



User Guide

10/100 PCI Network Interface Card with 3XP Processor

3C990B-TX-M

3C990BSVR

**10/100 Mbps PCI Client/Server
Network Interface Cards**

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

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Contents

About This Guide

Conventions 1

1 Introduction

Onboard 3XP Processor 3

Data Encryption 3

High Encryption Pack for Windows 2000 4

3C990B Client and Server NIC Features 4

Windows 2000 Offload Features 5

Remote Wake-Up 5

Remote Wake-Up Requirements 6

Remote Wake-Up and Multiple NIC Installations 6

Integrated Boot ROM with Managed PC Boot Agent (MBA) 6

Desktop Management Interface (DMI) 2.0 6

Remote System Alerts 7

Remote Control 7

Keep-Alive 7

Hot Plug NIC Installation 8

Flow Control Features 8

Pause Frames 8

Link Negotiation 8

Offline Diagnostics 8

3C990BSVR Server NIC Features 9

3Com DynamicAccess Advanced Server Features 9

Load Balancing 9

Self-Healing Drivers 9

Failover 10

VLANs 10

Traffic Prioritization 11

Server Features Using Other NICs 11

2 Installing and Connecting the NIC

Installation Overview 13

Safety Precautions 13

Installation Requirements 14

Installing Multiple NICs 14

Upgrading Windows 95 to Windows 98 14

Upgrading Windows 98 to Windows Me 15

Updating the Network Driver and NIC Software 15

Installing From Diskette	15
Making a DOS-Bootable Diskette	15
Creating Installation Diskettes	15
Product Registration	16
Preparing the NIC and the Computer	16
Installing and Connecting the NIC	18
Connecting the Remote Wake-Up Cable	19
Installing Software	20

3 Installing NIC Drivers and Diagnostics For Windows

Software Installation Requirements	21
Getting Help	21
Installing the Network Driver Using the <i>EtherCD</i>	21
Before Installing the Network Driver	21
Windows 2000	22
Installing the Driver	22
Verifying the Driver Installation	23
Windows NT 4.0	23
Installing the Driver	23
Verifying the Driver Installation	24
Windows Me	25
Installing the Driver	25
Verifying the Driver Installation	25
Windows 98	26
Installing the Driver	26
Verifying the Driver Installation	26
Windows 95	27
Installing the Driver	27
Verifying the Driver Installation	29
Installing the 3Com NIC Diagnostics Program	29
Starting the 3Com NIC Diagnostics Program	30
Updating the Network Driver and NIC Software	31
Installing Multiple NICs	31
Windows 2000, Windows Me, Windows 98, and Windows 95	31
Windows NT 4.0	32

4 Installing and Configuring Data Encryption Offloads

Overview	33
Offloading Encryption Processing	33
Selecting Basic or Strong Encryption Processing	34
Enabling Data Encryption	34
Overview	34
Downloading the 3Com Security Software Utility	34
Installing Data Encryption	36
Disabling Data Encryption	37
Upgrading Data Encryption	37

Configuring IPSec In Windows 2000	38
Creating a Security Policy	38
Defining the Console	38
Creating the Policy	39
Creating a Filter	39
Binding the Filter	40
Creating the Filter Action	40
Binding the Filter Action	41
Enabling Encryption	41
Disabling Encryption	41

5 Installing 3Com Advanced Server Features For Windows

Installing 3Com Advanced Server Software	43
Verifying Successful Installation	44
Configuring Groups and VLANs for a Server NIC	44
Planning the Configuration	45
Working With Server Features	46
Windows 2000	46
Windows NT	47
Creating a Group	47
Adding NICs to a Group	47
Specifying a Dedicated IP Address	48
Changing an IP Address	48
Creating a VLAN	49
Specifying Traffic Priorities	49
Saving the Configuration	49
Disabling Load Balancing for a Group	50
Changing the Primary NIC	50
Removing a NIC from a Group	50
Deleting or Editing a VLAN	50
Displaying NIC Properties	51
Displaying Group Properties	51
Troubleshooting a Load Balancing Configuration	51
Changing Windows 2000 Property Settings	52
Identifying Windows 2000 Miniport and LAN Connections	52
Using Windows 2000 Offload Features	52
Enabling Offloads	53
Configuring Offloads for a Group of Different NICs	54

6 Installing NetWare Drivers

Installing and Configuring the NetWare Driver	55
Using the Latest Support Packs	55
Obtaining NetWare Loadable Modules	56
Server Software Installation Requirements	56
Netware Packet Receive Buffers	56
Slot Numbers for Multiple NICs	57
Obtaining Slot Numbers	57

Installing the NetWare 3.12 Server Driver	57
Installing the Server Driver for NetWare 4.11 and 5.x Using INETCFG	58
Installing the Server Driver and Advanced Server Features Using AUTOEXEC.NCF	59
Loading the 3Com <i>EtherCD</i>	59
Copying the Driver	60
Specifying the Slot Number	60
Loading the Driver	60
Setting Up Another NIC	61
Installing Multiple Server NICs	61
Verifying the PCI Slot Number	61
Installing Server Features	62
Configuring Groups	62
Verifying the Installation and Configuration	64
Changing NetWare Driver Configuration Parameters	65
Maintaining Groups	65
Planning the Configuration	66
Adding a Secondary NIC to a Group	66
Adding a Group	67
Server Feature Commands	69
group	69
display status	69
help	70
link timeout	70
probe interval	70
receive timeout	70
retry count	71
send timeout	71
ungroup	71
wait timeout	72
Troubleshooting a Group Configuration	72
7 Configuring the NIC	
Default NIC Settings	73
Configuration Methods	75
Changing General NIC Configuration Settings	76
Using the 3Com NIC Diagnostics Program	76
Using the 3Com DOS Configuration Program	77
Configuring the Managed PC Boot Agent (MBA)	77
Enabling or Disabling the Boot ROM Setting	77
Booting From the Network	78
BBS BIOS-Compatible PCs	78
Non-BBS BIOS-Compatible PCs	79
Disabling the 3Com Logo	79

- 8 Troubleshooting the NIC**
 - Interpreting the NIC LEDs 81
 - Viewing the NIC LEDs in the Diagnostics Program 82
 - Troubleshooting Problems with the LEDs 82
 - Accessing 3Com Support Databases 82
 - Accessing the 3Com Knowledgebase 82
 - Accessing the 3Com NIC Help System 82
 - Accessing Release Notes and Frequently Asked Questions 83
 - Troubleshooting the NIC Installation 83
 - Problems/Error Messages 83
 - Cleaning Up a Broken Installation 83
 - Troubleshooting the Network Connection 84
 - Troubleshooting Remote Wake-Up 85
 - Troubleshooting a Network Connection 86
 - Troubleshooting Hubs 87
 - Cabling Pinouts 87
 - Removing the Network Driver 87
 - Windows 2000 87
 - Windows NT 4.0 88
 - Windows 95, 98, and Me 88
 - Removing 3Com DynamicAccess Advanced Server Features 89
 - Windows NT 4.0 89
 - Windows 2000 89
 - NetWare 90
- 9 Running NIC Diagnostics**
 - Running the 3Com DOS Diagnostics Program 91
 - Running the NIC Diagnostics Tests 92
 - Running the Network Test 93
 - Running the NIC Test 93
 - Viewing the NIC LEDs in the 3Com Diagnostics Program 93
 - Viewing Network Statistics 94
 - Using the 3Com Icon in the Windows System Tray 94
 - Enabling the Icon 94
 - Displaying Network Statistics 95
 - Removing the 3Com NIC Diagnostics Program 95
- A Specifications and Cabling Requirements**
 - 3C990B NIC Specifications 97
 - Cabling Requirements 98
 - RJ-45 Connector Pin Assignments 98
- B Installing the 3Com DMI Agent**
 - About the 3Com DMI Agent 99
 - System Requirements 99
 - Client PC Requirements 99
 - Network Management Requirements 100
 - Installing the 3Com DMI Agent 100

C *EtherCD* Content and Navigation

- Root Subdirectories List 104
- Enabling Auto Insert 104
- Text Files List 105

D Installing a 3Com NIC While Installing the NOS

- Windows Fresh Installation 107
 - Windows NT 107
 - Windows 2000 107
- NetWare Fresh Installation 107
 - Requirements 107
 - Installation Instructions 107

E Technical Support

- Online Technical Services 109
 - World Wide Web Site 109
 - 3Com Knowledgebase Web Services 109
 - 3Com FTP Site 109
- Support from Your Network Supplier 110
- Support from 3Com 110
- Returning Products for Repair 112

Index

Regulatory Compliance Information


- FCC Class B Statement
- FCC Declaration of Conformity
- Industry Canada Class B Emission Compliance Statement
- Avis de Conformité à la Réglementation d'Industrie Canada
- VCCI Class B Statement

About This Guide

This guide describes how to install, configure, and troubleshoot the following 3Com® 10/100 PCI network interface cards (NICs):

NIC/Description	Model Number
3Com 10/100 Mbps PCI NIC with 3XP processor Client NIC for 3DES (168-bit) and DES (56-bit) encryption	3C990B-TX-M
3Com 10/100 Mbps PCI Server NIC with 3XP processor Server NIC for 3DES (168-bit) and DES (56-bit) encryption	3C990BSVR

This guide is intended for those who install and configure Ethernet NICs. Some familiarity with Ethernet networks and NICs is assumed.

 **NOTE:** 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) on the 3Com World Wide Web site:




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

You can download Acrobat Reader from the *EtherCD* or from the Adobe Systems Incorporated Web site:

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

Conventions

The following tables list conventions that are used throughout this guide.

Icon	Notice Type	Information That
	Information note	Describes important features or instructions
	Caution	Alerts you to potential loss of data or potential damage to an application, system, or device
	Warning	Alerts you to potential personal injury

Convention	Description
Screen displays	This typeface represents information as it appears on the screen.
Commands	The word "command" means that you must enter the command exactly as shown and then press Return or Enter. Commands appear in bold. Example: To launch the DOS diagnostics program, enter the following command: a: install
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."
Words in <i>italics</i>	Italics are used to: <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: From the <i>Help</i> menu, select <i>Contents</i> . Click <i>OK</i> .

1

Introduction

This chapter describes the following 3Com® 10/100 Mbps PCI network interface card (NIC) models from the 3C990B NIC family.

Product Name/Description	Model Number
3Com 10/100 Mbps PCI NIC with 3XP processor Client NIC for 3DES (168-bit) and DES (56-bit) encryption	3C990B-TX-M
3Com 10/100 Mbps PCI Server NIC with 3XP processor Server NIC for 3DES (168-bit) and DES (56-bit) encryption	3C990BSVR



NOTE: Information in this user guide refers to both client and server 3C990B NIC models unless specifically indicated.

The 3C990B NIC connects your PCI-compliant PC to a 10 Mbps or 100 Mbps Ethernet network. It provides advanced features for high performance and secure transactions. High performance is achieved through an onboard RISC processor; secure transactions are achieved through data encryption.

Onboard 3XP Processor

The 3C990B NIC represents a new generation of secure, intelligent client NICs with an onboard RISC processor (3XP processor). The 3XP processor is designed to optimize system and network performance. The NIC off-loads key networking and security tasks from the host PC CPU (central processing unit) to the 3XP processor, even when running bandwidth-intensive applications such as voice, video, imaging, and Internet and intranet applications.

Data Encryption

The 3C990B NIC provides Data Encryption Standard (DES) 56-bit encryption and 3DES (3DES 168-bit) encryption. Encryption processing is handled entirely by the 3XP processor on the NIC.

The 3XP processor enables true end-to-end network security (IPSec) at the data capacity of the connected network cable (wire speed), without sacrificing performance.

The 3C990B NIC is shipped with encryption disabled. Once you have installed the NIC, you can upgrade it to the appropriate level of encryption acceleration (DES or 3DES) through the Security Software Utility provided on the 3Com *EtherCD*. See "Installing and Configuring Data Encryption Offloads" on page 33 for more information.

High Encryption Pack for Windows 2000

Microsoft Windows 2000 features a built-in VPN client. The Windows 2000 High Encryption Pack allows you to enhance your system with the highest available encryption level (168-bit). You can download the High Encryption Pack from the following Microsoft World Wide Web site:

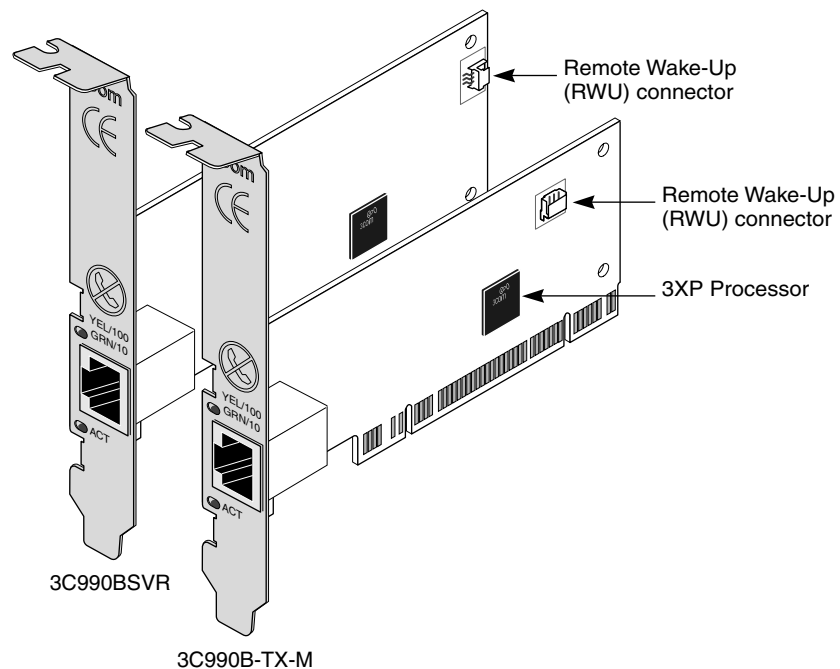
<http://www.microsoft.com/WINDOWS2000/downloads/recommended/encryption/default.asp>



NOTE: The Windows 2000 High Encryption Pack is eligible for export from the U.S. to all customers worldwide, except to U.S. embargoed destinations. Please see <http://www.microsoft.com/exporting/> for details. Other countries may exercise separate jurisdiction over the import, export, or use of encryption products. Users who download this product should observe any local regulations that may apply to the distribution or use of encryption products.

3C990B Client and Server NIC Features

The 3C990B NIC and accompanying software provide features that relieve network congestion and ensure high performance and maximum bandwidth availability.



The 3C990B NIC provides these features for supported IP and IPX environments:

- Support for Windows 2000 Offload Features — Off loading of key TCP/IP networking and security tasks from the Windows 2000 operating system.
- Remote Wake-Up — Lets you power on a computer remotely for after-hours administration.
- Integrated Boot ROM with Managed PC Boot Agent (MBA) — Adds management capabilities by enabling the computer to boot from a network server, rather than from its local drive. MBA is compliant with the Preboot Execution Environment (PXE) specification.

- Desktop Management Interface (DMI) 2.0 — Enables managed computers and net computers to report details about themselves and their peripheral devices across the network to a DMI 2.0-compliant management application.
- Remote System Alerts (heartbeat packets) — Can signal a possible computer power loss or theft.
- Remote Control — Lets you troubleshoot and resolve system issues across the network.
- Keep-Alive — Prevents the computer workstation address from being aged-out of switch router tables.
- Hot Plug NIC Installation — Lets you add a new NIC or remove and replace a NIC without turning off power to the computer.
- Flow Control Features — prevents the loss of packets by keeping the input buffers of a device from overflowing.
- Offline Diagnostics — Provides offline diagnostics programs for configuring, testing, and troubleshooting NICs.
- 3Com DynamicAccess Advanced Server Features (for 3C990BSVR server NICs only) — Improved network performance, management, and control.

Windows 2000 Offload Features

The 3C990B NIC supports Windows 2000 offload features in an IP environment. The Windows 2000 offload features are designed to enhance the Windows 2000 operating system capabilities by off-loading key TCP/IP networking and security tasks from the Windows 2000 operating system:

- IPsec Offload — reduces CPU utilization by allowing the 3XP processor and a crypto chip on the NIC to perform data encryption operations. (For more information, see Chapter 4, “Installing and Configuring Data Encryption Offloads.”)



NOTE: The 3C990B NIC is shipped with the IPsec offload capability disabled. To learn about enabling IPsec offloads, see Chapter 4, “Installing and Configuring Data Encryption Offloads.”

- TCP Segmentation Offload — reduces CPU utilization by allowing the 3XP processor on the NIC to perform segmentation of TCP packets.



NOTE: Windows 2000 does not allow IPsec offloads and TCP Segmentation offloads for the same session. Though all offload types may be enabled, TCP Segmentation offloading will not occur during an IPsec session.

- IP and TCP Checksum Offload — reduced CPU utilization by allowing the 3XP processor on the NIC to perform the checksum calculation of TCP/IP and UDP/IP packets.
- 802.1P Packet Priority Offload — reduces CPU utilization by allowing the 3XP processor on the NIC to perform the insertion of the 802.1Q tag header into the packet.

For more information on enabling and disabling offloads for Windows 2000, see “Using Windows 2000 Offload Features” on page 52.

Remote Wake-Up

Remote Wake-Up provides the ability to remotely power-on a network computer for after-hours administration. When the PC is in sleep mode and receives a wake-up packet (Magic Packet frame) through the LAN, the NIC turns on the power to the PC. Remote Wake-Up also requires using a desktop management application that is able to generate a Magic Packet Remote Wake-Up signal.

If the computer complies with PCI 2.2, Remote Wake-Up is automatically enabled through the PCI bus. If the computer complies with PCI 2.1, Remote Wake-Up support is enabled by connecting a Remote Wake-Up cable from the NIC's Remote Wake-Up (RWU) connector to a 3-pin Remote Wake-Up connector on the computer motherboard.



NOTE: The NIC provides a network connection with or without the Remote Wake-Up cable installed.

Remote Wake-Up Requirements

The following conditions are required to use Remote Wake-Up:

- Management application that supports Remote Wake-Up
- BIOS that supports Remote Wake-Up
- PCI 2.2-compliant bus or a 3-pin Remote Wake-Up connector on the computer motherboard and a 5-volt standby power supply unit rated at a minimum of 375 milliamperes

If you are unsure whether your computer meets the requirements listed above, refer to the computer documentation or consult the computer manufacturer.

Remote Wake-Up and Multiple NIC Installations

To use multiple NICs as Remote Wake-Up NICs in the same computer, the computer must have a power supply that can support multiple Remote Wake-Up devices.

Refer to your computer documentation if you are unsure whether your computer power supply can accommodate more than one Remote Wake-Up device.

Integrated Boot ROM with Managed PC Boot Agent (MBA)

The Managed PC Boot Agent (MBA) software adds management capabilities to the NIC by enabling the computer to boot from a network server, rather than from the computer's local drive. MBA is compliant with the Preboot Execution Environment (PXE) specification. This preboot support allows you to use management applications to perform various tasks remotely. For example, you can:

- Install and configure a new computer that has never been connected to the network.
- Upgrade software.
- Configure or reconfigure multiple systems simultaneously.
- Scan for viruses.
- Backup hard drives and perform disaster recovery tasks.

For information on configuring the MBA to boot from the network, see "Configuring the Managed PC Boot Agent (MBA)" on page 77.

For detailed information on the MBA, refer to the *Managed PC Boot Agent User Guide*, located with the MBA software on the 3Com *EtherCD*.

Desktop Management Interface (DMI) 2.0

Desktop Management Interface (DMI) is a network management standard that is widely accepted for managing Intel-based computers.

DMI 2.0 enables managed computers and net computers to report details about themselves and their peripheral devices across the network to a DMI 2.0-compliant management application.

The 3Com DMI Agent allows any DMI management application to access information such as:

- NIC driver location, version, and size
- Packets-sent statistics
- Cyclic Redundancy Check (CRC) receive errors

A network administrator can then use this type of information to remotely configure and manage a client or server computer.

The 3Com DMI Agent consists of a DMI browser with the following components:

- DMI service layer
- DMI agent
- GUI installer
- NDIS drivers

For detailed information about the 3Com DMI Agent, refer to the *3Com DMI Agent User Guide* included with the DMI software on the *EtherCD*. For information about installing the 3Com DMI Agent and downloading the *3Com DMI Agent User Guide*, see Appendix B, "Installing the 3Com DMI Agent."

Remote System Alerts

You can configure the 3C990B NIC to transmit a number of different packet alerts to the management server to notify the network administrator that there is a system issue that requires attention. These alerts support the Alert Standard Forum (ASF) specification and provide system monitoring in the OS-absent environment. The alerting capability is present whether the system is powered off, booting up, in sleep mode, or the OS has hung. There are many different alert types, including those that relate to:

- Physical security — chassis intrusion, heartbeat, loss of connection
- Environmental conditions — fan speed, temperature, voltage deviations
- BIOS issues — ROM initialization, system memory

Remote Control

The 3C990B NIC can also receive commands via Remote Control and Management Protocol (RMCP). This feature is also specified in the ASF specification and lets network administrators troubleshoot and resolve system issues across the network. Commands include:

- Power on
- Power off
- Reboot
- Reboot from an alternative device (for example: MBA, CD-ROM, and so forth)

Both monitoring alerts and sending commands are available in the system console through the 3Com Remote System Alert Manager. This management plug-in is available for HP OpenView Network Node Manager, Microsoft Systems Management Server, and Intel LANDesk Client Manager.

Keep-Alive

The 3C990B NIC can also transmit a workgroup keep-alive packet periodically while the computer is in a sleep state. This packet prevents the computer workstation address from being aged-out of switch router tables.

