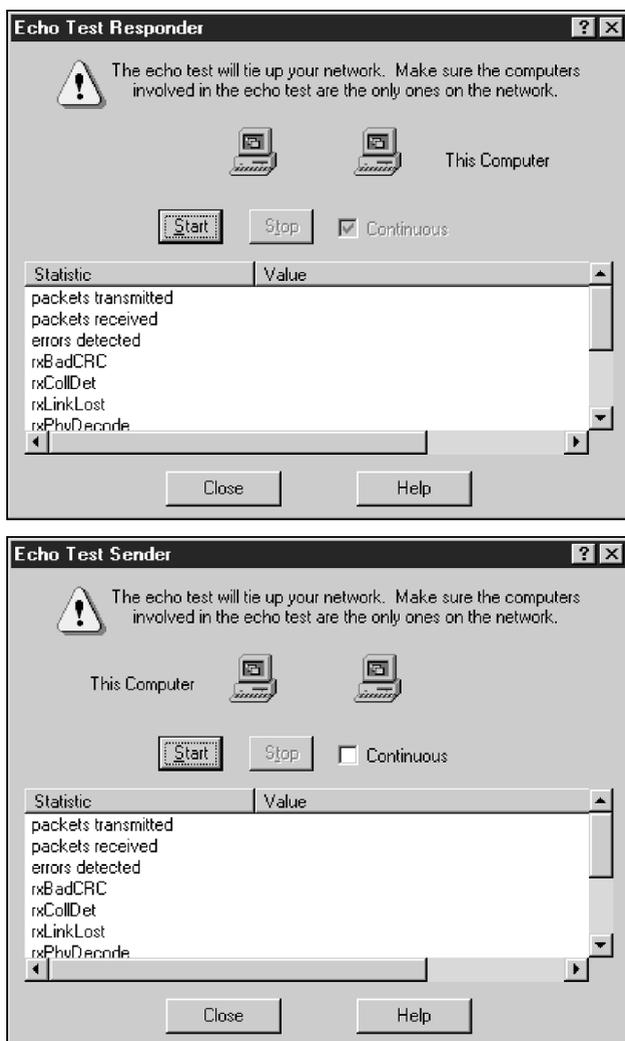
You must start the test on the responding server before starting the test on the sending server.

4 On the sending server:

- a In the Packet Test window, click *Send* to display the Sender window (Figure 23).
- b To run the test continuously, click the *Continuous* check box. Otherwise, the test runs once.
- c Click *Start*.
- d If you have chosen *Continuous*, click *Stop* to halt the test. Otherwise, the test halts when it is finished.

- 5 On the responding server, click *Stop*.
- 6 To exit the test, click *Close* on both servers.

Figure 23 Echo Test Windows



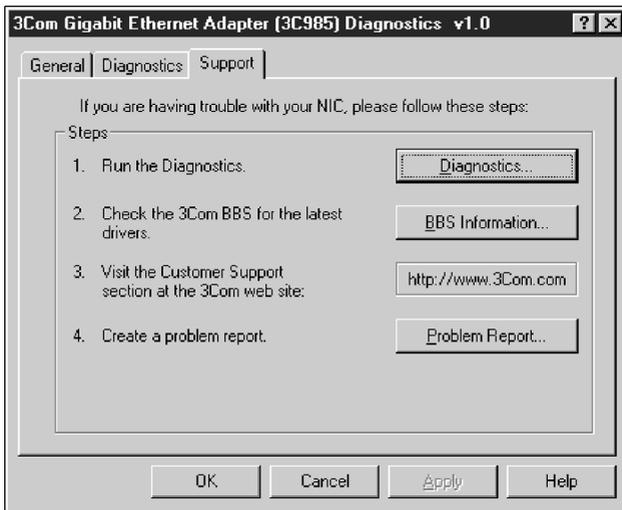
Using the Support Window

The Support window provides access to various 3Com support services.

To display the Support window:

- 1 **Start the 3Com NIC Diagnostics program.**
- 2 **Click the Support tab.**

Figure 24 Support Window



Accessing Support Services

To access 3Com support services in the Support window:

- Click *Diagnostics* to display the Diagnostics window. (See [Using the Diagnostics Window](#) earlier in this chapter for information on how to run diagnostic tests.)
- Click *BBS Information* to see BBS telephone numbers and modem speeds.
- Read the 3Com World Wide Web address in the next field.
- Click *Problem Report* to generate a problem report.

Generating a Problem Report

The problem report generator prompts you for information to help 3Com customer support solve NIC installation and configuration problems.

You can e-mail the completed report to 3Com customer support and receive an e-mail answer within two business days.

To generate a problem report from the Support window:

- 1 Click Problem Report to display the Problem Report main window.**
- 2 Review the window text and click *Next* to display the Customer Information window.**
- 3 Type the customer information in each field and click *Next* to display the Computer Information window.**
- 4 Type the computer information in each field:**
 - a** Manufacturer and model: Enter the manufacturer and model of your computer.
 - b** Identify your computer as a client, server, or both, using the pull-down menu.
 - c** Select your CPU type using the pull-down menu.
 - d** Enter the numbers of the PCI slots that have boards installed.
 - e** Enter the numbers of the PCI slots that support bus mastering.
 - f** Select your computer operating system using the pull-down menu.
 - g** Select your network operating system using the pull-down menu.
 - h** Select your computer processor speed using the pull-down menu.
- 5 Click *Next* to display the Problem Description window.**
- 6 Type the problem description and the 3Com case number if you have one.**

- 7 Use the pull-down menu to select whether you can reproduce the problem.**
- 8 Click *Next* to display the Save window.**
- 9 Click *Finish* to save the report as an ASCII text file.**

You can click *Back* to edit the previous windows. After saving, you can:

 - E-mail the report to 3Com.
 - View the report: click *View Report*.
- 10 Click *OK*.**

The General window appears.
- 11 To exit the program, click *Cancel*.**

Using the 3Com DOS Diagnostics Program

The DOS Configuration and Diagnostics Program includes the diagnostic tests summarized in [Table 6](#). If the NIC passes the Group 1 and Group 3 tests, hardware failure is ruled out. If a problem remains, look at cabling, the connected switch, software, and other issues that affect network functionality.

Table 6 DOS Diagnostic Tests

Test	Description
Group 1	These tests check the physical components, circuitry, and connectors on the NIC.
Group 2	These tests check the integrity of the on-board circuitry and the on-board transceiver and cable connectors.
Group 3	The Group 3 tests verify the ability of the NIC to send and receive data on the network. To run these tests, you need two PCs with NICs installed.

You can run the DOS diagnostics program after installing the NIC, any time you suspect a fault.

Use the DOS diagnostics program in the following cases:

- To verify that the hardware works before you install a driver.
Your site's network installation procedures may require you to verify that installed hardware is functional before you install software.
- If the network driver fails to load.
The internal and external tests determine whether the components on the NIC are functioning correctly.
- If there is no network activity, or if irregular activity is reported by the server or the switch.
- To acquire specific information about the NIC.
- To acquire specific configuration information about the NIC.

Copying the Program

The DOS Configuration and Diagnostics Program must be run in DOS with no device drivers or memory managers installed. It will not run in a Windows NT DOS window. You must boot from DOS without running the AUTOEXEC.BAT or CONFIG.SYS files.

The program name is 3C985CFG.EXE. To run the program in DOS, you must copy it from the 3Com EtherLink Server CD to a bootable DOS diskette.

Follow these steps to copy the program and start it in DOS:

- 1 Create a bootable DOS diskette.**
- 2 Insert the 3Com EtherLink Server CD into the CD-ROM drive.**
- 3 Insert the bootable DOS diskette into the floppy drive.**
- 4 Copy all the files from the DOS_DIAG directory on the 3Com EtherLink Server CD to the bootable DOS diskette:**

```
copy \dos_diag\*. * a:
```

Starting the Program

- 1 **Insert the bootable DOS diskette that contains the 3C985CFG.exe program into the floppy drive (for example, the A drive).**
- 2 **Boot the computer from the bootable DOS diskette.**
- 3 **Enter this command to start the program:**

a:\3c985cfg

The Configuration and Diagnostics Program detects all 3C985B-SX server NICs in the system. The main screen appears with a NIC selected.



Slot numbers listed in the Configuration and Diagnostics Program may not match those labeled on the mother board.

Navigating Within the Program

[Table 7](#) summarizes how to select items and move through the Configuration and Diagnostics Program.

Table 7 Using the Configuration and Diagnostics Program

Keystroke	Action
Tab	Move cursor to next field
Enter	Select field
Up and Down arrow keys	Move cursor up and down a list
Esc	Exit to previous screen
Shift+Tab	Move cursor to previous field
Alt+Highlighted letter	Execute indicated function
F1	Get Help for selected item
F2	Not applicable
F3	Exit to DOS
F4	Display Configure NIC screen
F5	Display Run Tests screen
F6	Display Test Setup screen
F7	Start echo server
F8	Display NIC Information screen
F9	Display NIC Statistics screen
F10	Select NIC
F11	Not applicable
F12	Not applicable

Running the Group 1 Tests

The Group 1 tests check the integrity of the on-board ASIC circuitry. The types of tests and number of test repetitions are set to the default values (that is, Group 1 tests enabled, other tests disabled).

To run all the internal tests:

- 1 Physically disconnect the NIC from the network.**
- 2 From the *Select* menu item on the main screen, select the NIC to be tested.**
- 3 From the *Test* menu, select *Test Setup*.**
- 4 In the *Test Setup* screen:**

a Verify that the Group 1 tests are selected.

b Verify that all the internal tests are enabled.

If they are not, select *Enable Group* to set all internal tests to Enable.



You can enable and disable an individual test by selecting the test and pressing the spacebar.

c Verify that the Group 2 and Group 3 tests are disabled.

If the Group 2 tests are not disabled, select *Group 2*, and click *Disable Group*.

If the Group 3 tests are not disabled, select *Group 3*, and click *Disable Group*.

d Enter the number of times you want the tests to run, or select *Continuous*.

- 5 Select *OK*.**

The main screen reappears.

- 6 From the *Test* menu, select *Run Tests*.**

The Test Results screen appears.