Hot Plug NIC Installation

If your computer supports PCI hot plug specifications, you can add a new 3Com NIC or remove and replace a 3Com NIC without turning off power to the computer. Hot plug NIC installation allows you to expand connections without taking the computer out of service. It makes troubleshooting faster and easier because you do not need to wait for the computer to reboot.

For instructions on performing a hot plug NIC installation, refer to your computer documentation.

Flow Control Features

The 3C990B NICs use flow control technology to throttle the incoming data packet stream and prevent the loss of packets. IEEE 803.2x flow control prevents the input buffers of a device from overflowing. By using *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 the transmission of data frames for a specified period, allowing the receiver's input port buffers to empty before receiving new packets.

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 at the end of the specified period.

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.

Offline Diagnostics

The NIC software includes offline diagnostics programs for configuring, testing, and troubleshooting NICs. The configuration program within the DOS diagnostics program is used for a PC running DOS or NetWare. The 3Com NIC diagnostics program (3Com NIC Doctor) is a Windows-based program used for a PC running Windows 2000, Windows NT 4.0, Windows Millennium Edition (Windows Me), Windows 98, or Windows 95.

3C990BSVR Server NIC Features

The 3C990BSVR NIC and accompanying software provide a variety of features that relieve network congestion and ensure high performance and maximum bandwidth availability.



NOTE: Advanced server features are available for the 3C990BSVR server NIC only. They are not available for the 3C990B-TX-M client NIC. Only system administrators should configure these features.

3Com DynamicAccess Advanced Server Features

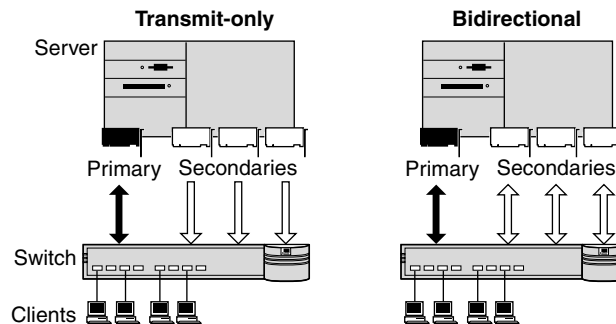
3Com DynamicAccess Advanced Server software adds intelligence to the NIC to improve network performance, management, and control. Advanced server features relieve network congestion and ensure high performance and maximum bandwidth availability.

- Load Balancing groups share the network load over resilient server links (RSLs) that keep traffic flowing even if a NIC in a group is temporarily disconnected.
- Self-Healing Drivers (SHDs) detect common error conditions and correct them while maintaining server link performance.
- Failover fault tolerance provides a backup solution in the event of a NIC failure.
- VLANs (IEEE 802.1Q multiple virtual LANs) let you divide network segments into logical partitions that simplify configuration changes, organize work groups efficiently, help to control traffic, and provide extra security.
- Traffic Prioritization (IEEE 802.1p/Q) ensures that business-critical and delay-sensitive traffic (such as multimedia applications) has priority over normal data.

Load Balancing

Load balancing maximizes bandwidth at the server through the use of multiple parallel resilient server links (RSLs) that share the network load as shown in the next figure.

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.



Self-Healing Drivers

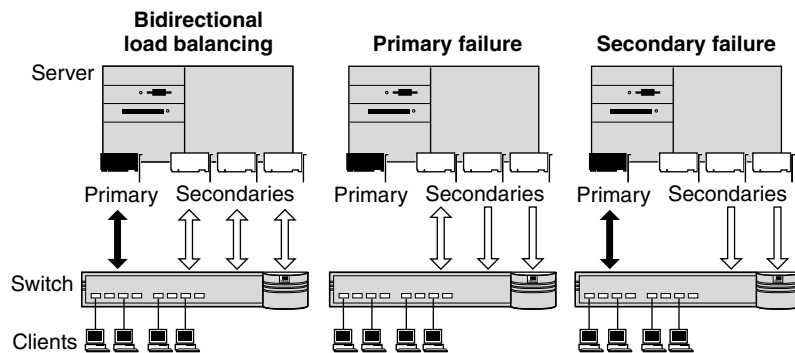
Self-healing drivers (SHDs) are automatically installed with the NIC software, and work together with RSLs to maintain the network connection. An SHD monitors the NIC continuously for error conditions and makes corrections. These corrections can include resetting the NIC, rebuilding software data structures, temporarily disabling features, or transferring all network traffic to secondary NICs (termed a *failover event*). An SHD can also continuously monitor the status of the physical NICs in a virtual NIC group before and after failover. Errors and actions are reported to the system console and to the system log file. Error threshold values can be configured at any time.

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* 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 the primary NIC fails, a secondary NIC takes over packet reception for the group. Bidirectional load balancing is restored after a failure when applications create new connections and new clients log in as illustrated in the following figure.



VLANs

A virtual LAN (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 3C990B NIC multiple VLAN capability supports IEEE 802.1Q VLAN tagging and works with any switch that complies with IEEE 802.1Q specifications. Refer to your Ethernet switch documentation for more information on IEEE 802.1Q VLANs.

Traffic Prioritization

Traffic prioritization (IEEE 802.1p/Q) ensures that business-critical and delay-sensitive traffic (such as multimedia applications) has priority over normal data.

Server Features Using Other NICs

Up to two *foreign NICs* (those that are not 3Com server NICs) are allowed in one group per server. For guidelines on using foreign NICs, see these topics:

- Windows NT and Windows 2000 — “Planning the Configuration” on page 45
- NetWare — “Planning the Configuration” on page 66

2 Installing and Connecting the NIC

This chapter describes how to install the NIC in your PC and connect it to an Ethernet or Fast Ethernet network.

Before starting the installation procedure, you can gain some familiarity with the directory structure and various files on the *EtherCD* supplied with the 3C990B NIC by reading Appendix C, "EtherCD Content and Navigation."

Installation Overview

Installing the NIC involves your carrying out the following tasks:

- Registering the product
- Installing the NIC in the PC
- Connecting the NIC to the network
- Installing the network driver
- Enabling data encryption offloads (the 3C990B NIC is shipped with encryption offloading disabled)

Safety Precautions

Observe the following safety precautions.



WARNING: 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 computer, 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 2.1 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.



WARNING: Make sure that the computer power cord is unplugged. Only properly trained and authorized personnel should perform service. Contact the computer manufacturer for information about safe service techniques.

Installation Requirements

The following items are required for hardware and software installation.

- **Network Interface Card (NIC)**—At least one 3Com 10/100 Mbps PCI 3C990B NIC (included)
 - **Processor:**
 - Server: Intel-based CPU (Pentium-class processor)
 - Client: 80486 or Pentium-class processor
 - **RAM:**
 - Server: 128 MB minimum; 256 MB recommended
 - Client: 32 MB RAM recommended for running 3Com Advanced Server Technology
 - **PCI slot**—For each NIC, one bus master slot that conforms to PCI 32-bit specifications, revision 2.1 or higher
 - **Drive**—CD-ROM
 - **Cable**—Category 5 UTP (included) with RJ-45 connectors for Fast Ethernet (100 Mbps) connectivity. Category 3, 4, or 5 UTP with RJ-45 connectors for Ethernet (10 Mbps) connectivity. (See cable specifications in “Preparing the NIC and the Computer” on page 16.)
 - **Software**—One 3Com *EtherCD* with 3Com Advanced Server software and network drivers (included)
 - **Operating system**—One of the following:
 - Microsoft Windows 2000
 - Microsoft Windows NT 4.0, Service Pack 6a
 - Microsoft Windows 95, 98, Me
 - Novell NetWare server version 3.12, 4.11, or 5.x with the most recent patches and updates available from Novell technical support (www.novell.com)
-  **NOTE:** You can install the NIC base network driver on any Windows PC without having to also install a specific Microsoft Service Pack; however, 3Com recommends that you always try to use the most recent Service Pack available from Microsoft technical support (www.microsoft.com).
- Running 3Com 3Com Advanced Server software on Windows NT 4.0 requires Service Pack 6 or greater from Microsoft.
- **Computer BIOS**—Latest version. Contact the computer manufacturer to verify.
 - **Remote Wake-Up**—For requirements, see “Remote Wake-Up” on page 5.

Installing Multiple NICs

If you are installing multiple 3Com 10/100 PCI NICs in one computer running Windows, see the instructions in “Installing Multiple NICs” on page 31. If you are installing multiple 3Com 10/100 PCI NICs in one computer running NetWare, follow the instructions in “Installing Multiple Server NICs” on page 61.

Upgrading Windows 95 to Windows 98

If you are upgrading a computer from Windows 95 to Windows 98, and the computer already has a 3Com 10/100 PCI NIC installed, follow the instructions in the WIN98.TXT file located in the HELP directory on the *EtherCD*.

Upgrading Windows 98 to Windows Me

If you are upgrading a computer from Windows 98 to Windows Me, and the computer already has a 3Com 10/100 PCI NIC installed, follow the instructions in the WINME.TXT file located in the HELP directory on the *EtherCD*.

Updating the Network Driver and NIC Software

If you already have a 3Com 10/100 PCI NIC installed and want to update the network driver, follow the instructions in "Updating the Network Driver and NIC Software" on page 31.

Installing From Diskette

If your computer does not have a CD-ROM drive, use a PC that has a CD-ROM drive and create *installation* diskettes from the *EtherCD*.



NOTE: The installation diskettes allow you to install the network driver and DOS Diagnostics software only. If you want to install the Windows NIC Diagnostics program or desktop management software, you must install them from the *EtherCD*.

Making a DOS-Bootable Diskette

For installation and configuration procedures that require you to boot from DOS, you cannot successfully use the MS-DOS prompt from within Windows. Perform a "clean" boot from DOS or use a DOS boot diskette.



NOTE: If the PC or server is only running DOS and a CD-ROM drive is not installed, you must install the NIC software using installation diskettes. For more information about installation diskettes, see the next section, "Creating Installation Diskettes."

To make a DOS-bootable diskette:

- 1 Insert a blank, formatted diskette in drive A.
- 2 At the DOS prompt, enter:
sys a:
System files are copied to the diskette.
- 3 Remove the diskette from drive A and attach a label for future reference.

Creating Installation Diskettes

If you anticipate having to install the driver for the 3C990B NIC without having access to a CD-ROM drive, you can create a set of installation diskettes beforehand using a computer that does have a CD-ROM drive. To start, you will need three blank, formatted floppy diskettes. To create installation diskettes from the *EtherCD*:

- 1 Turn on the power to the PC and start Windows.
- 2 Insert the *EtherCD* in the CD-ROM drive.
The *EtherCD* Welcome screen appears.
- 3 Click *NIC Software*.
- 4 Click *Installation Utilities*.
- 5 Click *Create Installation Diskettes*.
The *EtherCD* Diskette Creation Utility Welcome screen appears.
- 6 Click *Next*.

- 7 Insert a blank, formatted diskette labeled *Disk 1* in the PC, and then click *Next*. Files are copied. *Disk 1* contains the installation files and driver files for Windows 2000, Windows NT, and Windows 95/98.
- 8 Remove the disk and insert the disk labeled *Disk 2* when prompted, and then click *OK*. Files are copied. *Disk 2* contains the diagnostic and firmware images.
- 9 Remove the disk and insert the disk labeled *Disk 3* when prompted, and then click *OK*. Files are copied. *Disk 3* contains the NetWare drivers.



NOTE: For detailed information about the content of the installation diskettes, refer to the ROADMAP.TXT file contained on *Disk 2*.

Product Registration

The United States government places registration requirements on using data encryption products. To obtain customer support for the 3C990B NIC, you are required to electronically register your NIC product with 3Com.

In addition to enabling customer support for your NIC, registration also entitles you to receive upgrade information and advance feature information.



NOTE: To be able to register electronically, a Web browser must be installed on your system. You must also have an active Internet service provider (ISP) connection.



NOTE: The original version of Windows 95 (Build 950) does not automatically allow you to change your default browser, even if Microsoft Internet Explorer is not present. If you are running this version of Windows 95 on your PC, access the following site to register your 3C990B NIC:

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

To register electronically:

- 1 Insert the *EtherCD* (that shipped with this product) in the CD-ROM drive. The *EtherCD* Welcome screen appears. If the Welcome screen does not appear, see "EtherCD Content and Navigation" on page 103.
- 2 Click *Register Product*, and then *Register Online*.
- 3 Follow the prompts as they appear.

Preparing the NIC and the Computer

Observe the precautions listed in "Safety Precautions" on page 13. Follow these preparation steps:

- 1 Decide whether you want to use Remote Wake-Up. If you want to use the Remote Wake-Up feature on a computer that complies with PCI 2.1, you must obtain a Remote Wake-Up cable for the NIC (for details, see "Remote Wake-Up" on page 5). If the computer complies with PCI 2.2, Remote Wake-Up is automatically enabled through the PCI bus and no Remote Wake-Up cable is required.

- 2 Make sure that cable requirements are met.

The RJ-45 port provides a 10 Mbps or 100 Mbps connection automatically, depending on the speed of the connected hub or switch.

The following table shows the cable requirements and maximum network cable lengths for the RJ-45 port.

Network Environment	Cable Required	Maximum Cable Length
10 Mbps (10BASE-T)	Category 3, 4, or 5 unshielded twisted-pair	100 m (328 ft)
100 Mbps (100BASE-TX)	Category 5 unshielded twisted-pair	100 m (328 ft)

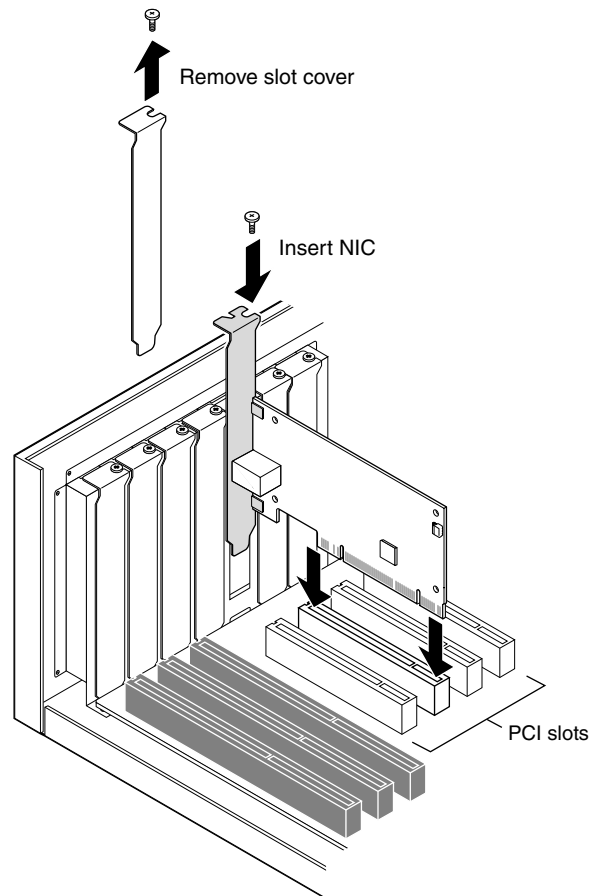
- 3 Unpack and inspect the NIC for damage.
- 4 Exit all open applications and user processes.
- 5 Turn off the power to the computer and attached devices.
- 6 Unplug the power cables from the power source.
- 7 Remove the computer cover.
- 8 Locate an empty, nonshared bus-mastering PCI slot and remove its slot cover. Save the screw, if there is one.
 Do not install the NIC in a shared PCI slot. Avoid any PCI slot next to an ISA slot. This slot is often shared and does not support bus mastering.
 If you do not know how to identify a PCI slot, check the computer documentation or ask the system administrator.
 If you are planning to install the Remote Wake-Up cable, choose an empty PCI slot that is close to the Remote Wake-Up connector on the computer motherboard. The Remote Wake-Up cable is only required if the computer complies with PCI 2.1 and you want to use the Remote Wake-Up. The cable is not required if the computer complies with PCI 2.2.
- 9 Write down the MAC address of the NIC and note the relative position of the intended PCI slot.
 The MAC address is the 12-digit hexadecimal number printed on the small bar code label on the component side of the NIC. This information is helpful when you are installing the network drivers and connecting the cables to the hub or switch.
 The next step is to install the NIC in the computer and connect it to the network.

Installing and Connecting the NIC

Observe the safety precautions listed in "Safety Precautions" on page 13.

Prepare the NIC and the computer as described in "Preparing the NIC and the Computer" on page 16.

The following instructions apply to installing the NIC in most computers. If these instructions are not appropriate for your computer, refer to the documentation that accompanied the computer.

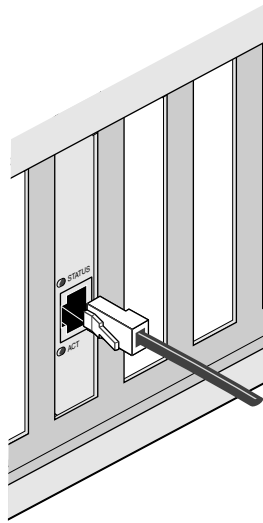


- 1 Carefully insert the NIC in the empty PCI slot, as shown in the illustration. Press firmly to ensure that the NIC is fully seated in the slot. Secure the NIC with the screw if you removed one earlier.

i **NOTE:** If you want to install the Remote Wake-Up cable, go to the next section, "Connecting the Remote Wake-Up Cable," to continue the installation. If you do not want to connect the cable, continue with step 2.

- 2 Replace the computer cover and plug in the power cord. Do not turn on the power to the computer.

- 3 Plug the RJ-45 connector on the twisted-pair network cable into the RJ-45 port on the NIC backplate as shown in the figure.



- 4 Connect the other end of the network cable to an active network port.

The next step is to install the software, as described in "Installing Software" on page 20.

i **NOTE:** If you are installing multiple 3Com 10/100 PCI NICs in one computer running Windows, see the instructions in "Installing Multiple NICs" on page 31. If you are installing multiple 3Com 10/100 PCI NICs in one computer running NetWare, follow the instructions in "Installing Multiple Server NICs" on page 61.

i **NOTE:** If your site network installation procedures require you to verify that installed hardware is functional before you install software, run the 3C99XCFG.EXE DOS diagnostics program before installing the driver. This program is located on the 3Com EtherCD. For more information, see "Using the 3Com DOS Configuration Program" on page 77.

Connecting the Remote Wake-Up Cable

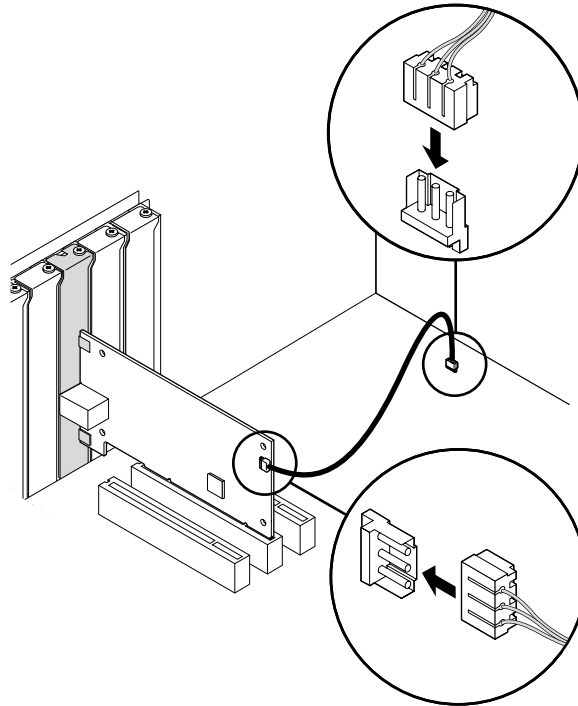
This section describes how to connect the Remote Wake-Up cable from the NIC to the PC motherboard. Connecting the Remote Wake-Up cable is optional. Connect this cable only if your NIC supports Remote Wake-Up and you want to use this feature.

⚡ **WARNING:** Make sure that the PC power cord is unplugged. Only properly trained and authorized personnel should perform service. Contact your PC manufacturer for information about safe service techniques.

i **NOTE:** If your PC is compliant with PCI 2.2, Remote Wake-Up is automatically enabled through the PCI bus. You do not need to connect the Remote Wake-Up cable.

To connect the Remote Wake-Up cable:

- 1 Make sure that the NIC is properly installed in a PCI slot.
- 2 Insert the Remote Wake-Up cable into the RWU connector on the NIC as shown in the next figure.
Twist the cable twice before attaching the cable to the PC.



- 3 Attach the other end of the cable to the connector on the PC motherboard.
Refer to your PC documentation if you need help locating the connector.
- 4 Replace the PC cover and plug in the power cord.
Do not turn on the power to the PC. Continue at step 3 in "Installing and Connecting the NIC" on page 18.

Installing Software

See the following topics for requirements and instructions on installing software for various operating systems:

- "Installing NIC Drivers and Diagnostics For Windows" on page 21
- "Updating the Network Driver and NIC Software" on page 31
- "Installing NetWare Drivers" on page 55

The next step is to install the network driver.

Go to "Installing NIC Drivers and Diagnostics For Windows" on page 21 or "Installing NetWare Drivers" on page 55.

For a list of additional network drivers that are not included on the *EtherCD* (for example, SCO UnixWare 7, SCO OpenServer 5, Linux 2.2, Solaris) and instructions on how to install them, go to the 3Com Web site and search for "3C990B" and "drivers."

3

Installing NIC Drivers and Diagnostics For Windows

This chapter explains the following tasks on a computer running Windows 2000, Windows NT, Windows Millennium Edition (Windows Me), Windows 98, or Windows 95:

- Install the network driver and NIC software using *EtherCD*
- Update the network driver or NIC diagnostics program
- Install multiple NICs

To obtain the latest version of a driver, go to:

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

Search for "3C990B" and "drivers." The network driver can be used in both Microsoft and NetWare network environments.