- 7 Select *Start* to run the Group 1 tests.**

The tests results are updated on the screen as the tests run.

Running the Group 2 Tests

Run the Group 2 tests to check the integrity of the on-board circuitry and the on-board transceiver and cable connectors. To run the External Loopback Test, you must use a loopback plug.



CAUTION: Do not run the External Loopback Test when the 3C985B-SX server NIC is cabled to another device.

To run the Group 2 tests:

- 1 Insert the loopback plug into the 3C985B-SX server NIC.**

For instructions on constructing a loopback plug, see [Constructing Loopback Plugs](#) in this chapter.

- 2 From the *Select* menu on the diagnostics program main screen, select the 3C985B-SX server NIC to be tested.**

- 3 From the *Test* menu, select *Test Setup*.**

The Test Setup screen appears.

- 4 Disable Group 1 tests by selecting *Group 1* and clicking *Disable Group*.**

- 5 Verify that Group 3 tests are disabled.**

If the Group 3 tests are not disabled, select *Group 3*, and select *Disable Group*.

- 6 Select *Group 2* and select *Enable Group*.**



You can enable and disable an individual test by selecting the test and pressing the spacebar.

- 7 Enter the number of times you want the tests to run, or select *Continuous*.**

- 8 Click *OK*.**

The main screen reappears.

- 9 From the *Test* menu, select *Run Tests*.**

The Test Results screen appears.

- 10 Click *Start* to run the Group 2 tests.**

The test results are updated on the screen as the tests run.

- 11 When you are finished, remove the loopback plug and reinsert the network cable.**

Running the Group 3 Tests

The Group 3 tests verify the ability of the NIC to send and receive data on the network. Group 3 consists of two tests:

- Transmit/Receive Test
- Echo Server Test

Running the Transmit/Receive Test

The Transmit/Receive Test checks the ability of the NIC to exchange packets with another computer. To run the Transmit/Receive Test, two PCs with 3C985B-SX server NICs installed are required: one PC to transmit data and one PC to receive data.



CAUTION: *Running the Transmit/Receive Test while connected to an active network can cause intermittent failures. To avoid this, connect to an inactive network on which only the PCs being tested are operating.*

To run the Transmit/Receive Test:

- 1 Make sure that a 3C985B-SX server NIC is installed in the transmitting PC and connected to the network.**
- 2 Install a 3C985B-SX server NIC in another PC (the receiving PC) and connect it to the network.**
- 3 Launch the DOS diagnostics program on both PCs.**
- 4 On the receiving PC:**
 - a** From the *Select* menu item on the main screen, select the NIC to be tested.
 - b** From the *Test* menu, select *Test Setup*.
 - c** Select *Group 1*, and select *Disable Group*.
 - d** Select *Group 2*, and select *Disable Group*.
 - e** Enable the Transmit/Receive test by selecting *Group 3*, selecting *Transmit/Receive Test*, and pressing the spacebar.
 - f** Click *OK*.
The main screen reappears.
 - g** From the *Test* menu, select *Receiver*.
The Transmit/Receive Receiver screen appears.

5 On the transmitting PC:

- a From the *Select* menu on the main screen, select the NIC to be tested.
- b From the *Test* menu, select *Test Setup*.
- c Select *Group 1*, and click *Disable Group*.
- d Select *Group 2*, and click *Disable Group*.
- e Enable the Transmit/Receive test by selecting *Group 3*, selecting *Transmit/Receive Test*, and pressing the spacebar.
- f Enter the number of times you want the test to run, or select *Continuous*.
- g Click *OK*.
The main screen reappears.
- h From the *Test* menu, select *Run Tests*.
The Test Results screen appears.
- i Click *Start*.
The test results are updated on the screen as the test runs.

Running the Echo Server Test

The Echo Server Test checks connectivity of the entire system by verifying the ability of the 3C985B-SX server NIC to send and receive echo packets. To run the Echo Server Test, two PCs with 3C985B-SX server NICs installed are required: one PC to send data and one PC to respond.



CAUTION: *Running the Echo Server Test while connected to an active network can cause intermittent failures. To avoid this, connect to an inactive network on which only the PC being tested is operating.*

To run the Echo Server Test, follow these steps:

- 1 **Make sure that a 3C985B-SX server NIC is installed in the sending PC and connected to the network.**
- 2 **Install a 3C985B-SX server NIC in another PC (the responder) and connect it to the network.**

3 Launch the DOS diagnostics program on both PCs.**4 On the echo server (responder):**

- a** From the *Select* menu item on the main screen, select the NIC to be tested.
- b** From the *Test* menu, select *Test Setup*.
- c** Select *Group 1*, and select *Disable Group*.
- d** Select *Group 2*, and select *Disable Group*.
- e** If it is not already disabled, disable the Transmit/Receive Test by selecting *Group 3*, selecting *Transmit/Receive Test*, and pressing the spacebar.
- f** Enable the Echo Test by selecting *Group 3*, selecting *Echo Test*, and pressing the spacebar.
- g** Click *OK*.
The main screen reappears.
- h** From the *Test* menu, select *Echo Server*.
The Echo Server screen appears.