NOTE: For instructions on using the installation diskettes (which can be created from the *EtherCD*) to install the network driver, see "Installing From Diskette" on page 15. For additional information, refer to the text file for your operating system in the HELP directory on the *EtherCD*.

Software Installation Requirements

If your site network installation procedures require you to verify that installed hardware is functional before you install software, you can verify that the installed NIC is functional or change its configuration settings by running the DOS diagnostics. Use the 3C99XCFG.EXE program located on the *EtherCD*. For more information, see "Using the 3Com DOS Configuration Program" on page 77.

If you are installing the software during the installation of the network operating system, see "Installing a 3Com NIC While Installing the NOS" on page 107.

For a list of minimum installation prerequisites, see "Installation Requirements" on page 14.

Getting Help

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

Installing the Network Driver Using the *EtherCD*

To install the network driver using the *EtherCD*, follow the steps in the section that is specific to your Windows operating system.

Before Installing the Network Driver

Before installing the network driver, make sure that:

- The NIC is installed in the PC and connected to the network. For instructions, see "Installing and Connecting the NIC" on page 18.
- All software installation requirements are met. See "Installation Requirements" on page 14.

- You have the Windows installation files (for Windows 95, 98, Me only). These files may be on a CD or diskettes, or they may have been copied to your hard drive when Windows was installed on your PC.



NOTE: If you encounter problems during the installation, refer to the TROUBLE.TXT file (located in the HELP directory on the *EtherCD*) for troubleshooting tips.

Windows 2000

This section describes how to install the network driver and NIC software in a PC client or server running Windows 2000.



NOTE: The 3C990B NIC supports Windows 2000 offload features in an IP environment. For more information, see “Windows 2000 Offload Features” on page 5 and “Using Windows 2000 Offload Features” on page 52.

Use the following procedure to install the driver for the first time in a computer that is running Windows 2000. (If you are updating a previous installation, see “Updating the Network Driver and NIC Software” on page 31.)

Installing the Driver

- 1 Turn on the power to the PC.
- 2 Start Windows 2000 and log in to the Windows 2000 Administrator account.
The Windows 2000 Found New Hardware Wizard starts. The wizard detects the new NIC(s) and begins the driver installation. The Welcome to the Found New Hardware Wizard screen appears.
- 3 Click *Next* to continue.
The Install Hardware Device Drivers screen appears.
- 4 Insert the *EtherCD* in the CD-ROM drive.
- 5 Select *Search for a suitable driver for my device (recommended)*, and then click *Next*.
The Locate Driver Files screen appears.
- 6 Select the *CD-ROM drives* option, clear any other checked options, and click *Next*.
The Driver Files Search Results screen appears.
Windows finds the driver on the *EtherCD*.
- 7 Click *Next* to install the driver.
The Hardware Install screen appears. Files are copied. Then the Completing the Found New Hardware Wizard screen appears, displaying the message “Windows has finished installing the software for this device.”
- 8 Click *Finish* to close the wizard.
If the System Settings Change dialog box appears, requesting that you restart your computer, click *Yes* to restart.

The driver installation is complete for Windows 2000. Next, verify the driver installation to confirm that the NIC is properly installed.

Verifying the Driver Installation

- 1 Right-click the My Computer icon, and then click *Properties*.
- 2 Select the Hardware tab, and then click *Device Manager* in the middle panel.
- 3 Double click *Network Adapters* and make sure that the name of the 3Com 10/100 PCI NIC appears.
If a red X or a yellow exclamation point (!) appears by the name of the NIC, the installation was not successful. See "Troubleshooting the NIC" on page 81 for troubleshooting help.

To change configuration settings, see "Configuring the NIC" on page 73.

Windows NT 4.0

This section describes how to install the network driver and NIC software in a PC client or server running Windows NT 4.0



CAUTION: Your computer must have the latest version of the Windows NT 4.0 service pack installed before you can install the 3Com network driver. You can download the latest service pack from the Microsoft Web site.

Installing the Driver

- 1 Turn on the power to the PC and start Windows NT.
- 2 Log in to the Windows NT Administrator account.
- 3 Insert the *EtherCD* in the CD-ROM drive.
- 4 Right-click the Network Neighborhood icon.
- 5 Select *Properties* on the pop-up menu.
The Network window appears.
- 6 Click the Adapters tab.
If networking has not been installed on your PC before, Windows NT asks you if you want to install networking. Click *Yes*. Refer to the WINNT.TXT file located on the *EtherCD* or your Windows NT documentation for instructions.
- 7 Click *Add*.
The Select Network Adapter dialog box appears.
- 8 Click *Have Disk*.
The Insert Disk dialog box appears.
- 9 Make sure that the correct path to your CD-ROM drive appears in the entry box, for example:
d:
- 10 Click *OK*.
The Select OEM Option screen appears, displaying two driver options:
3Com 10/100 Mbps PCI NIC with 3XP Processor
3Com Server 10/100 Mbps PCI NIC with 3XP Processor
- 11 If you have installed a client NIC (3C990B-TX-M), select:
3Com 10/100 Mbps PCI NIC with 3XP Processor
If you have installed a server NIC (3C990BSVR), select:
3Com Server 10/100 Mbps PCI NIC with 3XP Processor

- 12** Click *OK*.
Files are copied. The Network screen appears with the 3Com NIC name listed in the Network Adapters list box.
- 13** Click *Close*.
If the Microsoft TCP/IP Properties screen appears, enter the requested information for your network environment. Refer to your system administrator or the Windows NT documentation for assistance. After entering the appropriate TCP/IP information and clicking *OK*, the Network Settings Change window appears.
If the Microsoft TCP/IP Properties screen does not appear, the installation is complete. The Network Settings Change window appears.
- 14** Click *Yes* to restart the PC.
The network driver installation is complete. Next, verify the driver installation to confirm that the NIC is properly installed.

Verifying the Driver Installation

- 1** Double-click the My Computer icon.
The My Computer screen appears.
- 2** Double-click the Control Panel icon.
The Control Panel screen appears.
- 3** Double-click the Network icon.
The Network screen appears.
- 4** Select the Adapters tab.
- 5** Make sure that the name of the NIC appears in the list of network adapters.
If the name of the NIC does not appear in the list of network adapters, the installation was not successful. See "Troubleshooting the NIC Installation" on page 83 for troubleshooting help.
- 6** Click *OK* to close the Network screen. Close the Control Panel screen and the My computer screen.

You can also use the following alternative method to verify successful NIC installation:

- 1** In the Windows task bar, click *Start, Programs, Administrative Tools*, and then *Windows NT Diagnostics*.
The Windows NT Diagnostics screen appears.
- 2** Select the Resources tab.
 - If ELPPx appears in the displayed list in the Device column, the driver is successfully installed.
 - If ELPPx does not appear in the displayed list in the Device column, the installation was not successful. See "Troubleshooting the NIC Installation" on page 83 for troubleshooting help.

After you have verified that the driver has been installed properly, the next step is to install the 3Com NIC Diagnostics program for Windows operating systems (see "Installing the 3Com NIC Diagnostics Program" later in this chapter).

Windows Me

This section describes how to install the network driver and NIC software in a PC client or server running Windows Me.

Installing the Driver

- 1 Turn the PC power on.

Windows detects the NIC. The Add New Hardware Wizard starts and displays the following message:

Windows has found the following new hardware:

PCI Ethernet Controller

Windows can automatically search for and install software that supports your hardware. If your hardware came with installation media, insert it now and click Next.

The Add New Hardware Wizard screen also prompts you to select one of two options.

What would you like to do?

- Automatic search for a better driver (Recommended)
- Specify the location of the driver (Advanced)

- 2 Select the *Automatic search for a better driver (Recommended)* option.

- 3 Insert the *EtherCD* in the CD-ROM drive, and then click *Next*.

Files are copied. Windows finds the driver file for the NIC and displays the following message:

3Com 10/100 PCI NIC w/3XP (3C990B)

Windows has finished installing the new hardware device.

- 4 Click *Finish*.

The Systems Settings Change screen appears, prompting you to restart your computer.

- 5 Click *Yes* to restart your computer.



NOTE: You must restart your computer to complete the installation.

The software installation is complete. Next, verify the driver installation to confirm that the NIC is properly installed.

Verifying the Driver Installation

- 1 Right-click the My Computer icon, and then click *Properties*.

- 2 Select the Device Manager tab.

- 3 Double-click *Network adapters* and make sure that the name of the 3Com 10/100 PCI NIC appears.

If a red X or a yellow exclamation point (!) appears by the name of the NIC, the installation was not successful. See "Troubleshooting the NIC Installation" on page 83 for troubleshooting help.

After you have verified that the driver has been installed properly, the next step is to install the 3Com NIC Diagnostics program for Windows operating systems (see the next section, "Installing the 3Com NIC Diagnostics Program").

Windows 98

This section describes how to install the network driver and NIC software in a PC client or server running Windows 98.

Installing the Driver

- 1 Turn the PC power on.
Windows detects the NIC. The Add New Hardware Wizard starts.
- 2 Click *Next*.
The Add New Hardware Wizard screen prompts you to select an option.
- 3 Select the *Search for the best driver for your device (Recommended)* option, and then click *Next*.
The Add New Hardware Wizard screen prompts you for the driver location.
- 4 Select the *CD-ROM drive* option and clear any other check options that are selected.
- 5 Insert the *EtherCD* in the CD-ROM drive, and then click *Next*.
Windows finds the driver file for the device.
- 6 Click *Next*.
Files are copied.
The Insert Disk screen appears, prompting you for the Windows 98 CD.
- 7 Click *OK*.
The Copying Files dialog box appears.
- 8 Remove the *EtherCD* from the CD-ROM drive, insert the Windows 98 CD, enter the path to the CD-ROM drive, and click *OK*.
The Add New Hardware Wizard displays a message informing you that Windows has finished installing the software.
- 9 Click *Finish*.
The Systems Settings Change screen appears, prompting you to restart your computer.
- 10 Click *Yes* to restart your computer.



NOTE: You must restart your computer to complete the installation.

The software installation is complete. Next, verify the driver installation to confirm that the NIC is properly installed.

Verifying the Driver Installation

- 1 Right-click the My Computer icon, and then click *Properties*.
- 2 Select the Device Manager tab.
- 3 Double-click *Network adapters* and make sure that the name of the 3Com 10/100 PCI NIC appears.
If a red X or a yellow exclamation point (!) appears by the name of the NIC, the installation was not successful. See "Troubleshooting the NIC Installation" on page 83 for troubleshooting help.

After you have verified that the driver has been installed properly, the next step is to install the 3Com NIC Diagnostics program for Windows operating systems (see the next section, "Installing the 3Com NIC Diagnostics Program").

Windows 95

This section describes how to install the network driver and NIC software in a PC client or server running Windows 95.



CAUTION: Do not install a 3C990B NIC while installing Windows 95 OSR2 using the "Custom" option. Install Windows 95 OSR2 first, then install the 3C990B NIC.

Before installing the NIC software:

- Make sure that the NIC is installed in the PC and connected to the network.
- Make sure that you have the Windows 95 installation files. These files may be on a CD or diskettes, or they may have been copied to your hard disk when Windows 95 was installed on your PC.



NOTE: If you encounter problems during the installation, refer to the W95NDIS.TXT and TROUBLE.TXT files (located in the HELP directory on the EtherCD) for troubleshooting tips.

Installing the Driver

To begin the driver installation, turn the PC power on. Windows detects the NIC and depending on the version of Windows 95 that you have installed, either the New Hardware Found screen appears, or the Update Device Driver Wizard starts.

New Hardware Found If the New Hardware Found screen appears, follow this procedure to install the NIC driver:

- 1 Select the Driver from disk provided by hardware manufacturer option, and then click *OK*.
The Install From Disk screen appears.
- 2 Insert the *EtherCD* in the CD-ROM drive, enter the path to the CD-ROM drive, and click *OK*.
 - If networking has already been installed on your PC, go to step 4.
 - If this is the first time that networking is being installed on your PC, the Identification tab of the Network screen appears. Go to step 3.
- 3 In the specified fields of the Identification tab screen, enter the following information, and then click *Close*.
 - **Computer Name**—Identifies the PC on the network for other users. This entry must be a unique name of 15 characters or fewer, containing no spaces.
 - **Workgroup**—Identifies the group (for example, your department name) to which your PC belongs. If your computer is connected to a peer-to-peer network, this entry must be exactly the same for all the PCs in your network.
 - **Computer Description**—Displays additional details to other users on the network about this PC. For example, you could specify that the PC is connected to a printer. Filling in this field is optional.
- 4 The Insert Disk screen appears, prompting you for the Windows 95 CD. Click *OK*.
The Copying Files screen appears.

- 5 Do one of the following:
 - If the Windows 95 files were not copied to your hard drive, remove the *EtherCD* from the CD-ROM drive, insert the Windows 95 CD, enter the path to the CD-ROM drive, and then click *OK*.
 - If the Windows 95 files were copied to your hard drive, enter the path to the directory containing these files, and then click *OK*.
Files are copied. The Systems Settings Change screen appears, prompting you to restart your computer.
- 6 Click *Yes*.



NOTE: You must restart your computer to complete the installation.

The software installation is complete. Next, verify the driver installation to confirm that the NIC is properly installed, as described following the “Update Device Driver Wizard” section.



NOTE: After Windows restarts, double-click the Network icon in the Control Panel and make sure that the configuration settings are properly set for your network environment. Contact your system manager for assistance.

Update Device Driver Wizard If the Update Device Driver Wizard starts, follow this procedure to install the NIC driver:

- 1 Insert the *EtherCD* in the CD-ROM drive, and then click *Next*.
Windows finds the driver.
- 2 Click *Finish*.
 - If networking has already been installed on your PC, go to step 4.
 - If this is the first time that networking is being installed on your PC, the Identification tab of the Network screen appears. Go to step 3.
- 3 In the specified fields of the Identification tab screen, enter the following information, and then click *Close*.
 - **Computer Name**—Identifies the PC on the network for other users. This entry must be a unique name of 15 characters or fewer, containing no spaces.
 - **Workgroup**—Identifies the group (for example, your department name) to which your PC belongs. If your computer is connected to a peer-to-peer network, this entry must be exactly the same for all the PCs in your network.
 - **Computer Description**—Displays additional details to other users on the network about this PC. For example, you could specify that the PC is connected to a printer. Filling in this field is optional.
- 4 The Insert Disk screen appears, prompting you for the *EtherCD*. Click *OK*.
The Copying Files screen appears.
- 5 Enter the path to the CD-ROM drive, and then click *OK*.
Files are copied. The Insert Disk screen appears, prompting you for the Windows 95 CD.
- 6 Click *OK*.
The Copying Files screen appears.

- 7 Do one of the following:
 - If the Windows 95 files were not copied to your hard drive, remove the *EtherCD* from the CD-ROM drive, insert the Windows 95 CD, enter the path to the CD-ROM drive, and then click *OK*.
 - If the Windows 95 files were copied to your hard drive, enter the path to the directory containing these files, and then click *OK*.
Files are copied. The Systems Settings Change screen appears, prompting you to restart your computer.
- 8 Click *Yes*.



NOTE: After Windows restarts, double-click the Network icon in the Control Panel and make sure that the configuration settings are properly set for your network environment. Contact your system manager for assistance.

The software installation is complete. Next, verify the driver installation to confirm that the NIC is properly installed.

Verifying the Driver Installation

- 1 Right-click the My Computer icon, and then click *Properties*.
- 2 Select the Device Manager tab.
- 3 Double-click *Network adapters* and make sure that the name of the 3Com 10/100 PCI NIC appears.
If a red X or a yellow exclamation point (!) appears by the name of the NIC, the installation was not successful. See "Troubleshooting the NIC Installation" on page 83 for troubleshooting help.

After you have verified that the driver has been installed properly, the next step is to install the 3Com NIC Diagnostics program for Windows operating systems (see the next section, "Installing the 3Com NIC Diagnostics Program").

Installing the 3Com NIC Diagnostics Program

This section describes how to install the 3Com NIC Diagnostics program after you have already installed the network driver. This program is for PCs running Windows 2000, Windows NT 4.0, and Windows 98, 95, or Me.



NOTE: If you manually install the network driver by selecting options on the *EtherCD* Welcome Screen, you have the option of installing the network driver with or without the 3Com NIC Diagnostics program. If you have already installed the network driver together with the 3Com NIC Diagnostics program for Windows, you can ignore this section. You are ready to configure the NIC as described in Chapter 7, "Configuring the NIC."


The 3Com NIC Diagnostics program allows you to run tests that determine the status of your network and the NIC. It also allows you to configure the NIC, view network statistics and LEDs, and access support databases.



NOTE: When you install the 3Com NIC Diagnostics program, the network driver is automatically updated to the latest version on the *EtherCD*.


To install the 3Com NIC Diagnostics program:

- 1 Turn on the power to the PC and start Windows.
- 2 Insert the *EtherCD* in the CD-ROM drive.
The *EtherCD* Welcome screen appears.

 **NOTE:** If the *EtherCD* Welcome screen does not appear, auto insert is probably not enabled for your CD-ROM drive. See “Enabling Auto Insert” on page 104 for instructions.

- 3 Click *NIC Software*.
- 4 Click *NIC Drivers and Diagnostics*.
- 5 Click *Update NIC Driver*.
- 6 Click *Update Drivers and Diagnostic Program*.

The Update screen appears, displaying a message indicating the 3Com NIC Update Kit has successfully updated the network software, and informing you that you must restart your PC.

 **NOTE:** If the Update screen does not appear automatically, click the Update button displayed at the bottom of the window.

- 7 Click *OK* to return to the Update NIC drivers screen.
- 8 Restart Windows if prompted to do so.
The installation is complete. You are ready to configure the NIC as described in Chapter 7, “Configuring the NIC.”

Starting the 3Com NIC Diagnostics Program

To start the 3Com NIC Diagnostics program:

- 1 Open the *Windows Start* menu.
- 2 Select *Programs*, and then *3Com NIC Utilities*.
- 3 Click *3Com NIC Doctor*.

The 3Com NIC Diagnostic screen appears. For instructions on using the program, see “Running the NIC Diagnostics Tests” on page 92.

Alternatively, you can also start the 3Com NIC Diagnostics program using the following procedure if the 3Com NIC Diagnostics icon is displayed on the right side of the Windows task bar:

- 1 Double-click the 3Com NIC Diagnostics icon.
The 3Com NIC Diagnostic screen appears. For instructions on using the program, see “Running the NIC Diagnostics Tests” on page 92.

Updating the Network Driver and NIC Software

The latest 3Com network drivers can be downloaded from:

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

Search for "3C990B" and "drivers."

To update the network driver and NIC diagnostic software:

- 1 Turn on the power to the PC and start Windows.
- 2 Insert the *EtherCD* (or disk 1 downloaded from the Web or created from the *EtherCD*) in the appropriate drive in the PC.
The *EtherCD* Welcome screen appears.
- 3 Click *NIC Software*.
- 4 Click *NIC Drivers and Diagnostics*.
- 5 Click *Update NIC Driver*.
- 6 To update the network driver and NIC diagnostics software, click *Update Drivers and Diagnostics Program*.
To update the network driver and remove the NIC diagnostics software, click *Update Drivers and remove Diagnostics Program*.
The Update screen appears, displaying a message indicating the 3Com NIC Update Kit has successfully updated the network software, and informing you that you must restart your PC.
- 7 Click *OK* to return to the Update NIC drivers screen, and then exit the *EtherCD*.
- 8 Restart Windows.
The installation is complete.

Installing Multiple NICs

This section describes how to install multiple 3Com 10/100 PCI NICs in a computer running Windows 2000, Windows Me, Windows 98, Windows 95, or Windows NT 4.0.



NOTE: You must use these procedures to install multiple NICs. Failure to follow these procedures may lead to problems requiring you to reinstall your operating system.

Windows 2000, Windows Me, Windows 98, and Windows 95

To install multiple NICs in a PC running Windows 2000, Windows Me, Windows 98, or Windows 95, install and configure each NIC individually, following these steps:

- 1 Install the first NIC in your PC and connect it to the network, as described in "Installing and Connecting the NIC" on page 18.



CAUTION: Do not physically install the second NIC in your PC until you complete the driver installation for the first NIC, following steps 1-6.

- 2 Turn on the power to the PC and start Windows.
- 3 Insert the *EtherCD* when prompted, and then click *OK*.
- 4 Follow the prompts on the screen to install the network driver.
See "Windows 2000" on page 22, "Windows 98" on page 26, or "Windows 95" on page 27, earlier in this chapter for driver installation instructions.
- 5 After the network driver is installed, restart the PC.

- 6 After the PC restarts, exit Windows and turn the power off. Make sure that the PC is unplugged.
- 7 Install the second NIC in your PC and connect it to the network.
- 8 Plug in the PC power cord, turn on the power, and then start Windows. Windows detects the second NIC. The second NIC uses the same network driver as the first NIC. You are not prompted for the *EtherCD*.
When Windows starts, the second NIC appears under *Network adapters* in the Device Manager.
- 9 Repeat the process from step 6 for each additional NIC to be installed.

Windows NT 4.0

To install multiple NICs in a PC running Windows NT 4.0:

- 1 Install the first NIC in your PC and connect it to the network as described earlier in this guide.
- 2 Turn on the power to the PC and start Windows NT.
- 3 Double-click the My Computer icon, then the Control Panel icon, and then the Network icon.
The Network screen appears.
- 4 Select the Adapters tab.
- 5 Click *Add*.
The Select Network Adapter screen appears.
- 6 Click *Have Disk*.
- 7 Insert the *EtherCD*.
- 8 Make sure that d:\ appears in the entry box (where d:\ represents the letter name of the CD-ROM drive), and then click *OK*.
The Select OEM Option screen appears with the name of one of the NICs selected. Only one NIC appears on this screen.
- 9 Click *OK*.
Files are copied. The Network screen appears with the name of the first installed NIC.
- 10 Close the Network screen.
If you are prompted for network information, enter the requested information.
- 11 Turn off the PC and install the next NIC (if any).
- 12 Restart the PC.
- 13 When Windows NT starts, repeat step 3 through step 11 for each newly installed NIC.



NOTE: You will not be prompted for the *EtherCD* when you install the network driver for the second NIC.

4

Installing and Configuring Data Encryption Offloads

The 3C990B NIC performs data encryption processing offloads in a Windows 2000 environment. The 3C990B NIC does not encrypt the data itself: the operating system performs that function.

Encryption processing is handled entirely by the 3XP processor on the NIC. The 3XP processor enables true end-to-end network security at the data capacity of the connected network cable, without sacrificing performance.

The data encryption offload capability of the 3C990B NIC is disabled when you first unpack it. U.S. law requires that users be certified to use certain data encryption products. This chapter describes how to obtain the proper certification and enable encryption offloading on the 3C990B NIC by:

- Downloading the 3Com 3C990 Security Software Utility from the 3Com Corporation World Wide Web site.
- Running the Security Software Utility to install DES/3DES encryption on the 3C990B NIC.

This chapter also provides instructions for:

- Disabling Data Encryption on the 3C990B NIC.
- Upgrading Data Encryption on the 3C990B NIC from 56-bit DES to 168-bit 3DES.
- Configuring IPSec In Windows 2000 environments.

Overview

Internet Protocol Security (IPSec) is a framework of open standards for ensuring secure private communications over IP networks. IPSec ensures confidentiality, integrity, access control, and authenticity of data communications across a public IP network.

Offloading Encryption Processing

You can configure any two (or more) computers running Windows 2000 to perform IPSec encryption by changing the Local Security Setting in the operating system. With most non-3C990B NICs, all the IPSec processing is done by the host central processing unit (CPU), which significantly diminishes CPU performance. The 3C990B NIC can *offload* all the encryption processing from the host CPU, thereby freeing the CPU to work on other tasks.

For any two or more computers running non-Windows 2000 operating systems (Windows 95/98/Me/NT), IPSec encryption is provided by third-party applications. The 3C990B NIC does not provide IPSec encryption offloading for those operating systems.

Selecting Basic or Strong Encryption Processing

The 3C990B NIC provides Data Encryption Standard (DES) 56-bit encryption processing and 3DES (3DES 168-bit) encryption processing. You can configure the 3C990B NIC to process data packets encrypted with either DES (basic) or 3DES (strong) algorithms.

DES and 3DES are IPsec bulk encryption algorithms for coding data. DES encrypts 64-bit data blocks using a 56-bit key. DES can be applied in several modes. 3DES (Triple DES) achieves a higher level of security by encrypting the data three times using DES with three different, unrelated keys. 3DES is also known as 168-bit data encryption.

Enabling Data Encryption

To enable data encryption for the 3C990B NIC, follow the procedure outlined in the following Overview.

Overview

The basic tasks involved in enabling data encryption for the 3C990B NIC are as follows:

- 1 Access the 3Com Corporation World Wide Web site.
- 2 Select DES or 3DES encryption.
- 3 Provide data about yourself and your location (as required by law).
- 4 Download the 3Com Security Software Utility from the 3Com Web site to your computer.
- 5 Run the 3Com Security Software Utility. The utility detects the 3C990B NIC(s) installed in your computer.
- 6 Follow the displayed prompts to enable data encryption, and restart the computer.

Each of the steps listed above is covered in more detail in the sections that follow.

Downloading the 3Com Security Software Utility

Before you can enable data encryption for the 3C990B NIC, you must download the 3Com Security Software Utility from the 3Com Corporation World Wide Web site. Follow these steps to download the utility:

- 1 Launch your preferred Internet browser on your computer.
3Com recommends using either Microsoft Internet Explorer version 4.0 (or above), or Netscape Communicator version 4.0 (or above).
- 2 Type the following URL in the browser address field:
`http://www.3com.com/product/offload_enablement`
- 3 Press Enter.



NOTE: You can also access the 3Com Security Software Utility download site by using the *EtherCD*. Do the following:

- 1 Insert the *EtherCD* in the computer CD-ROM drive.
- 2 Click *Encryption Enablement*.
- 3 Click *Begin Encryption Enablement*.

Your default Internet browser is launched with the appropriate URL.

The Language Selection page appears, providing several different language options.

- 4 Select your desired language.
All subsequent pages will be displayed in the selected language. An introduction to the 3C990B NIC appears. Follow the prompts.
- 5 The 3Com 3C990 Security Software Utility Download screen appears, prompting you to select the level of data encryption that you want to use on your system:
 - 56-bit DES Encryption Version
 - 168-bit 3DES Encryption Version
- 6 Select either 56-bit or 168-bit encryption and then click *Download*.
3Com performs an initial security check based on the geographic location of your computer:
 - If your computer passes the initial 3Com security check, the browser prompts you for your name, address, and contact information to satisfy U.S. Department of Commerce regulations. Go to step 7.
 - If your computer fails the initial security check, 3Com will not allow you to download the 3Com Security Software Utility. You will be asked to enter your name, address, and contact information, and then to submit the information to 3Com for manual processing. Follow the steps displayed in your browser window.
- 7 Enter your personal information, such as name and address, in the appropriate fields:
Entries for all the following fields are required unless indicated otherwise:
 - Full Name of Business
If you will be using data encryption for personal use, type:
Self
 - Company Web site URL (optional)
 - Your Name
 - Address
 - City
 - State
 - Zip
 - Country
Use the pull-down menu to select the appropriate country.
 - Telephone
 - Email
 - Fax (optional)
- 8 Click *Submit*.
3Com performs a second security check based on the personal information you entered at step 7:
 - If your computer passes the second 3Com security check, the system displays a Certificate of Eligibility Under U.S. Export Control Laws to Receive Software Controlled for Export. Go to step 9.
 - If your computer fails the second security check, 3Com will not allow you to download the 3Com Security Software Utility. You will be prompted to submit the personal information you just entered to 3Com for manual processing. Follow the steps displayed in your browser window.

- 9** Read the Eligibility Certificate, scroll to the bottom of the screen, and click *I Agree* to continue.
You *must* agree to the certification conditions to download the 3Com Security Software Utility. The 3Com End User Software License Agreement appears.
- 10** Read the license agreement, scroll to the bottom of the screen, and click *I Agree* to continue.
You *must* agree to the software license conditions to download the 3Com Security Software Utility. The File Download dialogue box appears, and prompts you to select one of the following options:

 - *Open this file from its current location*
 - *Save this file to disk*
- 11** Select the default option *Save this file to disk* and click *OK*.
The Save As window appears.
- 12** Enter the download destination directory and file name you want to use for the encryption application.
Keep the 3Com Security Software Utility in an accessible location. You can use the utility not only to install encryption on the 3C990B NIC, but to disable encryption as well.
Use the Save in field to specify a different directory than the default one displayed, if necessary. Use the File name field to change the encryption application filename, if desired. (Do not change the filename suffix. Leave the .exe filename suffix as shown.)
- 13** Click *OK*.
The 3Com Security Software Utility is downloaded to the hard drive location that you specified in step 12. For further instructions, see the next section, "Installing Data Encryption."

Installing Data Encryption

This section explains how to install and activate data encryption on the 3C990B NIC once you have downloaded the 3Com Security Software Utility from the 3Com Web site. (If you have not yet downloaded the 3Com Security Software Utility, see instructions for "Downloading the 3Com Security Software Utility" on page 34.)

To install data encryption, use Windows Explorer to find the 3Com Security Software Utility in the location where you downloaded it and follow these steps:

- 1** Run the 3Com Security Software Utility by double-clicking the utility program icon, or by using the Windows Start menu.
The 3Com Security Software Utility Welcome screen appears. Follow the instructions on the screen to close any open applications you may have running. (You can also press Alt+Tab to suspend the 3Com Security Software Utility and close applications.) Continue at step 2 when all open applications have been closed.
- 2** Click *Next*.
The 3Com Security Software Utility first verifies that you have already installed the 3C990B NIC:

 - If the utility cannot find a 3C990B NIC, it will stop, allowing you to install the NIC. For NIC installation instructions, see "Installing and Connecting the NIC" on page 13.
 - If the utility finds an installed 3C990B NIC, it prompts you to enable or disable encryption. Go to step 3.

- 3** Select *Enable* to install data encryption.
The 3Com Security Software Utility will install data encryption on the 3C990B NIC at the level you specified when you downloaded the 3Com Security Software Utility. Data encryption will not be enabled on the 3C990B NIC until you restart the computer.
- 4** Restart the computer to enable data encryption.
Keep the 3Com Security Software Utility in an accessible location. You may want to use the utility again to disable or re-enable encryption on the 3C990B NIC.

Disabling Data Encryption

To disable data encryption on the 3C990B NIC, use Windows Explorer to find the 3Com Security Software Utility in the location where you downloaded it and follow these steps:

- 1** Run the 3Com Security Software Utility by double-clicking the utility program icon, or by using the Windows Start menu.
The 3Com Security Software Utility Welcome screen appears. Follow the instructions on the screen to close any open applications you may have running. (You can also press Alt+Tab to suspend the 3Com Security Software Utility and close applications.) Continue at step 2 when all open applications have been closed.
- 2** Click *Next*.
The 3Com Security Software Utility first verifies that you have already installed and registered the 3C990B NIC.
When the Registration Number is validated, the utility will prompt you to choose whether you want to enable encryption or disable encryption.
- 3** Select *Disable* to deactivate data encryption.
The 3Com Security Software Utility will disable data encryption on the 3C990B NIC.
- 4** Restart the computer to disable data encryption.
Keep the 3Com Security Software Utility in an accessible location. You may want to use the utility again to enable encryption on the 3C990B NIC.

Upgrading Data Encryption

To upgrade the data encryption level for a 3C990B NIC from DES (56-bit) to 3DES (168-bit), follow these steps:

- 1** Download the 3DES Security Software Utility.
See "Downloading the 3Com Security Software Utility" on page 34 for instructions. At step 5 in those instructions, select 168-bit 3DES Encryption Software.
- 2** Install Data Encryption using the new 3Com Security Software Utility.
See "Installing Data Encryption" on page 36 for instructions.

Configuring IPsec In Windows 2000

The 3C990B NIC accelerates IP security (IPsec) data encryption from supported operating systems that provide this offload capability. This feature is currently available in the Microsoft Windows 2000 operating system.

IPsec primarily consists of two parts:

- encryption/decryption
- authentication

To send or receive encrypted data in a PC running Windows 2000 with a 3C990B NIC installed, you must first create a *security policy*, and then enable encryption on the NIC. The security policy establishes and defines how encrypted network traffic between your PC and a specified server occurs.


Authentication enables the receiver to verify the sender of a packet by adding key fields to a packet without altering the packet data content.

The following table shows the available levels of encryption:

Encryption Type	Encryption Level	Description
AH	Medium	Authentication only
ESP	High	Authentication and encryption
Custom	Varies	Provides encryption and an extra authentication that includes the IP header. Custom allows you to select options for both AH and ESP, such as MD%/SHA-1 and DES/3DES. And you can select the rate at which new keys are negotiated. Microsoft uses IKE key exchange to renew keys every x seconds or y bytes. However, this practice is computationally very high in overhead. Some users may set these values low and have frequent key updates. Users more concerned with performance will set these values higher. For more information, refer to the Microsoft documentation about creating IPsec flows.

Creating a Security Policy

The process you use to create and enable a security policy will depend on your network environment requirements. The following is an example of one approach to creating a security policy.

 **NOTE:** You must complete all of the sequences in this section to establish and enable a security policy for transmitting and receiving encrypted data over the network.

Defining the Console

This sequence establishes the Console and defines its parameters.

To define the Console:

- 1 In the Windows taskbar, click *Start, Programs, Accessories*, and then *Command Prompt*.
- 2 At the DOS prompt, enter:
MMC
The Console1 screen appears.

- 3 In the menu click *Console*, and then *Add/Remove Snap-in*.
The Add/Remove Snap-in screen appears.
- 4 Click *Add*.
The Add Standalone Snap-in screen appears.
- 5 Select *IP Security Policy Management*, and then click *Add*.
The Select which computer this Snap-in will manage screen appears.
- 6 Enable the *Local computer* option.
- 7 Click *Finish*, *Close*, and then *OK*.

Creating the Policy

This sequence creates and names the new security policy.

The Console1 and Console Root screen appears with *IP Security Policies on Local Machine* displayed in the list.

- 1 In the left pane, click *IP Security Policies on Local Machine*.
- 2 Right-click inside the right pane below the list items.
- 3 From the pop-up menu, select *Create IP Security Policy*.
The IP Security Policy Wizard Starts.
- 4 Click *Next*.
The IP Security Policy Name screen appears.
- 5 Enter a name for the new security policy that you are creating. You can enter a description to help you identify this policy.
- 6 Click *Next*.
The Requests for Secure Communication screen appears.
- 7 Clear the *Activate the default response rule* check box.
- 8 Click *Next* and then *Finish*.
A screen appears with the name of the new security policy in the title bar.
- 9 Click *Add*.
The Security Rule Wizard starts.
- 10 Click *Next*.
The Tunnel Endpoint screen appears.
- 11 Enable the default option *This rule does not specify a tunnel*, and then click *Next*.
The Network Type screen appears.
- 12 Enable the default option *All network connections*, and then click *Next*.
The Authentication Methods screen appears.
- 13 Enable the *Use this string to protect the key exchange (preshared key)*: option, type the appropriate string text in the entry field, and then click *Next*.

Creating a Filter

This sequence creates a filter for the policy.

The IP Filter List screen appears.

- 1 Click *Add*.
A new IP Filter List screen appears.

- 2 Enter a name for the filter, and then click *Add*.
The IP Filter Wizard starts.
- 3 Click *Next*.
The IP Traffic Source screen appears.
- 4 Click *Next*.
The IP Traffic Destination screen appears.
- 5 Select *A Specific IP Address* in the pull-down list.
The IP Address entry box appears on the IP Traffic Destination screen.
- 6 Enter destination IP address, and then click *Next*.
The IP Protocol Type screen appears.
- 7 Accept the default, and then click *Next*.
- 8 Click *Finish* to close the IP Filter Wizard.
- 9 Click *Close* to close the IP Filter List screen.

Binding the Filter

This sequence attaches the new filter to the policy.

The IP Filter List screen appears.

- 1 Enable the option for the new filter name and make sure that the new filter name is selected.
- 2 Click *Next*.

Creating the Filter Action

This sequence defines how the filter acts on the policy.

The Filter Action screen appears.

- 1 Click *Add*.
The Filter Action Wizard starts.
- 2 Click *Next*.
The Filter Action Name screen appears.
- 3 Enter a name (for example: 3DES to the Server), and then click *Next*.
The Filter Action General Options screen appears.
- 4 Accept the default, and then click *Next*.
The screen, Communicating with computers that do not support IPsec, appears.
- 5 Accept the default value, and then click *Next*.
The IP Traffic Security screen appears.
- 6 Select *Custom*, and then click *Settings*.
The Custom Security Method Settings screen appears.
- 7 Enable the *Data integrity and encryption (ESP)*: check box, and then make the appropriate selections in the Integrity and algorithms list boxes.
- 8 Click *OK*, *Next*, and then *Finish*.

Binding the Filter Action

This sequence attaches the new filter action to the filter and policy.

The Filter Action screen appears.

- 1 Enable the filter action option and make sure that the filter name is selected. (In this example, we used the filter name: *3DES to the Server*.)
- 2 Click *Next*, *Finish*, and then *Close*.
The newly created policy appears in the right pane of the Console Root\IP Security Policies on Local Machine screen.
- 3 Exit this screen and, when prompted, save the new policy information. Use a meaningful name for future reference.

You can modify this security policy by double clicking the icon that is created when you save the policy in the previous step.

Enabling Encryption

An encryption policy must exist in the Console Root\IP Security Policies on the Local Machine screen before you can enable encryption on the 3C990B NIC.

To enable encryption:

- 1 Right-click the desired policy icon in the right pane of the screen.
- 2 Select *Assign*.
- 3 A green plus (+) symbol appears on the policy icon to indicate that encryption is toggled on.

Disabling Encryption

An encryption policy must exist in the Console Root\IP Security Policies on the Local Machine screen, and be enabled, before you can disable encryption on the 3C990B NIC.

To disable encryption:

- 1 Right-click the desired policy icon in the right pane of the screen.
- 2 Select *Un-assign*.
The absence of a green plus (+) symbol on the policy icon indicates that encryption is toggled off.

5

Installing 3Com Advanced Server Features For Windows

This chapter explains the following tasks for a computer running Windows 2000 or Windows NT with the 3Com 10/100 PCI Server NIC (3C990BSVR) with 3XP processor installed.

- Installing 3Com Advanced Server software for a server NIC
- Configuring groups and VLANs for a server NIC

3Com Advanced Server (DynamicAccess) features include:

- Fault tolerance
- Bi-directional load balancing
- Resilient server links (RSL)
- Self-healing drivers (SHD)
- Multiple virtual LANs (MVLANS) support
- PCI hot-plug support
- Traffic prioritization

For more information about 3Com Advanced Server (DynamicAccess) features, see “3C990BSVR Server NIC Features” on page 9.

This chapter also describes 3C990B NIC support for Windows 2000 offload features in an IP environment. The Windows 2000 offload features are designed to enhance the Windows 2000 operating system capabilities by off loading key TCP/IP networking and security tasks from the Windows 2000 operating system.

Installing 3Com Advanced Server Software

Follow these steps to install 3Com Advanced Server (DynamicAccess) software for a server NIC installed in a Windows 2000 or Windows NT 4.0 computer:

- 1 Make sure that the NIC and the network driver are properly installed in your computer. See Chapter 3, “Installing NIC Drivers and Diagnostics For Windows,” for information about confirming that the NIC and driver are properly installed.
- 2 Start Windows.
- 3 Insert the *EtherCD* in the CD-ROM drive. The *EtherCD* Welcome screen appears.
- 4 Click *NIC Software*.
- 5 Click *DynamicAccess technologies*.
- 6 Click *Install DynamicAccess software*.

- 7 Select the appropriate menu option for your operating system (*Windows NT 4.0* or *Windows 2000*). Do one of the following:
 - To select *Windows NT 4.0*, click *Install 3Com DynamicAccess Technology for Windows NT 4.0 Only*.
 - To select *Windows 2000*, click *Install 3Com DynamicAccess Technology for Windows 2000 Only*.

The 3Com DynamicAccess Software Installation screen appears, displaying the following prompt:

```
Do you wish to install Dynamic Access Software for Servers?
```

- 8 Click Yes.

The 3Com Advanced Server Software Installation program starts.

- When 3Com Advanced Server features are installed for *Windows NT*, NICs bind to the Advanced Server protocol and real protocols bind to the Advanced Server Miniport. Do not modify these bindings.
 - When 3Com Advanced Server features are installed for *Windows 2000*, LAN connections bind to the Advanced Server protocol and real protocols bind to the Advanced Server miniport. Do not modify these bindings.
- 9 When the 3Com Advanced Server Technology installation is finished, exit the *EtherCD*, and then exit *Windows*.
 - 10 Restart the PC.



NOTE: You must restart the PC to complete the installation.

Verifying Successful Installation

After the 3Com Advanced Server software is installed on the server PC, the following changes are visible in the *Windows Network* control panel:

- For each physical NIC installed in the client PC, a virtual NIC entry appears in the list of network adapters.

All protocols are re-bound to the virtual NIC. The bindings to the physical NIC are still intact.
- A 3Com DynamicAccess entry appears as a protocol.
- A 3Com DynamicAccess icon is installed in the *Windows Control Panel* (for *NT 4.0* installations only).

Configuring Groups and VLANs for a Server NIC

3Com Advanced Server technology features allow you to configure load balancing groups and virtual LANs (VLANs). The features are described in “3Com DynamicAccess Advanced Server Features” on page 9.

The following 3Com Advanced Server technology features are available for NIC groups in *Windows*:

- Load balancing
- RSL failover
- Multiple VLANs

The examples in this section illustrate typical actions you might take in the course of maintaining a 3Com Advanced Server configuration in *Windows*.

Planning the Configuration

Consider these items when planning groups and VLANs:

- Decide whether you want to use bidirectional load balancing, or transmit 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” on page 48.
- Decide which NICs are to be part of each group. Each group must include at least two NICs.
- Decide whether you want to use a foreign (non-3Com) NIC in one of the groups. Up to two foreign NICs (that is, NICs that are not 3Com server NIC) are allowed in one group per server.
- Decide which NIC is to be the primary NIC in each group. If a foreign NIC is used, it must be designated the primary NIC.
- Disable load balancing if you have set failover for a group of NICs operating at different speeds. 3Com Advanced Server supports failover for a group of NICs operating at different speeds (for example, with one NIC operating at 10 Mbps, another operating at 100 Mbps, and another at 1,000 Mbps). However, Advanced Server supports load balancing only for a group of NICs operating at the same speed (with all NICs operating at 10 Mbps, or all operating at 100 Mbps, or all at 1000 Mbps). For example, if you specify failover from a 3Com Gigabit Server 1000 PCI NIC to a 3Com 10/100 PCI NIC, you must disable load balancing for that group to achieve the best performance.
- For the best 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 limit of four groups per server.
- The following guidelines apply to groups under Windows 2000:
 - **802.1p Support Property**—The value of the Windows 2000 802.1p support property must be the same for all NICs in a group. For example, if this property is enabled for the primary NIC, it must also be enabled for all other NICs in the group.
 - **Microsoft Task Offload Support**—It is possible to form a group of NICs that have different levels of support for Microsoft Task Offload features (TCP Checksum, TCP Segmentation, and IP Sec). In this case, the offload support is limited to the features supported by all NICs in the group. For example, if two NICs in a group support all offload features but one NIC supports only TCP Checksum, then offload support for the group is limited to TCP Checksum.
- Observe these VLAN configuration guidelines:
 - 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.
 - 3Com Advanced Server software supports as many as 16 VLANs per server.
 - 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.
- Under Windows 2000, when VLANs are enabled, the Windows 2000 802.1p Support property must be disabled for all the underlying miniports.
- The following 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



CAUTION: Before creating or removing a load balancing group or VLAN, take note of configuration information such as IP addresses and IPX network numbers. 3Com Advanced Server software does not restore a network configuration to its pre-Advanced Server state. Always verify that the network configuration conforms to your expectations after creating or removing a load balancing group or VLAN.