5 On the sending server:

- a** From the *Select* menu item on the main screen, select the NIC to be tested.
- b** From the *Test* menu, select *Test Setup*.
- c** Select *Group 1*, and click *Disable Group*.
- d** Select *Group 2*, and click *Disable Group*.
- e** If it is not already disabled, disable the Transmit/Receive Test by selecting *Group 3*, selecting *Transmit/Receive Test*, and pressing the spacebar.
- f** Enable the Echo Test by selecting *Group 3*, selecting *Echo Test*, and pressing the spacebar.
- g** Enter the number of times you want the test to run, or click *Continuous*.

- h** Click *OK*.
The main screen reappears.
- i** From the *Test* menu, select *Run Tests*.
The Test Results screen appears.
- j** Click *Start*.
The test results are updated on the screen as the test runs.

Viewing Test Results and NIC Information

The Test Results screen is updated while the tests run, showing the number of times each test was run and the pass/fail results.

Internal test results are reported in the form of NIC statistics. To view the NIC Statistics screen select *NIC Statistics* from the View menu.

To view information about the NIC, from the View menu, select *NIC Information*.

Exiting the Program

To exit the DOS diagnostics program, from the Quit menu, select Exit, or press F3.

Uninstalling 3Com Software

Follow the procedures in this section to remove 3C985B-SX server NIC drivers and associated software from the server.

Windows NT Software Removal

- 1** From the Start menu, select *Settings/Control Panel*.
- 2** Double-click the Network icon.
- 3** In the Network window, click the *Adapters* tab.
- 4** In the *Adapters* tab, select *3Com Gigabit Ethernet Adapter (3C985)*.
- 5** Click *Remove*.
- 6** Follow the prompts to remove the software and reboot the server.

NetWare Software Removal

To remove the driver and load balancing software:

1 Start the NetWare installation program:

NetWare 4.11: **load install**

NetWare 5.0: **load nwconfig**

2 Remove the driver:

- a In the Installation Options screen, select *Driver options*.
- b In the Driver Options screen, select *Configure network drivers*.
- c In the Additional Driver Actions screen, select *Deselect a selected driver*.
- d Select the appropriate driver name from the list and press Enter to remove it.

3 Remove the load balancing software:

- a From the Installation Options screen, select *Product options*.
- b From the Other Installation Actions screen, select *View/Configure/Remove installed products*.
- c Delete *3Com Load Balancing Server Software* from the Currently Installed Products list.

DynamicAccess Software for Servers Removal

- 1 From the *Start* menu, select *Settings/Control Panel*.
- 2 Double-click the *Network* icon.
- 3 In the *Network* window, click the *Protocols* tab.
- 4 In the *Protocols* tab, select *DAPass Thru Driver Transport*.
- 5 Click *Remove*.
- 6 Follow the prompts to remove the software and reboot the server.

Troubleshooting Tips

If you need to test the NIC further after running diagnostic tests, use the following troubleshooting tips.

You can find the latest troubleshooting tips at the 3Com web site on the Customer Support page:

<http://www.3com.com>



WARNING: *Before inserting or removing the NIC from the server, turn off the power to the server.*

- Check the NIC installation. Make sure that the board is seated correctly in the slot. Check for specific hardware problems, such as broken traces or loose or broken solder connections.
- Inspect all cables and connections. Check the length and rating of the cable. Make sure that the cable segment is compliant with the requirements shown in [Cabling Types and Distances](#).
- The network port may be defective or improperly configured. Connect the NIC to a different network port and run the tests again.
- Check the configuration settings and change them if they conflict with another device.
- Make sure that your server is using the latest BIOS.
- Check the PCI BIOS parameters for the slot where the NIC is installed. [Table 8](#) shows how these parameters should be set. These parameters may not be configurable on all servers.

Table 8 PCI BIOS Parameters

Parameter	Setting
Bus master	Enabled.
Interrupt number	Set to any IRQ that does not conflict with another device.
Interrupt type	Level.
Latency timer	Recommended range is between 20 and 255; typically set to 40.

- Insert the NIC in another slot; the original slot may be defective.
- The NIC may be defective. Replace the suspected NIC with one that is known to work properly. For information on product repair, see [Appendix D](#).
- To test for a defective server, install the NIC in a functioning server.
- Other NICs may be causing contention. Remove all other NICs from the server and test the 3C985B-SX server NIC separately.