Working With Server Features

The 3Com Advanced Server features window 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.

Windows 2000

Access 3Com Advanced Server server features through the Windows 2000 Network and Dial-up Connections window as follows:

- 1 Log in to Windows 2000 with administrator privileges.
- 2 Launch the Windows 2000 Network and Dial-up Connections window.
- 3 Select a Local Area Connection icon.
- 4 Click the right mouse button and select *Properties*.
The Local Area Connections Properties window appears.
- 5 Click the General tab.
- 6 In the General window, select DynamicAccess Protocol and click *Properties*.
The DynamicAccess Protocol Properties window appears. Click the appropriate tab to configure server features.

Windows NT

Start 3Com Advanced Server features under Windows NT as follows:

- 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 DynamicAccess Resilient Server Link/Load Balance/VLAN Configuration window appears. Click the appropriate tab to configure server features.

Creating a Group

- 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:
 - To enable transmit 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 Host ID bytes required for a dedicated IP address. For example:

	Byte 1	Byte 2	Byte 3	Byte 4
Class A	Network ID	Host ID		
		24	1	253
Class B	Network ID		Host ID	
			2	253
Class C	Network ID			Host ID
				253

See “Specifying a Dedicated IP Address” later in this chapter 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.

Adding NICs to a Group

- 1 Click the Load Balance/RSL tab.
- 2 In the Load Balance/RSL window:
 - Select a group from the Load Balancing/RSL Groups list.
 - 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.

Specifying a Dedicated IP Address

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

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

You can specify the dedicated IP address in the Create Group or Group Properties dialog boxes. You cannot specify the bytes for the Network ID; they are fixed. Specify the bytes for the Host ID for various classes of subnets as follows:

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

Changing an IP Address

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

Changing the Other Device's IP Address

After you change the other device's address, restart receive load balancing as follows:

- 1 In the Load Balancing/RSL window, select the group that had the duplicate address.
- 2 Click *Properties*.
- 3 In the Properties dialog box, click *OK*.
- 4 In the Load Balancing/RSL window, click *OK* to exit the window and restart Windows.

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 Windows.

Creating a VLAN

- 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*.
Valid 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.

Windows 2000—If you create more than one VLAN, assign a VLAN ID number to each VLAN as follows:

- Right-click My Network Places and select *Properties* from the menu.
- In the next window, right-click a VLAN and select *Properties* from the menu.
- Click *Configure*.
- In the NIC Properties window, click TCP/IP.
- In the next window, configure the IP address and subnet mask.

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

Specifying Traffic Priorities

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

- 1 Double-click the 3Com DynamicAccess icon in the Windows Control Panel.
The DynamicAccess Software Setup window appears.
- 2 Click the appropriate tab:
 - **Traffic Prioritization**—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
 - Group that does not have VLANs
 - VLAN
 - Virtual NIC (NIC, group, or VLAN) shown in the Traffic Prioritization control panel
 - **Administration**—Set 3Com Advanced Server control panel access, set VLAN options, enable efficient multicast control, and enable the prioritizing of multicast traffic.

Saving the Configuration

To save and exit, click *OK*.

A prompt asks whether you want to configure traffic prioritization. If you click *Yes*, the DynamicAccess Software Setup window appears.

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

Disabling Load Balancing for a Group

Follow these steps to disable load balancing for a group:

- 1 Click the Load Balance/RSL tab.
- 2 In the Load Balance/RSL window:
 - Select a group from the Load Balancing/RSL Groups list.
 - 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.
- 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. If a foreign (non-3Com) NIC is used, it must be designated the primary NIC. 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:

- 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*.

Removing a NIC from a Group

Follow these steps to remove 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, 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 VLAN ID for the selected VLAN, click *Edit VLAN*.

Displaying NIC Properties

Follow these steps to display NIC properties:

- 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.

Displaying Group Properties

Follow these steps to display group properties:

- 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.

Troubleshooting a Load Balancing Configuration

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



NOTE: To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:

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

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 or 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" on page 48 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.

Changing Windows 2000 Property Settings

If you receive warnings about inconsistent property settings (for example, the 802.1p Support property) while creating a group, use the following procedure to change a NIC property:

- 1 Right-click the My Computer icon and select *Properties* from the menu.
- 2 Click the Hardware tab, then click *Device Manager*.
- 3 Double-click *Network Adapters*.
- 4 Right-click on the name of the appropriate NIC and select *Properties* from the menu.
- 5 Click the Advanced tab.
- 6 Select the appropriate property from the list (for example, 802.1p Support).
- 7 Use the scroll list to change the property value.
- 8 Exit the Device Manager.

Identifying Windows 2000 Miniport and LAN Connections

3Com Advanced Server miniport connections and NIC Local Area Connections are listed in the Network and Dial-up Connections window. If a group or VLAN is associated with a miniport, the group name and VLAN name appear in the miniport icon name. If a miniport is associated with an ungrouped NIC, you can identify the NIC by its MAC address as follows:

- 1 In the Network and Dial-up Connections window, right-click the miniport icon and select *Properties* from the menu.
- 2 In the DynamicAccess Properties window, click the General tab.
- 3 In the General tab, move the cursor over the miniport name. (Do not click the name.)

After a short pause, the MAC address of the associated NIC appears in a pop-up window.

Using Windows 2000 Offload Features

The 3C990B NIC supports Windows 2000 offload features in an IP environment. The Windows 2000 offload features are designed to enhance the Windows 2000 operating system capabilities by off-loading key TCP/IP networking and security tasks from the Windows 2000 operating system:

- IPsec Offload—reduces CPU utilization by allowing the 3XP processor and a crypto chip on the NIC to perform data encryption operations.
- TCP Segmentation Offload—reduces CPU utilization by allowing the 3XP processor on the NIC to perform segmentation of TCP packets.



NOTE: Windows 2000 does not allow IPsec offloads and TCP Segmentation offloads for the same session. Though all offload types may be enabled, TCP Segmentation offloading will not occur during an IPsec session.

- IP and TCP Checksum Offload—reduced CPU utilization by allowing the 3XP processor on the NIC to perform the checksum calculation of TCP/IP and UDP/IP packets.
- 802.1p Packet Priority Offload—reduces CPU utilization by allowing the 3XP processor on the NIC to perform the insertion of the 802.1Q tag header into the packet.

Enabling Offloads

Windows 2000 provides the capability to individually enable or disable each of the four offload features. (The default setting for these features is *enabled*.)

To enable or disable individual offload settings in Windows 2000:

- 1 Right-click the My Network Places desktop icon and select Properties.
The Network and Dial-up Connections screen appears.
- 2 Right-click the Local Area Connection icon and select Properties.
The Local Area Connection Properties screen appears.
- 3 Click *Configure*.
The 3Com 10/100 Mbps PCI NIC with 3XP Processor screen appears.
- 4 Click the Advanced tab.
- 5 Select Enable Offloads in the Property list box.
- 6 Select the appropriate value in the Value entry box (shown in the following table) for the desired offload state.
- 7 Close all open windows.

The following table describes values for the offload functions:

Value	Offload Function Enabled
All Offloads Disabled	No offloads
cksum	TCP Checksum
cksum-ipsec	TCP Checksum and IPSec
cksum-tcpseg	TCP Checksum and TCP Segmentation
cksum-tcpseg-ipsec	TCP Checksum and TCP Segmentation and IPSec
ipsec	IPSec
tcpseg	TCP Segmentation
tcpseg-ipsec	TCP Segmentation and IPSec
802.1p	Packet Priority
802.1p-cksum	Packet Priority and TCP Checksum
802.1p-cksum-ipsec	Packet Priority and TCP Checksum and IPSec
802.1p-cksum-tcpseg	Packet Priority and TCP Checksum and TCP Segmentation
802.1p-cksum-tcpseg-ipsec	Packet Priority and TCP Checksum and TCP Segmentation and IPSec
802.1p-ipsec	Packet Priority and IPSec
802.1p-tcpseg	Packet Priority and TCP Segmentation
802.1p-tcpseg-ipsec	Packet Priority and TCP Segmentation and IPSec

Configuring Offloads for a Group of Different NICs

Your computer may contain a combination of installed NICs (including one or more 3Com 10/100 PCI NICs with the 3XP processor (3C990Bs)) with varying offload capabilities. If you have a mix of dissimilar NICs configured in a group, then 3Com DynamicAccess Advanced Server software will support only those offload functions that are supported by all the NICs in the group.

For example, if you have created a group consisting of a 3C990B NIC and another NIC that does not have any offload capabilities, then the group will not support any offloads.

In another example, if you have a group of three NICs with two supporting TCP Checksum, TCP Segmentation, and IPSec offloads, and one supporting only IPSec, then the group will support only IPSec offloads.

If you add a NIC to an existing group, and that NIC has offload capabilities that differ from those of the group, then you must reconfigure the group: that is, you must delete the group, recreate the group, and restart the computer. (If you do not delete and recreate the group, the Advanced Server software will not bind to the NIC.)

Similarly, if you replace a NIC that has been configured as part of a group with another NIC that has different offload capabilities, then you must reconfigure the group.

In addition, if you disable or enable any offloads for a group through the Windows 2000 Advanced tab, then you must reconfigure the group.

6

Installing NetWare Drivers

This chapter describes how to install drivers for Novell NetWare versions 3.12, 4.11, and 5.x.

To obtain the latest shipping version of a driver, go to:

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

Search for "3C990B" and "drivers."

Installing and Configuring the NetWare Driver

This section describes how to install the NetWare driver on a Novell server running NetWare 3.12, 4.11, or 5.x. The \NWSERVER directory contains the network driver file (3C99X.LAN) to be used for servers running NetWare 3.12, 4.11, or 5.x. Additional files (NetWare Loadable Modules [NLMs]) that are required for servers running NetWare are on the *EtherCD* in the \NWSERVER directory, or they can be obtained from Novell.

Using the Latest Support Packs

The 3C990B NIC does not support NetWare 3.11 or 4.0x servers. The 3C990B NIC does not support NetWare 3.12 or 4.11 servers that are not updated to the latest Novell Support Pack. NetWare 3.12 does not support 3C990B NIC load balancing/failover or TCP/IP checksum offload/hardware checksumming.



CAUTION: If you plan to form load balancing/failover groups using NetWare 4.11 or 5.x, do not enable TCP/IP checksum offload for the 3C990B NIC driver.

Use the following support packs to achieve best results with the network driver.

NetWare Version	Required Support Pack
3.12	Latest patch files.
4.11	Support Pack 6 or later for all types of operation. Support Pack 7 or higher is required for proper operation of the failover mechanism for the 3C990B server NIC.
5.x	Support Pack 2a or later



NOTE: The required support pack must be loaded before you install the driver for the 3C990B NIC.

You can obtain the latest support packs from the Novell Web site:

<http://www.support.novell.com>

Obtaining NetWare Loadable Modules

You can obtain current NLMs for the NetWare servers listed in the table below from the \NWSERVER directory on the *EtherCD*, or from the Novell Web site:

<http://www.support.novell.com>

NetWare Server	NLM Name
NetWare 3.12	ETHERTSM.NLM
	MSM31X.NLM
	NBI31X.NLM
NetWare 4.11, 5.x	ETHERTSM.NLM
	TCPIP.NLM
	NBI.NLM
	MSM.NLM



NOTE: To upgrade the NetWare driver for a NetWare server, you must create installation diskettes from the EtherCD that accompanied this product. Use these diskettes to install the Netware server driver. See "Creating Installation Diskettes" on page 15.

Server Software Installation Requirements

Before you install software, you may want to verify that the installed NICs are functional or change their configuration settings by running DOS diagnostics. Use the 3C99XCFG.EXE program located on the *EtherCD*.

The instructions in this section describe how to set up a sample server configuration. Setting up your own configuration may require a slightly different sequence of tasks and different numbers of NICs.

If you are installing the software during the installation of the network operating system, see "Installing a 3Com NIC While Installing the NOS" on page 107.

For a list of installation requirements, see "Installation Requirements" on page 14.

Netware Packet Receive Buffers

Follow these guidelines for NetWare 4.11 and 5.x:

- The driver requires 200 packet receive buffers for each installed NIC.
- You must increase the minimum and maximum packet receive buffers values by 200 for each installed NIC.

For example, if you install two NICs, increase the parameters in the STARTUP.NCF file by 400 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 = 1400
	SET MAXIMUM PACKET RECEIVE BUFFERS = 2900

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 in order 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.)

Obtaining Slot Numbers

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 value of a slot number can be 10001 or larger.

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

- 1 Install only one 3C990B NIC, as described in "Installing and Connecting the NIC" on page 18.
- 2 Follow the installation instructions in this chapter to load the *EtherCD*, copy the driver, and load the driver.
- 3 In the NetWare Console, issue a CONFIG command.
- 4 Write down the slot number that is listed for the installed NIC.
- 5 Install the second 3C990B NIC.
- 6 Follow the installation instructions in this chapter to install the driver on the second NIC. Each time you load the driver, the CONFIG command displays the slot numbers for all the 3C990B NICs in the system.

Installing the NetWare 3.12 Server Driver

To install the driver in a NetWare 3.12 server:

- 1 Copy the MSM31X.NLM, ETHERTSM.NLM, and NBI31.NLM files from the \NWSERVER directory on the *EtherCD* to the directory on your hard drive where other NLM files are located.



NOTE: Copy the NLM files only if the versions existing on the server are older than the versions supplied on the *EtherCD*.

The NLM file location is typically in the sys:system directory. You need a NetWare client system to copy the NLM files to the server.

- 2 Copy the LAN driver file (3C99X.LAN) from the *EtherCD* to the same directory.
- 3 Add the following two lines to the AUTOEXEC.NCF file:

```
load sys:\system\3c99x.lan slot=<slot> NAME=<name>
FRAME=<frametype>
bind ipx to <name> net=<number>
```



NOTE: If you copy the NLM files to a different directory, you must specify the path in the preceding LOAD statement.

- 4 Save and exit the file, and then reboot the server.

Installing the Server Driver for NetWare 4.11 and 5.x Using INETCFG

To install the driver in a NetWare 4.11 or 5.x server:

- 1 Copy the MSM.NLM, ETHERTSM.NLM, and NBI.NLM files from the \NWSERVER directory on the *EtherCD* to the directory on your hard drive where other NLM files are located.



NOTE: Copy the NLM files only if the versions existing on the server are older than the versions supplied on the *EtherCD*.



CAUTION: You can configure load balancing only through the command line interface or by manually updating the AUTOEXEC.NCF file. You cannot have load balancing automatically configured by INETCFG.SYS.

The NLM file location is typically in the *sys:system* directory. You need a NetWare client system to copy the NLM files to the server.

- 2 Insert installation diskette 2 in drive A.
- 3 At the server prompt, enter:
load inetcfg
The Internetworking Configuration screen appears.
- 4 In the displayed menu, select *Boards*, and then press Enter.
- 5 Press Insert.
A list of currently installed drivers appears.
- 6 Press Insert again.
The New Driver dialog box appears.
- 7 Enter the directory:
a:\nwserver\3c99x.lan
An updated list of installed drivers appears.
- 8 Select *3C99x*, and then press Enter.
You are prompted to name the NIC, for example: **3c99x_1**.
- 9 Type the name of the NIC and press Enter.
You are prompted for the slot number. For information on how to verify the slot number, see "Verifying the PCI Slot Number" on page 61.
- 10 Enter the slot number, and then press Enter.
- 11 Press Esc, Enter (to save), and then Esc.
The Internetworking Configuration screen appears.
- 12 Select *Bindings*, and then press Enter.
The configured protocols for installed NICs appears. (This list will be empty if no protocols are currently bound to the NIC.)

- 13 Press Insert.
The Select From the List of Configured Protocols screen appears.
For NetWare 5.x:
 - The default *To a Network Interface* is selected. Press Enter.
The Select a Configured Network Interface screen appears.
 - Select the board. For example, enter: **3c99x_1**, and then press Enter.
- 14 When prompted, enter the network number, and then press Enter.
- 15 In the Frame Type field, press Enter to display a list of frames, choose a frame, and press Enter.
- 16 Press Esc.
You are prompted to save the changes.
- 17 Press Enter to save the changes.
The configured Protocol to Network Interface Bindings screen appears.
- 18 Press Esc to Exit.
The Main menu appears.
 - NetWare 4.11: Restart the server.
 - NetWare 5.x:
 - Select *Reinitialize System*.
 - Press Enter to reinitialize.
- 19 Press Esc to exit from the program.

Installing the Server Driver and Advanced Server Features Using AUTOEXEC.NCF

You can also install the server driver by editing (or adding new) LOAD commands in the AUTOEXEC.NCF file.

With NetWare installed and the server up and running, complete the following steps to install and configure the driver and 3Com Advanced Server technology server features on a NetWare file server.

In NetWare screens, use the arrow keys to select an item, and then press Enter.

Loading the 3Com *EtherCD*

NetWare 4.11 Insert the CD in the CD-ROM drive and enter these commands:

```
load cdrom
cd mount ecd200p99x
```

NetWare 5.x 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.x: **load nwconfig**
- 2 In the Configuration 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 a path to the volume that contains the driver. For example:
3C99XC_TXM:\nwserver
The Select a Driver to Install screen appears with the 3Com Server 10/100 PCI 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:
10001
See "Changing NetWare Driver Configuration Parameters" on page 65 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:
 - a Select the driver
 - b Enter the slot number
 - c 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 Multiple Server NICs

To support more than one NIC in a NetWare server, change the AUTOEXEC.NCF file to the following format:

```
load 3C99X.LAN slot=<slot1> NAME=<name1> FRAME=<frametype1>
bind ipx to <name1> net=<net1>
load 3C99X.LAN slot=<slot2> NAME=<name2> FRAME=<frametype2>
bind ipx to <name2> net=<net2>
```

The values <slot1> and <slot2> are the numbers of the PCI slots in which the NICs are physically installed. To view the numbers of these PCI slots, use the 3Com Configuration and Diagnostic program for DOS. See "Verifying the PCI Slot Number" on page 61 for instructions.

The values <name1> and <name2> are unique names assigned to each NIC by your system administrator. The values <name1> and <name2> must be different.

The frame parameters <frametype1> and <frametype2> can be one of the following:

- Ethernet_802.2
- Ethernet_802.3
- Ethernet_II
- Ethernet_SNAP

Make sure that the frametype for the server and the workstation is the same. For example, if the server uses Ethernet_802.2, the workstation must also use Ethernet_802.2.

The values <net1> and <net2> are unique numbers assigned by the system administrator to each NIC. Make sure that <net1> and <net2> are different numbers.

See the appropriate Novell NetWare manuals for further information.

Verifying the PCI Slot Number

To verify the PCI slot number in which a NIC is installed:

- 1 Boot the NetWare server with the -na option.
This prevents the AUTOEXEC.NCF file from loading. For example, enter:
server -na
- 2 Issue the load command for the NIC LAN driver without a slot parameter.
For example, enter:
load sys:\system\3c99x.lan

- 3 NetWare lists the valid slot number(s) for the NIC, depending on how many NICs are installed. The values appearing in the list are the slot values that you should use.

Example:

After you issue the command, a message appears. At the end of the message, additional text similar to the following appears:

```
Total of 2 3C99x PCI adapter card(s) found. Supported slot
values are 2,3.
```

```
Slot:2
```

Installing Server Features

Two drivers are associated with 3Com Advanced Server technology features under NetWare: SE and LBRSL.

- 1 From the Configuration 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 this command:

```
3c99xC_txm:\nwserver
```

The following message appears:

```
Product "3Com DynamicAccess Server Features" 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 3Com Advanced Server software to the SYS volume.

Configuring Groups

- 1 Press Esc to return to the Installation Options screen.
- 2 From the Configuration 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 SE and LBRSL drivers before any commands to load LAN drivers. For example:

```
load se
```

```
load lbrsl
```



CAUTION: Do not set Novell's Load Balance Local LAN=ON when using SE and LBRSL (the 3Com Load Balancing suite).

- b** Add or verify the LOAD commands for the LAN drivers for all slot-frame instances.
- c** For 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 protocol BIND commands from each secondary NIC.
- f** For each group, add an LBRSL GROUP command to group the primary and secondary NICs together. There can be only one LBRSL GROUP command per group, and it must list the primary and all secondary NICs. Place this command after the LAN driver LOAD commands or the SYS:ETC\NITSYS.NCF command. To specify a load balancing group with resilient server links, use the LB option. To specify a resilient server link group without load balancing, use the RSL option.



CAUTION: If you are connecting the 3C990B NIC to a spanning tree-enabled hub or switch, it is possible that the link may drop during load/reset. To avoid this potential problem, avoid creating the load balancing group in the AUTOEXEC.NCF file and comment out the LBRSL GROUP/BIND LB <slot 1><slot 2> line. Wait a couple of minutes until one of the clients connected to the server is able to "see" the server. Then use the command prompt on the server console screen to enter the command shown above to form the load balancing group.

For the LBRSL GROUP command syntax, see "Server Feature Commands" on page 69.

For more information on maintaining the group configuration, see "Maintaining Groups" on page 65.

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

The sample AUTOEXEC.NCF file below shows a group of two NICs. The primary NIC in slot 10001 is bound to a secondary NIC in slot 10002.

```
load se
load lbrsl

;Define primary NIC slot-frame instances
load 3c99x slot=10001 frame=ethernet_802.2 name=p1_802.2
load 3c99x slot=10001 frame=ethernet_ii name=p1_ii

;Define secondary NIC slot-frame instances
load 3c99x slot=10002 frame=ethernet_802.2 name=p2_802.2
load 3c99x slot=10002 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 10001 primary and NIC 10002
secondary
lbrsl group lb 10001 10002
;To create a resilient server link group without load
balancing (for
;use with NICs from manufacturers other than 3Com) use the
rsl option:
;lbrsl group rsl 10001 10002
```

Verifying the Installation and Configuration

To verify that the 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 Drivers*.

The *Available LAN Driver* menu appears. If the driver has been properly loaded, the driver 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 #XXXXXX passed.
```


Changing NetWare Driver Configuration Parameters

You can change server configuration parameters using the NetWare installation program Configuration screen. The following table lists the parameters shown on the Configuration screen. Default values are shown in uppercase text.

Parameter	Range of Values	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.
ENABLE_CHKSUM	0 (Disable) 1 (Enable)	NetWare 5.x only. Enter the parameter on the load line to enable TCP/IP checksum offload. The default value is 0 (zero), which means <i>Disable</i> . Do not enable TCP/IP checksum offload if you plan to form load balancing/failover groups.
SHD_LEVEL	0 (None) 1 (Basic) 2 (Enhanced) 3 (Basic + Enhanced)	1 — The default value, indicating Basic . Monitors levels for the following self-healing driver conditions: firmware heartbeat, interrupt availability, recoverable transmit and receive errors (CRC, transmit underruns, receive overruns, collisions, jabbers). 2 — Indicates Enhanced . In this state the NIC monitors DMA stalls and hardware errors.
VERBOSE	0 (Disable) 1 Enable	1 — Enables driver warning and error messages. The default value is 0 (zero), which means <i>Disable</i> .
MEDIA_SELECT	0 (Auto negotiate) 1 (10 Mbps HALF duplex) 2 (10 Mbps FULL duplex) 3 (100 Mbps HALF duplex) 4 (100 Mbps FULL duplex)	Sets the media speed at which the NIC communicates with other network devices. The default value is 0 (zero), which means <i>Auto negotiate</i> . In Auto negotiate mode, the NIC automatically sets itself to the best possible speed and duplexity of the network. When set at any other valid value (1-4), the NIC is forced to connect at the rate indicated in the Range of Values column. Note: If you force the speed and duplexity on the NIC by using this parameter, make sure that the NIC has the same speed and duplexity as the network.

Maintaining Groups

3Com Advanced Server technology server features allow you to configure load balancing groups. The load balancing features are described in "3Com DynamicAccess Advanced Server Features" on page 9.

The following 3Com Advanced Server technology features are available for NIC groups in NetWare:

- load balancing
- RSL failover

The examples in this section illustrate typical actions you might take in the course of maintaining a 3Com Advanced Server server configuration under NetWare. They show how to add NICs and groups to a server where 3Com Advanced Server technology features are already installed and configured.

Two drivers are associated with 3Com Advanced Server technology features in NetWare: SE and LBRSL.

Planning the Configuration

In planning the configuration of your load balancing groups, consider the following factors:

- 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 group. Each group must include at least two NICs.
- Decide whether you want to use a foreign NIC in one of the groups. One foreign NIC (one that is not a 3C990B NIC) is allowed in one group per server.
- Decide which NIC is to be the primary NIC in each group.
- Decide whether groups are to perform load balancing:
 - Load balancing groups provide failover and share the network load.
 - Resilient server link groups provide failover, but do not share the network load.
 - If you plan to form load balancing/failover groups, do not enable TCP/IP checksum offload.
- 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).
- Obtain the slot numbers of the NICs. You need these numbers if you are installing more than one NIC. See "Obtaining Slot Numbers" on page 57 for instructions.

Adding a Secondary NIC to a Group

To add a secondary NIC to a load balancing group, follow these steps:

- 1 Install the new secondary NIC.
Follow the procedures in "Installing and Connecting the NIC" on page 18.
Connect the new secondary NIC to the network that is used by the group.
- 2 Make the following changes to the AUTOEXEC.NCF file:
 - Add or verify the LOAD commands for the LAN drivers for all slot-frame instances.
 - Load the same protocols and frame types on the new secondary NIC.
 - Add the slot number of the new secondary NIC to the LBRSL GROUP command.
- 3 Reboot the server.
The sample AUTOEXEC.NCF file in the following figure shows a group of three NICs. The primary NIC in slot 10001 is bound to two secondary NICs in slot 10002 and slot 10003.

```

load se
load lbrsl

;Define primary NIC slot-frame instances
load 3c99x slot=10001 frame=ethernet_802.2 name=p1_802.2
load 3c99x slot=10001 frame=ethernet_ii name=p1_ii

;Define secondary NIC slot-frame instances
load 3c99x slot=10002 frame=ethernet_802.2 name=p2_802.2
load 3c99x slot=10002 frame=ethernet_ii name=p2_ii
load 3c99x slot=10003 frame=ethernet_802.2 name=p3_802.2
load 3c99x slot=10003 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 10001 primary and NICs 10002 and
1003 secondary
lbrsl group lb 10001 10002 10003
;To create a resilient server link group without load
balancing (for
;use with NICs from manufacturers other than 3Com) use the
rsl option:
;lbrsl group rsl 10001 10002 10003

```

Adding a Group

To add a load balancing group, follow these steps:

- 1 Install the NICs.

Follow the procedures in "Installing and Connecting the NIC" on page 18. Connect all NICs in the group to the same network.
- 2 Make the following changes to the AUTOEXEC.NCF file:
 - Add or verify the LOAD commands for the LAN drivers for all slot-frame instances.
 - In each group, load the same protocols and frame types on the primary and all secondary NICs.
 - On the primary NIC only, bind a protocol to each slot-frame instance.
 - Remove any BIND commands from each secondary NIC.
 - For each group, add an LBRSL GROUP command to bind the primary and secondary NICs together. There can be only one LBRSL GROUP command per group, and it must list the primary and all secondary NICs. Place this command after the LAN driver LOAD commands or the SYS:ETC\NITSYS.NCF command. To specify a load balancing group with resilient server links, use the LB option. To specify a resilient server link group without load balancing, use the RSL option.

For the LBRSL GROUP command syntax, see "Server Feature Commands" on page 69.

3 Reboot the server.

The sample AUTOEXEC.NCF file in the following figure shows one group of three NICs and one group of two NICs. The primary NIC in slot 10001 is bound to two secondary NICs in slot 10002 and slot 10003. The primary NIC in slot 10004 is bound to the secondary NIC in slot 10005.

```
load se
load lbrsl

;Define Group 1 primary NIC slot-frame instances
load 3c99x slot=10001 frame=ethernet_802.2 name=p1_802.2
load 3c99x slot=10001 frame=ethernet_ii name=p1_ii

;Define Group 1 secondary NIC slot-frame instances
load 3c99x slot=10002 frame=ethernet_802.2 name=p2_802.2
load 3c99x slot=10002 frame=ethernet_ii name=p2_ii
load 3c99x slot=10003 frame=ethernet_802.2 name=p3_802.2
load 3c99x slot=10003 frame=ethernet_ii name=p3_ii

;Define Group 2 primary NIC slot-frame instances
load 3c99x slot=10004 frame=ethernet_802.2 name=p4_802.2
load 3c99x slot=10004 frame=ethernet_ii name=p4_ii

;Define Group 2 secondary NIC slot-frame instances
load 3c99x slot=10005 frame=ethernet_802.2 name=p5_802.2
load 3c99x 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=ff.ff.ff.00

;Create Group 1 with NIC 10001 primary
;and NICs 10002 and 10003 secondary
lbrsl group lb 10001 10002 10003

;Create Group 2 with NIC 10004 primary
;and NIC 10005 secondary
lbrsl group lb 10004 10005

;To create resilient server link groups without load balancing
;use the rsl option:
;lbrsl group rsl 10001 10002 10003
;lbrsl group rsl 10004 10005
```

Server Feature Commands

3Com Advanced Server feature commands for NetWare can be used to create sophisticated configurations of groups and for troubleshooting. You can enter them at the NetWare command line or add them to the appropriate NCF file. The commands are summarized below.

As shown in the examples, all commands are preceded by the keyword *lbrsl*.

group

This command creates groups from specified slot parameters for primary and secondary NICs.

Syntax **lbrsl group lb addr** *RxIPAddr pri_slot sec_slot*
[sec_slot ...]

lbrsl group rsl *pri_slot sec_slot*
[sec_slot...]

where:

lb specifies a load balancing group.

rsl specifies a resilient server link group.

RxIPAddr is a dedicated IP address for the load balancing group

pri_slot is the PCI slot number of the primary NIC.

sec_slot is the PCI slot number of a secondary NIC.

Example **lbrsl group lb addr 192.1.1.100 10001**
10002

lbrsl group rsl 10001 10002

Default None

display status

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

Syntax **lbrsl display status** [*pri_slot*]

where:

pri_slot is the PCI slot number of the primary NIC in the group for which information is to be displayed. If this parameter is not specified, information for all groups is displayed. An example of the type of information displayed follows:

Group NNN (LB group)

Primary board id: Original NNN, Current NNN

Load balancing on incoming IP packets: Enabled; IP Rx Addr: NN.NN.NN.NN

Primary node address: XX:XX:XX:XX:XX:XX

Timeout values in seconds: send NNN, receive NNN, wait NNN, link NNN

Probe Interval: NNN seconds

Slot number NNN (Active), Node Address:
 XXX:XXX:XXX:XXX:XXX:XXX

Example **lbrsl display status 10001**

help

This command displays the syntax for the 3Com Advanced Server server features commands.

Syntax `lbrsl help`

link timeout

When a group is being created, the software waits the number of seconds specified by this command for the link/topology check to finish and then displays timeout information.

Syntax `lbrsl link timeout seconds`

where:

seconds is the time in seconds.

Example `lbrsl link timeout 10`

Default 5

probe interval

This command sets the probe packet interval. If no argument is specified or the specified argument is invalid, the current value is displayed. Otherwise, the new value is displayed.

Syntax `lbrsl probe interval seconds`

where seconds is the interval in seconds.

Example `lbrsl set probe interval 1`

Default 1 second

If the delay is longer than 1 second, NIC or link failures are not recognized as quickly.

receive timeout

This command sets the receive timeout individually for each group and displays a message for each loaded frame type.

Syntax `lbrsl receive timeout pri_slot seconds`

where:

pri_slot is the PCI slot number of the primary NIC.

seconds is the time in seconds

Example `lbrsl receive timeout 10001 1`

Default 1 second

retry count

This command sets the number of retries that the software attempts when a probe packet fails to appear at the receive end. After the retries, the software puts the board in Wait mode. If no argument is specified or the specified argument is invalid, the current value is displayed. Otherwise, the new value is displayed.

Syntax **lbrsl retry count** *number_of_retries*
where:
number_of_retries is any positive integer

Example **lbrsl retry count 2**

Default 5

send timeout

This command sets the timeout value, in seconds, that the software waits before retransmitting a probe packet when a send request to the link support layer (LSL) is not acknowledged. A message is displayed for each loaded frame type.

Syntax **lbrsl send timeout** *pri_slot seconds*
where:
pri_slot is the PCI slot number of the primary NIC.
seconds is the time in seconds.

Example **lbrsl send timeout 1001 10**

Default 10

ungroup

This command deletes a group. The LAN driver for the group must not be loaded. The following message appears for all frame types that the NIC supports:

```
Cleaning up resources for group associated with Primary Slot #xxxx.
```

Syntax **lbrsl ungroup** *pri_slot*
where:
pri_slot is the PCI slot number of the primary NIC.

Example **lbrsl ungroup 10001**

Default None

wait timeout

This command sets the timeout value, in seconds, that the software waits before marking a NIC that is in wait mode as failed (see retry count). If no argument is specified or if the specified argument is invalid, the current value is displayed. Otherwise, the new value is displayed.

Syntax **lbrsl wait timeout seconds**
 where:
 seconds is any positive integer.

Example **lbrsl wait timeout 2**

Default 1

Troubleshooting a Group Configuration

Use the troubleshooting tip in the table below to solve problems that may occur in a group configuration.



NOTE: To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:

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

Symptom	Tip
More than one non-3Com server NIC has been detected in one or more groups on this server.	You can use only one NIC that is not a 3Com server NIC in one 3Com load balancing/RSL group per server. Check the groups and remove all but one of the non-3Com server NICs from the groups.

7

Configuring the NIC

This chapter describes how to configure the NIC.



NOTE: Before you change the NIC configuration settings, contact your system administrator.

Default NIC Settings

The table below lists the configuration settings for the NIC. The default setting is shown in uppercase in the Settings column.

Option	Description	Settings
NetBoot ROM	Provides the ability to boot a PC over the network. Enables or disables the Netboot ROM (if a boot ROM is installed on the NIC).	<ul style="list-style-type: none">■ DISABLED■ Enabled
Duplex	<p>Determines if the NIC transmits data across the network in both directions simultaneously (full-duplex) or in one direction at a time (half-duplex).</p> <ul style="list-style-type: none">■ <i>Auto Select</i> allows the NIC to automatically connect at the duplex mode of the connected hub or switch. When you select this setting, the <i>Media Type</i> is automatically set to <i>Auto Select</i>.■ <i>Full-Duplex</i> sets the NIC to operate in full-duplex mode. To use this setting, the switch that you are connected to must support full-duplex. You must also manually set the NIC <i>Media Type</i> setting.■ <i>Half-Duplex</i> sets the NIC to operate in half-duplex mode. You must also set the NIC <i>Media Type</i> setting. <p>Note: If you are running Windows 2000, changes made to the Duplex setting through the 3Com NIC Diagnostics are not reflected in the registry unless you also change the Media Select property setting in Windows 2000:</p> <ol style="list-style-type: none">1 In the Device Manager window, double-click <i>Network adapters</i>.2 Right-click the 3C990B NIC and select Properties.3 Select the Advanced tab.4 Select <i>Media Select</i> in the property list, and make the appropriate setting change in the Value list.	<ul style="list-style-type: none">■ AUTO SELECT■ Full-Duplex■ Half-Duplex

(continued)

Option	Description	Settings
Media Type	<p>Determines the type of media your network is using.</p> <ul style="list-style-type: none"> ■ <i>Auto Select</i> allows the NIC to automatically select the Media Type for you. ■ If you set the NIC <i>Duplex</i> setting to <i>Auto Select</i>, the <i>Media Type</i> is automatically set to <i>Auto Select</i>. ■ If you set the NIC <i>Duplex</i> setting manually, you must set the <i>Media Type</i> setting manually. <p>Note: If you are running Windows 2000, changes made to the Media Type setting through the 3Com NIC Diagnostics are not reflected in the registry unless you also change the Media Select property setting in Windows 2000:</p> <ol style="list-style-type: none"> 1 In the Device Manager window, double-click <i>Network adapters</i>. 2 Right-click the 3C990B NIC and select <i>Properties</i>. 3 Select the Advanced tab. 4 Select <i>Media Select</i> in the property list, and make the appropriate setting change in the Value list. 	<ul style="list-style-type: none"> ■ AUTO SELECT ■ 100BASE-TX (100 Mbs) ■ 10BASE-T (10 Mbs)
Self Healing	<p>In BASIC mode, monitors firmware heartbeat and interrupt stalls, and tries to automatically reset the NIC.</p> <p>Also monitors link status and reports changes.</p> <p>In ENHANCED mode, checks for transmit/receive errors and tries to recover.</p>	<ul style="list-style-type: none"> ■ BASIC ■ Disabled ■ Enhanced
Error Tolerance	<p>Specifies threshold levels for transmit/receive errors. An RSL failover or NIC reset occurs when the threshold is exceeded during the sampling period.</p> <ul style="list-style-type: none"> ■ High = 100 of each error category (default setting) ■ Medium = 50 of each error category ■ Low = 5 of each error category 	<ul style="list-style-type: none"> ■ HIGH ■ Medium ■ Low
Alert Type	<p>Enabled alert types are reported to the Windows System Events monitor. The default setting is ALL. alert types:</p> <ul style="list-style-type: none"> - Information - Warning - Error 	<ul style="list-style-type: none"> ■ Off ■ Information ■ Warning ■ Error ■ ALL
Flow Control	<p>When enabled, the NIC throttles the incoming data packet stream to prevent the input buffers from overflowing and losing packets.</p>	<ul style="list-style-type: none"> ■ DISABLED ■ Enabled

Configuration Methods

The NIC can be configured using any of the methods listed in the table below.



NOTE: This section describes how to configure the NIC using the 3Com NIC Diagnostics program for Windows. For instructions on using the other two methods, see the file or section mentioned in the table.

Method	Description	Requirement(s)
3Com NIC Diagnostics program for Windows	<p>Configure the NIC locally using the 3Com NIC Diagnostics program for Windows:</p> <ol style="list-style-type: none"> 1 Make sure that the 3Com NIC diagnostics program is installed. See "Installing the 3Com NIC Diagnostics Program" on page 29 for installation instructions. See "Using the 3Com NIC Diagnostics Program" later in this chapter for usage instructions. 2 Open the Windows <i>Start</i> menu. 3 Select <i>Programs</i>, and then <i>3Com NIC Utilities</i>. 4 Click <i>3Com NIC Doctor</i>. 	Windows 2000 Windows NT 4.0 Windows Me Windows 98, or Windows 95
3Com Configuration and Diagnostics program for DOS	<p>Configure the NIC locally using the 3Com Configuration and Diagnostics program for DOS:</p> <ol style="list-style-type: none"> 1 Copy <i>3c99xcfg.exe</i> from the <i>EtherCD</i> to the root directory of a DOS-bootable diskette. 2 Reboot the PC using the DOS-bootable diskette. 3 Enter at the DOS prompt: a:\3c99xcfg.exe <p>See "Using the 3Com DOS Configuration Program" on page 77 for more information. Customers running Japanese DOS must switch to U.S. mode DOS before running this program.</p>	DOS or NetWare
DMI 2.0 or 2.0s	<p>Configure the NIC remotely using the 3Com DMI Agent software. See "Installing the 3Com DMI Agent" on page 99 for more information.</p>	3Com DMI Agent and a DMI-compatible browser or a network management application that supports DMI 2.0 or 2.0s
Windows 2000 Advanced Tab	<p>Configure the NIC locally as described in "Changing Windows 2000 Property Settings" on page 52.</p>	Windows 2000

Changing General NIC Configuration Settings

This section describes two NIC configuration methods. Depending on your PC operating system, you can use one of the following configuration programs:

- **3Com NIC Diagnostics Program**—for PCs running Windows 2000, Windows NT 4.0, Windows Me, Windows 98, or Windows 95.
- **3Com Configuration and Diagnostics Program for DOS**—for PCs running DOS and NetWare.

Using the 3Com NIC Diagnostics Program

This section describes NIC configuration for PCs running Windows 2000, Windows NT 4.0, Windows Me, Windows 98, or Windows 95.

Before you configure the NIC, make sure that:

- The NIC is installed in the PC and is connected to the network.
- The network driver is installed.
- The 3Com NIC Diagnostics program is installed.

To change the NIC general configuration settings, such as network driver optimization, duplex mode, and media type:

- 1 Open the Windows *Start* menu.
- 2 Select *Programs*, and then *3Com NIC Utilities*.
- 3 Click *3Com NIC Doctor*.

The 3Com NIC Diagnostics General screen appears.



NOTE: Click Help to obtain general information about the function of a screen. To obtain specific information about any topic on a screen, click the question mark (?) in the upper right corner of the screen, move it over a topic, and click once.

- 4 If your PC has more than one NIC installed, open the Network Interface Card (NIC) list box and select the NIC to be configured.
- 5 Click the Configuration tab.
The Configuration screen appears.
- 6 Under Network Parameter, select the setting to be changed.
For a description of each setting, click the question mark (?) in the upper right corner of the screen, move it over a setting, and click once.
- 7 Open the Set Value list box and select a new value from the list of available options.
Repeat the process to change any other configuration setting.
To undo changes and return the settings to their previous values, click *Undo Changes*.
To return the settings to the factory default settings, click *Set Factory Defaults*.
- 8 Click *OK* to save the changes and exit the program.



NOTE: For complete instructions on using the 3Com NIC Diagnostics program, see "Running NIC Diagnostics" on page 91.

Using the 3Com DOS Configuration Program

This section describes NIC configuration for computers running DOS or NetWare.

To run the DOS diagnostic program:

- 1 Copy 3c99xcfg.exe from the *EtherCD* to the root directory of a DOS-bootable diskette.



NOTE: If you do not have a DOS-bootable diskette, see "Making a DOS-Bootable Diskette" on page 15 for instructions.

- 2 Boot to DOS using the DOS-bootable diskette.

- 3 Enter the following at the DOS prompt:

a:\3c99xcfg.exe

where a:\ is the drive containing the DOS-bootable diskette.

If multiple NICs are installed in the PC, select Select NIC on the first screen to display a list of installed NICs. Use the arrow keys to select the NIC that you want to configure and press Enter.

- 4 Use the arrow keys to scroll the list and make a selection. Press Enter.