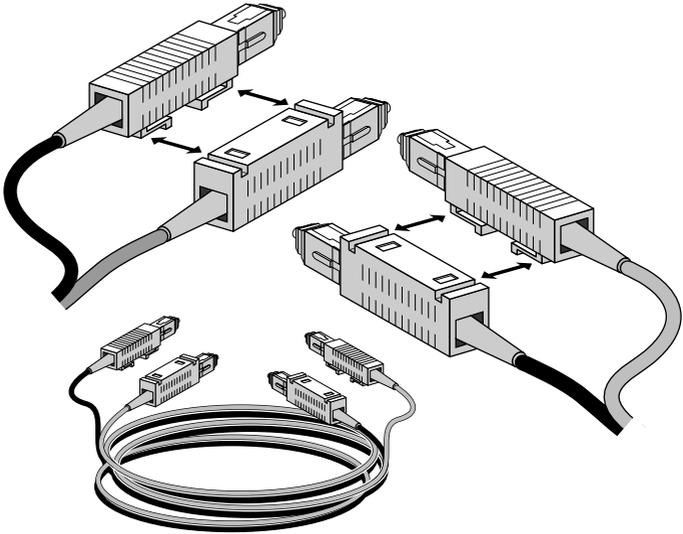
Constructing Loopback Plugs

To run the External Loopback Test, you must first insert a loopback plug into the cable connectors of the 3C985B-SX server NIC. The loopback plug lets the 3C985B-SX server NIC transmit and receive on a closed loop. A fiber-optic loopback plug for the 3C985B-SX server NIC can be constructed from a single strand or a double strand of standard fiber-optic cable.

- Single-strand cable — Insert the male connectors at both ends of the cable into the female connectors on the NIC.
- Double-strand cable — The following procedure for creating a loopback plug from a common type of double-strand cable is provided for your reference. The way the connectors clip together may vary with the manufacturer.

- 1 **Unclip the connectors at both ends of the double-strand cable, as shown in [Figure 25](#).**

Figure 25 Unclipping Double-strand Fiber-optic Cable Connectors



If you cannot unclip the connectors, create a loopback plug from a new strand of cable whose connectors have not yet been clipped together.

- 2 **Clip together the connectors of one of the strands (one strand has markings on it; the other does not).**
- 3 **Insert the connectors into the SC connector ports of the 3C985B-SX server NIC.**



DYNAMICAccess TECHNOLOGY SERVER FEATURES

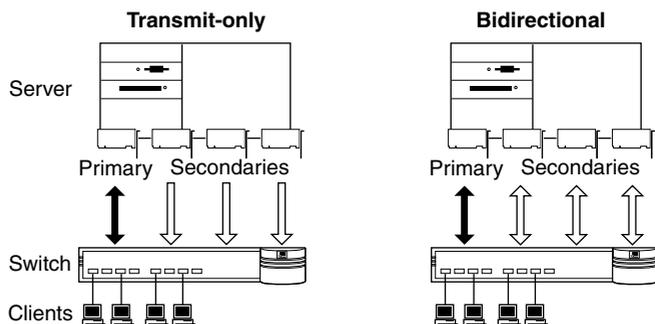
Topics:

- [About Load Balancing](#)
- [About Resilient Server Links](#)
- [About Failover](#)
- [Specifying a Dedicated IP Address](#)
- [Changing an IP Address](#)
- [Troubleshooting a Load Balancing Configuration](#)
- [About VLANs](#)

About Load Balancing

Load balancing removes bandwidth bottlenecks at the server through the use of multiple parallel resilient server links (RSLs) that share the network load.

Figure 26 Types of Load Balancing Arrangements



About Resilient Server Links

An RSL consists of two or more NICs that form a *virtual NIC*. Each virtual NIC has multiple physical NICs bound to it, forming a *group*. Each NIC in a group uses the same protocols and frame types. One NIC is designated the *primary* NIC and the others *secondary* NICs.

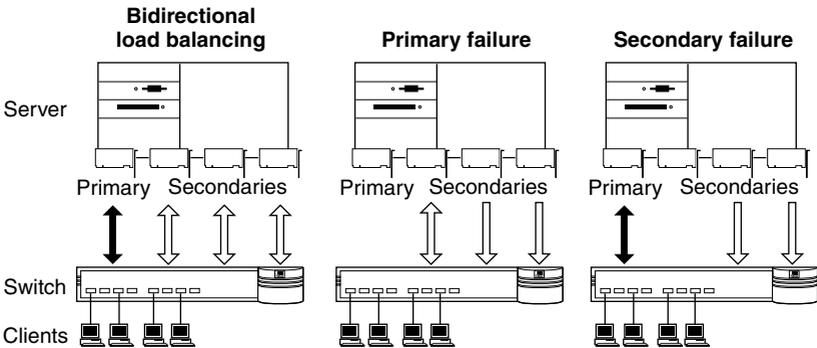
About Failover

In addition to load balancing, RSLs provide failover fault tolerance between a server and a switch — if one NIC in a group fails, the others assume the network load of the failed NIC. The failover behavior of secondary NICs depends on how you set load balancing:

- In a *transmit-only* load balancing arrangement, the primary NIC is the only one that receives packets. If the primary NIC fails, a secondary NIC assumes the configuration profile, network traffic, and active status of the failed primary NIC.
- In a *bidirectional* load balancing arrangement, all NICs receive packets. If any NIC fails, receive load balancing is disabled, and the other NICs continue transmit-only load balancing activity. Receive load balancing is restored when new connections are established with clients.

If any NIC in a bidirectional arrangement fails, receive load balancing is disabled, and the other NICs continue transmit-only load balancing activity. If the primary NIC failed, a secondary NIC takes over packet reception for the group.

Figure 27 Bidirectional Load Balancing Failover



Bidirectional load balancing is restored after a failure when applications create new connections and new clients log in.