NOTE: On the Configuration screen, when you choose the Auto Select setting for Media Type, the setting for Duplex is automatically changed to Auto Select. Selecting Auto Select for Duplex automatically changes the Media Type setting to Auto Select.



NOTE: Note that any configuration change you make through the Windows 2000 Advanced tab overrides the same configuration setting made through the 3Com NIC (Windows) Diagnostic program or the 3Com DOS Diagnostic program.

- 5 Continue this procedure for other options. For more information on a specific option, select the option and press F1.



NOTE: Press Esc to return to a previous screen. If a secondary window is open, press Esc to close the window.

Configuring the Managed PC Boot Agent (MBA)

This section explains how to configure the Managed PC Boot Agent (MBA) boot ROM to boot from the network.



NOTE: For detailed information on using, configuring, and troubleshooting the MBA boot ROM, refer to the *Managed PC Boot Agent User Guide*, located with the MBA software on the *EtherCD*.

Enabling or Disabling the Boot ROM Setting

The default NIC boot ROM setting is *Disabled*. This setting must be enabled to boot from the network.

To enable or disable the NIC boot ROM setting:

- 1 Make sure that the NIC is installed and is connected to the network and that the NIC driver is installed.
- 2 Open the Windows *Start* menu.
- 3 Select *Programs*, and then *3Com NIC Utilities*.

- 4 Click *3Com NIC Doctor*.
The 3Com NIC Diagnostics General screen appears.
- 5 Select the Configuration tab.
The Configuration screen appears.
- 6 Under Network Parameter, select *NetBoot ROM*.
- 7 Open the Set Value list box and select *Enabled* to enable the boot ROM or *Disabled* to disable the boot ROM.
- 8 Click *OK* to save the setting and exit the program.

Booting From the Network

The boot process for the MBA boot ROM varies depending on the type of PC you have (BBS BIOS-compatible or non-BBS BIOS-compatible).

If your PC was purchased recently, it may be BBS (BIOS Boot Specification) BIOS-compatible. The BBS determines how the system BIOS identifies boot devices in a PC (such as a CD-ROM drive, a hard drive, or a floppy drive), allows the user to select the boot order of these devices, and then attempts to boot from each device in the specified order.

Refer to your PC documentation if you do not know which type of PC you have.

BBS BIOS-Compatible PCs

To enable a BBS BIOS-compatible PC to boot from the network using the MBA boot ROM:

- 1 Make sure that the NIC boot ROM setting is *Enabled*.
See the previous section, "Enabling or Disabling the Boot ROM Setting," for instructions.
- 2 Set the MBA manually as the first boot device in the PC BIOS.
Refer to your PC documentation for instructions on accessing and configuring the PC BIOS.
- 3 Reboot the PC.

The MBA attempts to boot from the network using the default boot method PXE. To change the default boot method or any other MBA configurations, press Ctrl+Alt+B when the following message appears:

```
Initializing MBA. Press Ctrl+Alt+B to configure...
```

If the network boot fails, the following message appears:

```
Network boot aborted, press any key to continue
```

The BIOS continues to the next device in the boot order (for example, the local hard drive).



NOTE: To cancel the network boot, press Esc anytime during the network boot process.

Non-BBS BIOS-Compatible PCs

To enable a non-BBS BIOS-compatible PC to boot from the network using the MBA boot ROM:

- 1 Make sure that the NIC boot ROM setting is *Enabled*.
See "Enabling or Disabling the Boot ROM Setting" on page 77 for instructions.
- 2 Change the MBA default boot setting from *Local* to *Network*.
To change the default boot setting or any other MBA configurations, use the MBACFG utility or press Ctrl+Alt+B when the following message appears:
Initializing MBA. Press Ctrl+Alt+B to configure...



CAUTION: For computers running Windows 98, boot directly to DOS (using a DOS-bootable diskette) instead of restarting in MS-DOS mode from a Windows 98 session. The MBACFG.EXE program will not work properly if you restart in MS-DOS mode with the 3C990B NIC drivers loaded.



NOTE: For more information on using, configuring, and troubleshooting the MBA boot ROM, refer to the *Managed PC Boot Agent User Guide*, located with the MBA software on the *EtherCD*.

Disabling the 3Com Logo

To disable the 3Com logo that appears during startup:

- 1 Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.
- 2 Open the Windows *Start* menu.
- 3 Select *Programs*, and then *3Com NIC Utilities*.
- 4 Click *3Com NIC Doctor*.
The 3Com NIC Diagnostics General screen appears.
- 5 On the General screen, make sure that the check box next to *Show 3Com Logo on Startup* is not selected.
- 6 Exit the 3Com NIC Diagnostics program.

8

Troubleshooting the NIC

This chapter describes procedures for locating problems you might have with the 3Com 10/100 PCI (3C990B) NIC. It explains how to:

- Interpret the NIC LEDs.
- Access 3Com support databases.
- Troubleshoot NIC installation problems.
- Troubleshoot NIC and network connection problems.
- Troubleshoot Remote Wake-Up.
- Remove the network driver.



NOTE: To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:

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

Interpreting the NIC LEDs

The 3C990B NICs have light-emitting diodes (LEDs), as described in the following table, that can assist with network troubleshooting.

LED	State	Meaning
YEL/100 GRN/10	Green	If drivers are installed, the 10BASE-T connection is active. If drivers are not installed, the NIC is receiving power.
	Off	Something is preventing the connection between the NIC and the hub or switch.
	Blinking	The cable polarity is reversed. Try a different network cable or contact your system administrator.
YEL/100 GRN/10	Yellow	If drivers are installed, the 100BASE-TX connection is active. If drivers are not installed, the NIC is receiving power.
	Off	Something is preventing the connection between the NIC and the hub or switch.
	Blinking	The cable polarity is reversed. Try a different network cable or contact your system administrator.
ACT (activity)	Blinking	Network traffic is present.
	Steady	Heavy network traffic is present.
	Off	No network traffic is present.

Viewing the NIC LEDs in the Diagnostics Program

To view the LEDs in the 3Com NIC Diagnostics program:

- 1 Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.



NOTE: For instructions on using the 3Com NIC Diagnostics program, see “Running NIC Diagnostics” on page 91.

- 2 Open the Windows *Start* menu.
- 3 Select *Programs*, and then *3Com NIC Utilities*.
- 4 Click *3Com NIC Doctor*.

The 3Com NIC Diagnostics General screen appears and displays following LEDs:

Link — lights if there is a valid connection between the NIC and the network.

Transmit — lights if the NIC is transmitting information.

Receive — lights if the NIC is receiving information.

Troubleshooting Problems with the LEDs

If a Link LED indicates a problem, check the following ensure that:

- 1 Your network hub or switch and the cable connecting to your NIC comply with the specifications appropriate for your network connection.
- 2 The hub or switch is powered on.

Accessing 3Com Support Databases

In addition to the 3Com support databases listed in this section, check the README.TXT files in the ENGLISH, INSTALLS, and NWSERVER subdirectories and check the Help text files located in the HELP directory on the *EtherCD*.

Accessing the 3Com Knowledgebase

To access a database of technical information that can help you diagnose and solve NIC installation, configuration, and upgrade problems, go to:

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

Accessing the 3Com NIC Help System

To access the 3Com NIC Help system:

- 1 Make sure that the NIC, its driver, and the 3Com NIC Diagnostics program are installed. See “Installing the 3Com NIC Diagnostics Program” on page 29 for instructions.
- 2 Open the Windows *Start* menu.
- 3 Select *Programs*, and then *3Com NIC Utilities*.
- 4 Select *3Com NIC Doctor Help*.
The main Help screen appears.
- 5 Click *Help Topics* to display a list of Help topics or click *Find* to search for a Help topic.

Accessing Release Notes and Frequently Asked Questions

To access release notes and frequently asked questions about the NIC:

- 1 Make sure that the NIC, its driver, and the 3Com NIC Diagnostics program are installed. See “Installing the 3Com NIC Diagnostics Program” on page 29 for instructions.
- 2 Open the Windows *Start* menu.
- 3 Select *Programs*, and then *3Com NIC Utilities*.
- 4 Click *3Com NIC Doctor*.
The 3Com NIC Diagnostics General screen appears.
- 5 Click the Support tab.
The Support screen appears.
- 6 Click *Support Databases* to display customer support databases about the NIC in three categories:
 - Release notes** — Display tips about installing and using the NIC.
 - Frequently asked questions** — Display common questions asked by customers and answered by 3Com support experts.
 - Knowledgebase topics** — Display NIC compatibility topics.

Troubleshooting the NIC Installation

If you encounter any of the following problems or error messages, follow the steps in “Cleaning Up a Broken Installation” later in this chapter to resolve the problem.

Problems/Error Messages

- A red X or a yellow exclamation point (!) appears by the name of the NIC in the Windows Device Manager.
- The Network Neighborhood icon does not appear on the Windows desktop.
- The NIC does not appear in the Network Configuration or Properties window.
- Error: “This device is not present, not working properly, or does not have all of the driver installed. Code 22.”
- Error: “Windows was unable to locate a driver for this device.”
- Error: “You have selected a plug and play adapter. Please turn off your machine and install the adapter. Then turn on your machine and reinstall.”

Cleaning Up a Broken Installation

If the network driver installation failed, or was not completed properly, follow the steps below to clean up your system and install the NIC correctly.

This procedure:

- Removes all 3C990B NIC drivers from your system.
- Removes the 3Com NIC Diagnostics program.
- Installs the latest network driver.

You can reinstall the 3Com NIC Diagnostics program after completing this procedure. See “Installing the 3Com NIC Diagnostics Program” on page 29 for instructions.

- 1 Insert the *EtherCD* in the CD-ROM drive.
The *EtherCD* Welcome screen appears.
- 2 Click *NIC Software*.
- 3 Click *Installation Utilities*.
- 4 Click *Undo Broken Installation and Uninstall*.
You are given the option to *Proceed* or go *Back*. Before proceeding, write down your network settings so that you can refer to your notes when you reinstall the NIC.
- 5 Click *Proceed*.
The uninstall process begins. A warning message appears.
- 6 Click *OK*.
A message appears stating that all of the 3C990B NICs have been removed from your system.
- 7 Click *OK*.
- 8 Exit the *EtherCD*, and then exit Windows.
- 9 Restart the computer.
- 10 Install the network driver, as described in “Installing the Network Driver Using the EtherCD” on page 21.
If you are prompted for 3Com files when Windows restarts, open the drop-down box and select the following path:
`\options\cabs`
See Chapter 3, “Installing NIC Drivers and Diagnostics For Windows,” for information about confirming that the NIC and driver are properly installed.

After the driver has been reinstalled, reinstall the 3Com NIC Diagnostics program. See “Installing the 3Com NIC Diagnostics Program” on page 29 for instructions.

Troubleshooting the Network Connection

If you encounter problems with using the NIC or connecting to the network, check the table below for troubleshooting tips.



CAUTION: Before inserting or removing the NIC from the computer, turn the computer power off and unplug the power cord.

Tip	Description
Check the NIC hardware installation	Make sure that the NIC is installed correctly in a PCI slot. Check for specific hardware problems, such as broken traces or loose or broken solder connections. See “Installing and Connecting the NIC” on page 18.
Check the NIC software installation	Make sure that the NIC software is installed correctly in the computer. See Chapter 3, “Installing NIC Drivers and Diagnostics For Windows,” for information about confirming that the NIC and driver are properly installed.

(continued)

Tip	Description (continued)
Check the network connection	<ul style="list-style-type: none"> ■ Inspect all cables and connections. Make sure that the cable complies with length and rating specifications described in "Installing and Connecting the NIC" on page 18. ■ Examine the cable for obvious signs of damage, wear, or crimping. Substitute a known working cable. Check the length and rating of the cable. Make sure that the cable complies with 10BASE-T or 100BASE-TX recommendations.
Check the computer BIOS	Make sure that you are running the latest BIOS for your computer. If the BIOS has not been upgraded in the previous 12 months, contact the computer manufacturer to obtain the current version of the BIOS software.
Run the NIC diagnostic tests	<p>Run the NIC and Network Tests, as described in "Running NIC Diagnostics" on page 91.</p> <p>If the tests fail, replace the NIC with a known working NIC and run the tests again, using the same configuration settings as those used on the failed NIC. If the working NIC passes all tests, the original NIC is probably defective. For information on product repair, see "Technical Support" on page 109.</p>
Check the 3Com support databases	<p>Review the known problems and solutions found in the following areas:</p> <ul style="list-style-type: none"> ■ 3Com Knowledgebase ■ 3Com NIC Help system ■ Release Notes and Frequently Asked Questions <p>See "Accessing 3Com Support Databases" on page 82 for instructions on using these databases.</p>
Download the latest NIC driver	The 3Com Software Library is your World Wide Web connection to software, drivers, and INF files for all 3Com products. Point your browser to the 3Com Web page (http://www.3com.com/). Under Service and Support, click <i>Software, Drivers & INFs</i> .
Run the <i>Clean Up Failed Installation</i> program	The <i>Clean Up Failed Installation</i> program is located on the <i>EtherCD</i> . See "Cleaning Up a Broken Installation" on page 83 for instructions.

Troubleshooting Remote Wake-Up

If your computer does not boot in response to a Remote Wake-Up event, perform these troubleshooting steps:

- 1 Make sure that the computer meets the "Remote Wake-Up Requirements" on page 6.



NOTE: Wake-On-Error is enabled by default.

- 2 Make sure that you are using the latest driver for the NIC.
This driver is shipped with the NIC on the *EtherCD*. It can also be downloaded from the 3Com Software Library. Point your Web browser to the 3Com home page:

http://www.3com.com/

Under "Service and Support," click *Software, Drivers, and INFs*.

- 3 Check the computer BIOS.
 - Boot the computer and enter the BIOS.
 - For instructions on entering the BIOS, refer to the computer documentation or consult the computer vendor.
 - Locate the Wake-Up on LAN event setting.
 - Verify that the setting is enabled.
- 4 Check the Remote Wake-Up cable connection.

If the computer complies with PCI 2.2, the Remote Wake-Up cable is not required. Remote Wake-Up is automatically enabled through the PCI bus.

 - Turn off the power to the computer and remove the computer cover.
 - Make sure that the Remote Wake-Up cable is plugged in to the RWU connector on the NIC and in to the appropriate connector on the computer motherboard. Unplug and reinsert the cable if necessary.
 - Replace the Remote Wake-Up cable with a known functioning Remote Wake-Up cable and perform the Remote Wake-Up Test again.
- 5 If the previous steps have failed, install a known functioning Remote Wake-Up NIC in the computer.

If Remote Wake-Up works with the new NIC installed, consult your computer vendor for a replacement NIC.

If Remote Wake-Up does not work with the new NIC installed, there may be a problem with the computer motherboard. Consult your computer manufacturer.

Troubleshooting a Network Connection

When working with 10BASE-T or 100BASE-TX cabling, concentrators, and NICs from different vendors, it is possible to connect everything but still have no network communication.



NOTE: For additional network troubleshooting information, see “Running NIC Diagnostics” on page 91.

To narrow the range of possible causes of common network connection problems:

- 1 Determine whether your equipment complies with the 10BASE-T or 100BASE-TX standard. This is particularly important for data concentrators (hubs or repeaters).
- 2 Connect a straight-through cable from the PC to the hub.

The hub performs an internal crossover so that the signal can go from TD+ to RD+ and TD- to RD-. When you look at an RJ-45 connector from the front (that is, the opposite side from where the wires enter the connector), pin 1 is identified on the right side when the metal contacts are facing up.
- 3 Make sure that the TD+ and TD- wires are twisted together, and that the RD+ and RD- are twisted together.

Using wires from opposing pairs can cause signals to be lost.

Troubleshooting Hubs

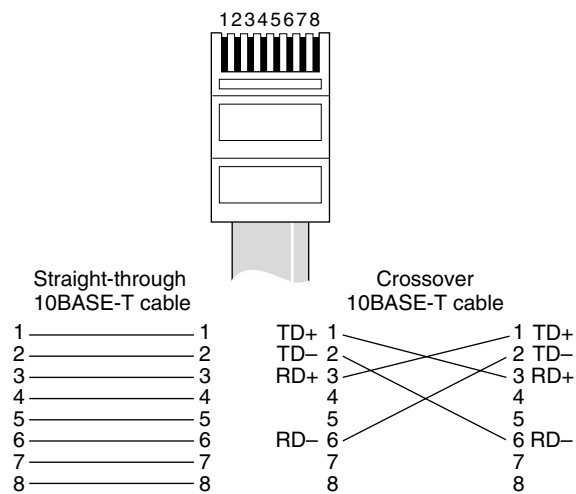
A crossover cable can be used to identify the type of failure when hub performance or connectivity is in question.

To use a crossover cable:

- 1 Connect a file server and a client PC back-to-back with a crossover cable to verify that the NIC and network operating system are properly configured.
- 2 To make a crossover cable, connect TD+ to RD+ and TD- to RD-.
The cable performs the crossover that is usually performed by the hub.

Cabling Pinouts

The following illustration compares the cabling pinouts for straight-through and crossover cables.



If the file server and client PC function together as a small network, then either the existing cabling or the hub is failing.

When a crossover cable is used, the LED on the NIC functions differently than it would under normal operating conditions. For example, with a correct crossover connection, the LED lights, whereas with a straight-through connection, the LED does not light. If you make a crossover cable and the polarity is mismatched (that is, TD+ to RD- instead of TD+ to RD+), the LED blinks.

Removing the Network Driver

To remove the network driver from your computer, follow the steps for your operating system.

Windows 2000

The Windows 2000 system does not allow you to uninstall the network driver from the Network and Dial-up Connections window. To remove the network driver:

- 1 Right-click the My Computer icon.
- 2 Select *Properties* on the pop-up menu.
The System Properties screen appears.
- 3 Select the Hardware tab.

- 4 Click *Device Manager* in the middle panel.
The Device Manager screen appears.
- 5 Double-click *Network Adapters*.
- 6 Right-click the name of the NIC.
- 7 Select *Uninstall* on the pop-up menu.
A warning message appears.
- 8 Click *OK* to confirm the driver removal.
The network driver is removed. The Device Manager screen appears.



NOTE: The Windows 2000 system does not allow you to uninstall the 3Com Advanced Server technology miniport using the Device Manager. To remove Advanced Server technology features in Windows 2000, see “Removing 3Com DynamicAccess Advanced Server Features” on page 89.

- 9 Exit the Device Manager and shut down Windows.
To reinstall the NIC driver and software, restart the computer.
To physically remove the NIC from the computer, shut down the system, turn the power off, and remove the NIC from the computer.

Windows NT 4.0

To remove the network driver:

- 1 Double-click the My Computer icon, then the Control Panel icon, and then the Network icon.
The Network screen appears.
- 2 Click the Adapters tab.
- 3 Select the name of the NIC in the Network Adapters box, and then click *Remove*.
- 4 Click *Yes* to confirm the removal.
- 5 Click *Close* to close the Network screen.
You are prompted to restart the computer.
- 6 Depending on whether you are removing the NIC or reinstalling NIC software, do the following:
 - If you are physically removing the NIC from the computer, click *No*. Do not restart the computer until you shut down the system, turn the power off, and remove the NIC from the computer.
 - If you are reinstalling the NIC software, click *Yes* to restart the computer.

Windows 95, 98, and Me

To remove the network driver:

- 1 Double-click the My Computer icon, then the Control Panel icon, and then the System icon.
- 2 Click the Device Manager tab.
- 3 Double-click *Network adapters*.
- 4 Select the name of the NIC.
- 5 Click *Remove*.

6 Click *OK* to confirm the device removal.



NOTE: Note that removing the network driver does not result in the removal of the diagnostics software. See “Removing the 3Com NIC Diagnostics Program” on page 95.

You are prompted to restart the computer.

If you are physically removing the NIC from the computer, click *No*. Do not restart the computer until you shut down the system, turn the power off, and remove the NIC from the computer.

If you are reinstalling the NIC software, click *Yes* to restart the computer.

Removing 3Com DynamicAccess Advanced Server Features

Follow the steps in this section to remove 3Com DynamicAccess Advanced Server features for your operating system.

Windows NT 4.0

To remove 3Com DynamicAccess Advanced Server features:

- 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 *DA Pass Thru Driver Transport*.
- 5 Click *Remove*.
- 6 Follow the prompts to remove the software and reboot the server.

Windows 2000

The Windows 2000 system does not allow you to uninstall the 3Com Advanced Server technology miniport using the Device Manager. To remove 3Com DynamicAccess Advanced Server features:

- 1 Launch the Windows 2000 Network and Dial-up Connections window.
- 2 Select a Local Area Connection icon.
- 3 Click the right mouse button and select *Properties* from the menu. The Local Area Connections Properties window appears.
- 4 Click the General tab.
- 5 In the General window, select DynamicAccess Protocol and click *Uninstall*.

NetWare

To remove 3Com DynamicAccess Advanced Server features:

- 1 Enter this command at the prompt:
NetWare 4.11: load install
NetWare 5.x: load nwconfig
- 2 In the Installation Options screen, select *Product options*.
- 3 In the Other Installation Actions screen, select *View/Configure/Remove installed products*. The Currently Installed Products screen appears, listing software products that are installed in the system.
- 4 From the list of products, select *3Com DynamicAccess Server Features* and press Del. Select Yes to remove the software.



NOTE: For instructions on removing the 3Com NIC Diagnostics Program from your computer, see "Removing the 3Com NIC Diagnostics Program" on page 95.

9

Running NIC Diagnostics

The 3Com 10/100 PCI (3C990B) NIC uses two types of NIC diagnostics programs: a Windows-based diagnostics program and a DOS-based diagnostics program.



NOTE: Before starting any diagnostics program, close all running applications.