Specifying a Dedicated IP Address

Bidirectional load balancing requires that you specify a dedicated IP address for the load balancing group. This address must be unique (not used elsewhere on the network). For example:

	Network ID		Host ID	
	Byte 1	Byte 2	Byte 3	Byte 4
Class A	125	24	1	253
Class B	139	25	2	253
Class C	193	26	3	253

You specify the dedicated IP address in the Create Group or Group Properties dialog boxes. Byte 1 is fixed for each class of subnet; you cannot specify it. Specify the other bytes in the dedicated IP Address for various classes of subnets as follows:

- Class A — (Byte 1 = 1 – 126.) Specify only bytes 2, 3, and 4 (the three rightmost boxes).
- Class B — (Byte 1 = 128 – 191.) Specify only bytes 3 and 4 (the two rightmost boxes).
- Class C — (Byte 1 = 192 – 223.) Specify only byte 4 (the rightmost box).

Changing an IP Address

If another device is using a load balancing group's dedicated IP address, you must change either the other device's IP address or that of the load balancing group.

Changing the Other Device's IP Address

- 1 Use Windows NT procedures to change the IP address of the other device.
- 2 In the Load Balancing/RSL window, select the group that had the duplicate address.
- 3 Click *Properties*.
- 4 In the Properties dialog box, click *OK*.
- 5 In the Load Balancing/RSL window, click *OK* to exit the window and restart receive load balancing.

Changing the Group's Dedicated IP Address

- 1 In the Load Balancing/RSL window, select the group that has the duplicate address.
- 2 Click *Properties*.
- 3 In the Properties dialog box, enter a new IP address and click *OK*.
- 4 In the Load Balancing/RSL window, click *OK* to exit the window and restart receive load balancing.

Troubleshooting a Load Balancing Configuration

Use the troubleshooting tips below to solve problems that may occur in a load balancing configuration.

For the latest troubleshooting tips, see the Customer Support page at the 3Com Web site:

<http://www.3com.com/>

Table 9 Troubleshooting Tips for Load Balancing

Symptom	Tip
Receive load balancing fails to begin functioning.	Check the Group Properties to verify that the dedicated IP address has been entered. If no address appears in the Group Properties dialog box, enter one to enable receive load balancing.
Receive load balancing stops functioning.	Cables may be disconnected, or there may be other hardware problems. Reconnect or change the cables. Correct any other hardware problems. Bidirectional load balancing is restored after this type of failure when applications create new connections and new clients log in.
Reconnecting cables does not restore load balancing.	Check the event log for a duplicate IP address. If another device is using a load balancing group's dedicated IP address, change one of the IP addresses. See Changing an IP Address for instructions.
Receive load balancing does not function across a router.	Receive load balancing across a router is not supported. Clients across the router cannot use receive load balancing, but clients within the subnet get higher throughput from receive load balancing.

About VLANs

A VLAN is a group of location-independent and topology-independent devices that communicate as if they were on the same physical LAN. Network devices on different LAN segments and of different media types can be members of the same VLAN. Membership in a VLAN is determined by a VLAN tag that is transmitted with the Ethernet frame for use by a switch.

With VLANs, you can define a network according to:

- Organizational groups — For example, you can have one VLAN for the Marketing department and one for the Finance department.
- Application groups — For example, you can have one VLAN for e-mail users and one for multimedia users.

Implementing VLANs on a network has these advantages:

- It eases the change and movement of devices on IP networks.

With traditional IP networks, if users move to a different IP subnet, the IP addresses of each workstation must be updated manually. With VLANs installed, if an end station on VLAN 1 is moved to a port elsewhere on the network, you need only to specify that the new port is on VLAN 1.

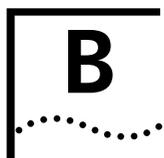
- It helps to control traffic.

With traditional networks, congestion can be caused by broadcast traffic that is directed to all network devices whether they require it or not. Each VLAN can be set up to contain only those devices that need to communicate with each other, increasing network efficiency.

- It provides extra security.

Devices within each VLAN can communicate only with member devices in the same VLAN. If a device in VLAN 1 needs to communicate with devices in VLAN 2, the traffic must cross a router.

The DynamicAccess software for servers multiple VLAN capability supports IEEE 802.1Q VLAN tagging and works with any switch that complies with IEEE 802.1Q specifications. See your Ethernet switch documentation for more information on IEEE 802.1Q VLANs.



INSTALLING 3COM SOFTWARE DURING NETWARE INSTALLATION

Follow these instructions to install 3Com software while you are installing the NetWare network operating system. (This procedure is often called “performing a fresh install.”)

These instructions apply to NetWare versions 4.11 and 5.0.

Software Installation Requirements

- **NIC** — At least one 3Com server NIC must be installed in a PCI bus master slot. The following models are supported: 3C985B-SX.
- **Operating system** — Novell NetWare version 4.11 or 5.0 and the most recent patches and updates available from Novell technical support (www.novell.com).
- **Netware Packet Receive Buffers** — For guidelines, see [Software Installation Requirements](#) in [Installing and Configuring the NetWare Driver](#).
- **Slot numbers for multiple NICs** — For guidelines, see [Software Installation Requirements](#) in [Installing and Configuring the NetWare Driver](#).

Installation Instructions

These instructions are for installing from the 3Com EtherLink Server NIC CD. If you download 3Com software from the web and make installation diskettes to use for the installation, the steps are slightly different (you do not need to remove and replace the NetWare CD).

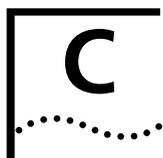
- 1 Start the installation and proceed as usual until you reach the Devices Detected screen.**
- 2 In the Devices Detected screen:**

There are no NICs listed in the Network Boards field. From the Options menu, select *Modify*.

- 3 In the next screen, select Network Boards and press Enter.**
- 4 Press Ins (Add a Board).**
- 5 Press Ins (Add Unlisted Driver).**
- 6 Remove the NetWare CD from the CD-ROM drive.**
- 7 Insert the 3Com EtherLink Server CD in the CD-ROM drive.**
- 8 Press F3.**
- 9 Enter the location of the driver on the 3Com CD.
For example:**
`D:\netware`
- 10 The next screen lists the drivers on the 3Com CD.
Select this driver:**

3Com EtherLink Server 1000 SX PCI (Minimum Receive Buffers)

- 11 In the Driver Summary screen, select 3C985.LAN and press Enter.**
- 12 Modify driver properties as necessary.**
Do not modify the RecvBuffers property.
- 13 Return to the Driver Summary screen.**
- 14 Remove the 3Com CD from the CD-ROM drive.**
- 15 Insert the NetWare CD in the CD-ROM drive.**
- 16 From the Options menu, select Continue.**
The installation continues.
- 17 When the installation is finished:**
 - a** Edit the STARTUP.NCF file.
Specify 512 receive buffers for each installed 3C985B-SX server NIC. (For more details on receive buffers, see [Software Installation Requirements](#) in [Installing and Configuring the NetWare Driver.](#))
 - b** Edit the AUTOEXEC.NCF file.
Delete the RecvBuffers parameter.



SPECIFICATIONS

Hardware

Memory	16 Kb serial EEPROM 1 MB SRAM
Bus interface	<i>PCI Local Bus Specification, Revision 2.1</i> PCI Compliance Checklist 32-bit zero wait state master 32- or 64-bit bus (33/66 MHz)
PCI master	Supports up to 13 dword bursts Supports bus master scatter-gather DMAs Memory read line support Memory read multiple support
PCI slave	I/O, memory, and configuration cycles
Interrupts	Interrupt pin: INTA#
Board dimensions	Single-slot, short form, 32- or 64bit PCI card Length: 6.80 in. (17.27 cm) Width: 3.75 in. (9.53 cm)
Power requirements	10 W (2.0 A @ 5 V)

Environment

Operating temperature	0 to 50°C (32 to 122°F)
Storage temperature	-40 to 60°C (-40 to 140°F)
Operating relative humidity	5% to 95% (noncondensing)
Storage humidity	5% to 95% (noncondensing)

Network Connections

SC duplex	Multimode fiber (62.5/125 µm or 50/125 µm)
-----------	--

Standards Conformance

PCI Local Bus Specification, Revision 2.1

IEEE 802.1p

IEEE 802.1Q

IEEE 802.3

IEEE 802.3z

IEEE 802.3x

Cabling Types and Distances

Signal Type	Connector Type	Cable Type	Cable Diameter (Microns)	Modal Bandwidth (MHz*km)	Maximum Length (Meters) (Feet)	
1000BASE-SX	SC	MMF	62.5	160	220	722
Short wavelength (850 nm)			62.5	200	275	902
			50	400	500	1641
			50	500	550	1805



TECHNICAL SUPPORT

3Com provides easy access to technical support information through a variety of services. This appendix describes these services.

Information contained in this appendix is correct at time of publication. For the most recent information, 3Com recommends that you access the 3Com Corporation World Wide Web site.

Online Technical Services

3Com offers worldwide product support 24 hours a day, 7 days a week, through the following online systems:

- World Wide Web site
- 3Com Knowledgebase Web Services
- 3Com FTP site
- 3Com Bulletin Board Service (3Com BBS)
- 3Com FactsSM Automated Fax Service

World Wide Web Site

To access the latest networking information on the 3Com Corporation World Wide Web site enter this URL into your Internet browser:

<http://www.3com.com/>

This service provides access to online support information such as technical documentation and software library, as well as support options that range from technical education to maintenance and professional services.

3Com Knowledgebase Web Services

This interactive tool contains technical product information compiled by 3Com expert technical engineers around the globe. Located on the World Wide Web at <http://knowledgebase.3com.com>, this service gives all 3Com customers and partners complementary, round-the-clock access to technical information on most 3Com products.

3Com FTP Site

Download drivers, patches, software, and MIBs across the Internet from the 3Com public FTP site. This service is available 24 hours a day, 7 days a week.

To connect to the 3Com FTP site, enter the following information into your FTP client:

- Hostname: **ftp.3com.com**
- Username: **anonymous**
- Password: **<your Internet e-mail address>**



You do not need a user name and password with Web browser software such as Netscape Navigator and Internet Explorer.

3Com Bulletin Board Service

The 3Com BBS contains patches, software, and drivers for 3Com products. This service is available through analog modem or digital modem (ISDN) 24 hours a day, 7 days a week.

Access by Analog Modem

To reach the service by modem, set your modem to 8 data bits, no parity, and 1 stop bit. Call the telephone number nearest you:

Country	Data Rate	Telephone Number
Australia	Up to 14,400 bps	61 2 9955 2073
Brazil	Up to 28,800 bps	55 11 5181 9666
France	Up to 14,400 bps	33 1 6986 6954
Germany	Up to 28,800 bps	4989 62732 188
Hong Kong	Up to 14,400 bps	852 2537 5601

Country	Data Rate	Telephone Number
Italy	Up to 14,400 bps	39 2 27300680
Japan	Up to 14,400 bps	81 3 5977 7977
Mexico	Up to 28,800 bps	52 5 520 7835
P.R. of China	Up to 14,400 bps	86 10 684 92351
Taiwan, R.O.C.	Up to 14,400 bps	886 2 377 5840
U.K.	Up to 28,800 bps	44 1442 438278
U.S.A.	Up to 53,333 bps	1 847 262 6000

Access by Digital Modem

ISDN users can dial in to the 3Com BBS using a digital modem for fast access up to 64 Kbps. To access the 3Com BBS using ISDN, call the following number:

1 847 262 6000

3Com Facts Automated Fax Service

The 3Com Facts automated fax service provides technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, 7 days a week.

Call 3Com Facts using your Touch-Tone telephone:

1 408 727 7021

Support from Your Network Supplier

If you require additional assistance, contact your network supplier. Many suppliers are authorized 3Com service partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

When you contact your network supplier for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

If you are unable to contact your network supplier, see the following section on how to contact 3Com.

Support from 3Com

If you are unable to obtain assistance from the 3Com online technical resources or from your network supplier, 3Com offers technical telephone support services. To find out more about your support options, call the 3Com technical telephone support phone number at the location nearest you.

When you contact 3Com for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

Here is a list of worldwide technical telephone support numbers:

Country	Telephone Number
Asia Pacific Rim	
Australia	1 800 678 515
Hong Kong	800 933 486
India	+61 2 9937 5085
Indonesia	001 800 61 009
Japan	0031 61 6439
Malaysia	1800 801 777
New Zealand	0800 446 398
Pakistan	+61 2 9937 5085
Philippines	1235 61 266 2602
P.R. of China	10800 61 00137 or 021 6350 1590
Singapore	800 6161 463
S. Korea	
From anywhere in S. Korea:	00798 611 2230
From Seoul:	(0)2 3455 6455
Taiwan, R.O.C.	0080 611 261
Thailand	001 800 611 2000
Europe	
From anywhere in Europe, call:	+31 (0)30 6029900 phone
	+31 (0)30 6029999 fax

Country	Telephone Number
Europe, South Africa, and Middle East	
From the following countries, you may use the toll-free numbers:	
Austria	0800 297468
Belgium	0800 71429
Denmark	800 17309
Finland	0800 113153
France	0800 917959
Germany	0800 1821502
Hungary	00800 12813
Ireland	1800 553117
Israel	1800 9453794
Italy	1678 79489
Netherlands	0800 0227788
Norway	800 11376
Poland	00800 3111206
Portugal	0800 831416
South Africa	0800 995014
Spain	900 983125
Sweden	020 795482
Switzerland	0800 55 3072
U.K.	0800 966197
Latin America	
Argentina	AT&T +800 666 5065
Brazil	0800 13 3266
Chile	1230 020 0645
Colombia	98012 2127
Mexico	01 800 CARE (01 800 2273)
Peru	AT&T +800 666 5065
Puerto Rico	800 666 5065
Venezuela	AT&T +800 666 5065
North America	
	1 800 NET 3Com (1 800 638 3266)
	Enterprise Customers: 1 800 876-3266

Returning Products for Repair

Before you send a product directly to 3Com for repair, you must first obtain an authorization number. Products sent to 3Com without authorization numbers will be returned to the sender unopened, at the sender's expense.

To obtain an authorization number, call or fax:

Country	Telephone Number	Fax Number
Asia, Pacific Rim	+65 543 6500	+65 543 6348
Europe, South Africa, and Middle East	+31 30 6029900	+31 30 6029999
Latin America	1 408 326 2927	1 408 326 3355

From the following countries, you may call the toll-free numbers; select option 2 and then option 2:

Austria	0800 297468	
Belgium	0800 71429	
Denmark	800 17309	
Finland	0800 113153	
France	0800 917959	
Germany	0800 1821502	
Hungary	00800 12813	
Ireland	1800553117	
Israel	1800 9453794	
Italy	1678 79489	
Netherlands	0800 0227788	
Norway	800 11376	
Poland	00800 31 11206	
Portugal	0800 831416	
South Africa	0800 995014	
Spain	900 983125	
Sweden	020 795482	
Switzerland	0800 55 3072	
U.K.	0800 966197	
U.S.A. and Canada	1 800 NET 3Com (1 800 638 3266)	1 408 326 7120 (not toll-free)

Enterprise Customers:
1 800 876 3266

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