Use the Windows-based 3Com NIC Diagnostics program if you are running any of the following operating systems:

- Windows 2000
- Windows NT 4.0
- Windows Me
- Windows 98
- Windows 95

Use the 3Com DOS Diagnostics program if you are running any of the following operating systems:

- DOS
- NetWare



NOTE: The following sections explain how to start both NIC diagnostics programs. However, specific instructions are provided only for using the Windows-based 3Com NIC Diagnostics program.

This chapter explains how to:

- Run the NIC diagnostic tests.
- View the NIC LEDs in the NIC Diagnostics program.
- View network statistics.
- Use the 3Com icon in the Windows system tray.
- Remove the 3Com NIC Diagnostics program.

Running the 3Com DOS Diagnostics Program

To start the 3Com DOS diagnostics program for DOS and NetWare installations:

- 1 Copy 3c99xcfg.exe from the *EtherCD* to the root directory of a DOS-bootable diskette.



CAUTION: If you are running Japanese DOS, you must switch to U.S. mode DOS before running the 3Com DOS diagnostics program.



NOTE: If you do not have a DOS-bootable diskette, see "Making a DOS-Bootable Diskette" on page 15 for instructions.

- 2 Boot to DOS using the DOS-bootable diskette.
- 3 Enter the following at the DOS prompt:
a:\3c99xcfg.exe
 where a:\ is the drive containing the DOS-bootable diskette.

For more information about the 3Com DOS Diagnostics program to configure the NIC, see "Using the 3Com DOS Configuration Program" on page 77.

Running the NIC Diagnostics Tests

The 3Com NIC Diagnostics program for Windows contains tests that can check the status of the following items:

- Network
- NIC

To run the NIC Test or Network Test:

- 1 Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.
- 2 Open the Windows *Start* menu.
- 3 Select Programs, and then 3Com NIC Utilities.
- 4 Click *3Com NIC Doctor*.

The 3Com NIC Diagnostics screen appears.



NOTE: Click Help to obtain general information about the function of a screen. To obtain specific information about any topic on a screen, click the question mark (?) in the upper right corner of the screen, move it over a topic, and click once.

The following tabs are available for viewing NIC data:

Tab	Description
General	Select the General tab to display the node address, I/O address, and device ID for the installed NIC.
Configuration	Select the Configuration tab to view and modify configuration settings for the installed NIC.
Statistics	Select the Statistics tab to view network traffic statistics about the installed NIC.
Diagnostics	Select the Diagnostics tab to access diagnostics tests that you can run on the installed NIC.
Support	Select the Support tab to access various 3Com customer support resources.
Utilities	Select the Utilities tab to: - Update firmware for the installed NIC. - Perform an encryption loopback test (to test the encryption chip). - Test the SMBus on the system.

- 5 Select the Diagnostics tab.
 The Diagnostics screen appears.

Running the Network Test

Run the Network Test to check the NIC connectivity to the network.

To successfully pass the Network Connectivity test, at least one of the following conditions must be met:

- A Windows client running on the same network. This client must have a successfully installed Windows diagnostics program that is currently not running.
- A NetWare server running on the same network.
- A DHCP server running on the same network.

A DNS server running on the same network with TCP/IP properties configured for the DNS server.

To run the Network test:

- 1 On the Diagnostics screen, click *Run Network Test*.
The Network Connectivity Test screen appears.
- 2 Click *Start*.
If the test passes, the NIC connection to the network is functioning correctly.
- 3 Click *Close*.
If the test fails, make sure that the:
 - NIC is properly connected to the network cable.
 - Hub or switch to which the NIC is connected is powered on.
 - Cable complies with the proper length and specifications for your network.

Running the NIC Test

Run the NIC Test to check the physical components, connectors, and circuitry on the NIC.

- 1 On the Diagnostics screen, click *Run NIC Test*.
The NIC Test screen appears.
- 2 Click *Perform NIC Test*.
While the test is running, a progress bar indicates test progress.
If the test passes, the NIC is functioning correctly.
If the test fails, a message indicates the error type. Click *Help* in the error message screen to obtain more information.
- 3 Click *Close*.

Viewing the NIC LEDs in the 3Com Diagnostics Program

To view the LEDs in the 3Com NIC Diagnostics program:

- 1 Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.
- 2 Open the Windows *Start* menu.
- 3 Select *Programs*, and then *3Com NIC Utilities*.

4 Click *3Com NIC Doctor*.

The 3Com NIC Diagnostics General screen appears and displays following LEDs:

Link—lights if there is a valid connection between the NIC and the network.

Transmit—lights if the NIC is transmitting information.

Receive—lights if the NIC is receiving information.



NOTE: For instructions on interpreting the NIC LEDs, see “Interpreting the NIC LEDs” on page 81.

Viewing Network Statistics

To view statistical information about the network:

1 Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.

2 Open the *Windows Start* menu.

3 Select *Programs*, and then *3Com NIC Utilities*.

4 Click *3Com NIC Doctor*.

The 3Com NIC Diagnostics General screen appears.

5 Click the *Statistics* tab.

The *Statistics* screen appears, providing numerical data for a variety of network events, such as: packets transmitted, bytes transmitted, late collisions, and so forth. The information is updated by the NIC driver every five seconds.

For a description of each statistic, click the question mark (?) in the upper right corner of the screen, drag it over a statistic and click once. A pop-up box appears, displaying information about the statistic.

6 Click *OK* to exit the diagnostics program. To go to another diagnostics screen, click the appropriate tab.

Using the 3Com Icon in the Windows System Tray

The 3Com icon, which can be enabled to appear in the Windows system tray, allows you to start the 3Com NIC Diagnostics program. It also allows you to view the NIC’s link speed and number of frames sent and received.

Enabling the Icon

To display the 3Com icon in the Windows system tray:

1 Make sure that the NIC, the network driver, and the 3Com NIC Diagnostics program are installed.

2 Open the *Windows Start* menu.

3 Select *Programs*, and then *3Com NIC Utilities*.

4 Click *3Com NIC Doctor*.

The 3Com NIC Diagnostics General screen appears.

5 On the *General* screen, select the check box next to *Show Icon in System Tray*.

6 Close the 3Com NIC Diagnostic program.

The NIC icon appears in the Windows system tray.

When you double-click the icon, the 3Com NIC Diagnostics program starts.

Displaying Network Statistics

When you drag the mouse pointer over the icon (but do not double-click the icon) a network statistics box appears, displaying the following information:

Frames Sent and Received—A count of the number of frames (packets) sent and received through the NIC since the last time statistics were reset.

Link Speed—The speed (10 Mbps or 100 Mbps) at which the NIC is connected to the network. The information is updated each time you move your mouse pointer over the 3Com icon.

Removing the 3Com NIC Diagnostics Program

The 3Com NIC Diagnostics Program can be removed using the Add/Remove Programs Wizard in Windows, or by using the *EtherCD*.

For instructions on using the Add/Remove Programs Wizard in Windows, refer to your Windows documentation.

To remove the 3Com NIC Diagnostics program using the *EtherCD*:

- 1 Start Windows.
- 2 Insert the *EtherCD* in the CD-ROM drive.
The *EtherCD* Welcome screen appears.
- 3 Click *NIC Software*.
- 4 Click *NIC Drivers and Diagnostics*.
- 5 Click *Installation Utilities*.
- 6 Click *Remove Diagnostics*.
- 7 Click *Proceed*, and then follow the prompts on the screen.

A

Specifications and Cabling Requirements

This appendix lists the specifications, standards conformance, cable requirements, and connector pin assignments for the 3Com 10/100 PCI NIC.

3C990B NIC Specifications

The following table provides environmental, interface, and standards information for the 3Com 10/100 PCI NIC with 3XP processor (3C990B family).

Hardware

Memory	128 KB external RAM
Bus interface	<i>PCI Local Bus Specification, Revision 2.2</i> 32-bit bus
PCI master	Supports bus master scatter-gather DMAs.
Dimensions	Length: 13.31 cm (5.24 in) Height: 8.51 cm (3.35 in)
Power requirement	+5 V \pm 5% operating 1.26A maximum for normal operation (375 mA for low power mode)

Network Interface

10 Mbps Ethernet 10BASE-T	Ethernet IEEE 802.3 industry standard for a 10 Mbps baseband CSMA/CD local area network
100 Mbps Ethernet 100BASE-TX	Ethernet IEEE 802.3u industry standard for a 100 Mbps baseband CSMA/CD local area network

Environment

Operating temperature	32° to 158° F (0° to 70° C)
Storage temperature	-22° to 194° F (-30° to 90° C)
Operating humidity	10 to 90% noncondensing
Storage humidity	10 to 90% noncondensing
Altitude	-300 to 3,000 m (-984 ft to 9,840 ft)

Standards Conformance

IEEE 802.3 10BASE-T
IEEE 802.3u 100BASE-TX
IEEE 802.3x full-duplex, auto negotiation, and flow control
IEEE 802.1p (General Attribute Registration protocol) for multicast addresses
IEEE 802.1Q VLAN Tagging

(continued)

Standards Conformance

Microsoft PC97
Microsoft PC98
Microsoft PC99
PCI 2.1 and 2.2
DMI 1.0 and 2.0
ACPI 1.0
SMBus 2.2
WBEM, CIM, WMI

Cabling Requirements

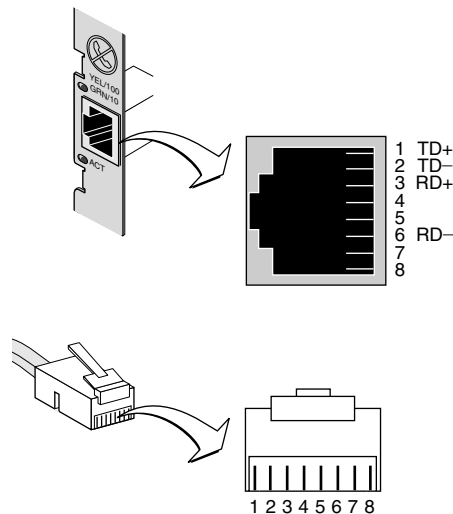
The cable, quality, distance, and connectors must comply with the Electronic Industries Association/Telecommunications Industries Association (EIA/TIA) 568 *Commercial Building Wiring Standard* and the Technical Services Bulletin TSB38 standards.

Network connection criteria are shown below:

NIC:	3C990B family
Cable:	Category 3, 4, or 5 unshielded twisted pair
Network cable connector:	RJ-45
Transceiver:	On-board
Maximum Network Segment:	100 m (328 ft)
Speed:	10/100 Mbps
Media Type:	10BASE-T 100BASE-TX

RJ-45 Connector Pin Assignments

The following illustration shows the RJ-45 connector pin assignments for the 3C990B NICs.



B

Installing the 3Com DMI Agent

This appendix explains how to install the 3Com Desktop Management Interface (DMI) Agent on your PC.

The 3Com DMI Agent allows any DMI-compatible browser or network management application that supports DMI 2.0 to remotely manage and configure advanced features of a 3C990B NIC.



NOTE: For detailed information about the 3Com DMI Agent, refer to the *3Com DMI Agent User Guide* included with the 3Com DMI Agent software on the *EtherCD*.

About the 3Com DMI Agent

The 3Com DMI Agent allows you to obtain basic NIC information, including:

- Node address
- MAC address
- Driver version

Additionally, depending on the features of your NIC, the 3Com DMI Agent allows you to view and configure advanced NIC features, including:

- Managed PC Boot Agent (MBA) software
- Remote Wake-Up events
- Workgroup keep-alive packet
- Remote system alerts (including heartbeat)

Each PC that contains a 3C990B NIC and the 3Com DMI Agent generates a Management Information Format (MIF) file that contains information about the PC and the NIC. DMI applications use the information from the MIF to manage the PC and the NIC.

The content of the MIF is based on the capabilities of the NIC driver found in the PC. For example, if a NIC with an MBA boot ROM is found, all groups related to the boot ROM are included in the MIF for that particular NIC. This ensures that the network management application does not receive irrelevant information for the NIC.

For a description of each MIF supported by the 3Com DMI Agent, refer to the *3Com DMI Agent User Guide* included with the 3Com DMI Agent software on the *EtherCD*.

System Requirements

This section lists the client PC and network management requirements for installing and using the 3Com DMI Agent.

Client PC Requirements

Your PC requires the following items to use the 3Com DMI Agent:

- DMI Service Provider 2.0 or greater (such as Smart Technologies Service Provider 2.0)
- NDIS 3, 4, or 5 driver

- Windows 2000, Windows NT 4.0, Windows Me, Windows 98, or Windows 95 using the appropriate Service Pack listed below:
 - Windows NT 4.0 Service Pack 4
 - Windows 98 Retail Release
 - Windows 95 Retail Service Pack 1 or OEM Service Release (OSR2)

Network Management Requirements

The 3Com DMI Agent InstallShield Wizard checks for the presence of a DMI service provider on the computer you are configuring as a network management station. The network management station requires a DMI-compatible browser or a network management application that supports DMI 2.0, such as:

- Hewlett Packard TopTools
- Tivoli Management Suite
- Dell OpenManage
- Compaq Insight Manager Management Station
- Intel LANDesk Client Manager

Installing the 3Com DMI Agent

This section describes how to install the 3Com DMI Agent on a PC running Windows 2000, Windows NT 4.0, Windows Me, Windows 98, or Windows 95.



NOTE: Before installing the DMI Agent, logon to the PC with an account that has system administration privileges.

To install the 3Com DMI Agent:

- 1 Make sure that the PC meets the requirements listed in “Client PC Requirements” on page 99.
- 2 Make sure that the 3C990B NIC is installed in the PC and is connected to the network.
- 3 Insert the *EtherCD* in the CD-ROM drive.
The *EtherCD* Welcome screen appears.
- 4 Click *NIC Software*.
- 5 Click *Install 3Com DMI Agent Now*.

The 3Com DMI Agent setup program prepares the InstallShield Wizard, which allows you to:

- View the latest README.TXT file
- Copy the *3Com DMI Agent User Guide* to your computer hard drive.



NOTE: The *3Com DMI Agent User Guide* is in Microsoft Word format. If you do not currently have access to Microsoft Word, you can download a free version of the Microsoft Word reader from the Microsoft Web site.

- Install the 3Com DMI Agent software

6 Follow the prompts on the screen.

To verify successful installation, use a DMI-compatible browser or a network management application that supports DMI 2.0 or 2.0s to verify that the 3Com NIC is present.



NOTE: If you have 3Com DynamicAccess Advanced Server features and a foreign (non-3Com) NIC installed, the foreign NIC is displayed as a 3Com NIC in the DMI browser.

Refer to the *3Com DMI Agent User Guide* or contact your system administrator for instructions.

C

EtherCD Content and Navigation

This appendix provides information about *EtherCD* content and navigation.

If auto insert is enabled for your CD-ROM drive, the 3Com Welcome screen is displayed when you insert the *EtherCD* in your CD-ROM drive.

If the Welcome screen is not displayed when you insert the *EtherCD* in your CD-ROM drive, you can:

- Enable the auto insert feature for your CD-ROM drive (see “Enabling Auto Insert” on page 104)

or

- Navigate to the root subdirectories (see “Root Subdirectories List” on page 104)

The following table describes the navigation links available on the Welcome screen:

Links	Description
User Guide	<ul style="list-style-type: none">■ Prints a PDF version of the user guide.■ Copies a PDF version of the user guide to your computer hard drive.
NIC Software	<ul style="list-style-type: none">■ Installs and configures the NIC in supported Windows operating systems.■ Installs 3Com DynamicAccess Advanced Server features.■ Creates installation diskettes to install the NIC software in a PC that does not have a CD-ROM drive installed.
Other Software	<ul style="list-style-type: none">■ Installs Adobe Acrobat Reader (version 4.0 for English or version 3.0 for international).
Register Product	<ul style="list-style-type: none">■ Registers your NIC product online.
Release Notes	<ul style="list-style-type: none">■ Describes the features of 3C990B NICs, includes frequently asked questions and known problems.

Root Subdirectories List

The following table lists and describes the root subdirectories included on the *EtherCD* that shipped with this product.

Subdirectory	Contains
English	In each language subdirectory files specific to that language. This subdirectory contains copies of Adobe Acrobat Reader (4.0 or 3.0), CMI Client installation files, the Disk Copy utility, and a PDF version of the user guide.
Help	Installation and configuration files, basic troubleshooting, support information, and system resource information.
Installs	Images for 3Com DynamicAccess Advanced Server features, MBA, and 3Com <i>EtherDisk</i> diskettes.
Ndis2	The DOS NDIS 2.x driver.
NWCClient	A DOS NetWare client driver file and runtime image file, a sample NET.CFG file, and an installer for the DOS ODI client driver.
NWServer	A server driver, LDI import file, and appropriate .NLMs for loading into a NetWare 4.11 or 5.x server.

Enabling Auto Insert

If auto insert is not enabled for your CD-ROM drive, the *EtherCD* Welcome screen is not displayed when you insert the *EtherCD* in your CD-ROM drive. To enable auto insert on your (Windows 9x) CD-ROM drive:

- 1 Right-click the My Computer icon, and then select *Properties*.
- 2 Select the Device Manager tab.
- 3 Click the + symbol next to CD-ROM in the list.
- 4 Select the name of your CD-ROM drive.
- 5 Click *Properties*, and then select the *Settings* tab.
- 6 Select the check box for *Auto insert notification*.

To view the Welcome screen on the CD navigator with auto insert enabled, reinsert the CD in the CD-ROM drive.

Text Files List

The following table lists the text files that are included in the Help directory on the 3Com *EtherCD*.

File Name	File Description
client32.txt	Contains NetWare 4.11 on Windows 95/98 client driver installation notes.
license.txt	Includes the 3C990B NIC software license agreement.
netware.txt	Explains how to install the ODI driver for the NetWare 4.1x and 5.x server. You can also get NetWare installation instructions from README text files located in the following directories: \nwserver\readme.txt (client) \nwserver\readme_se.txt (server) \english\diskcopy\disk2\nwserver\readme.txt (client) \english\diskcopy\disk2\nwserver\readme_se.txt (server)
nwdosodi.txt	Explains how to install the driver for a 16-bit NetWare client running DOS.
register.txt	Explains why and how to register your NIC.
support.txt	Contains information about technical assistance services available from 3Com.
trouble.txt	Contains troubleshooting tips.
unt_nt4.txt	Explains how to perform an automated installation of Windows NT 4.0 over the network (unattended install).
unt_w98.txt	Explains how to perform an automated installation of Windows 98 over the network (unattended install).
w95ndis.txt	Provides instructions specific to Windows 95 for first-time installations, updating drivers, removing the NIC driver and <i>EtherCD</i> software, troubleshooting installation problems, and a peer-to-peer networking overview.
w95netwr.txt	Explains how to install the Windows 95 driver to support the Microsoft client for NetWare networks.
wakefaq.txt	Contains common questions and answers about Remote Wake-Up.
win2000.txt	Explains how to install the NIC, verify a successful installation, uninstall the NIC software, and update the driver.
win98.txt	Explains how to install the NIC, verify a successful installation, uninstall the NIC software, and update the driver.
winnt.txt	Provides installation instructions and troubleshooting tips for installing drivers in Windows NT 4.0.

In addition to the Help directory, you can find general installation information and the latest release notes in the \INSTALLS\README.TXT file (or on *EtherDisk 1*, if you install from diskettes.)

D

Installing a 3Com NIC While Installing the NOS

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

Windows Fresh Installation

For installation requirements, see "Installation Requirements" on page 14.

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

Windows NT

For instructions, see the WINNT.TXT file in the HELP directory on the *EtherCD*.

Windows 2000

During the Windows 2000 installation, the Hardware Wizard detects installed NICs and installs drivers it finds for them from the Windows 2000 CD. If you want to install the latest software from the *EtherCD* after you finish installing Windows 2000, restart the server and follow the instructions for Windows in "Updating the Network Driver and NIC Software" on page 31.

NetWare Fresh Installation

These instructions apply to NetWare versions 4.11 and 5.x.

Requirements

See "Installation Requirements" on page 14.

Installation Instructions

These instructions are intended for installing from the 3Com *EtherCD*. 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 Install the NIC hardware and connect it to the network.
- 2 Start the installation and proceed as usual until you reach the Device Types screen.
- 3 In the Device Types screen:
Locate the Network Boards field, and notice that there are no NICs listed. From the Options menu, select *Modify*.
- 4 In the next screen, select Network Boards and press Enter.
- 5 Press Insert (Add a Board).
- 6 Press Insert (Add Unlisted Driver).
- 7 Remove the NetWare CD from the CD-ROM drive.
- 8 Insert the 3Com *EtherCD* in the CD-ROM drive.
- 9 Press F3.

- 10** Enter the location of the driver on the 3Com *EtherCD*. For example:
D:\nwserver
- 11** In the Driver Summary screen, select *3C99X.LAN* and press Enter.
Edit parameters as necessary.
- 12** From the Additional Driver Options menu, select *Return to Driver Summary*.
- 13** Remove the *EtherCD* from the CD-ROM drive.
- 14** Insert the NetWare CD in the CD-ROM drive.
- 15** From the Options menu, select *Continue*.
The installation continues.
In NetWare 5.x, the Configure Server Properties windows appear. Locate the Network Boards list in the Protocols window. The installed NICs are listed in this window. Select each installed NIC and configure its protocols. Proceed with the installation, and reboot when you are prompted to do so.
- 16** When the installation is finished, edit the *STARTUP.NCF* file.
Specify receive buffers for each installed NIC.

E

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

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>`**



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

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. These numbers are correct at the time of publication. Refer to the 3Com Web site for updated information.

Country	Telephone Number
Asia, Pacific Rim	
Australia	1 800 678 515
Hong Kong	800 933 486
India	+61 2 9937 5085 or 000800 6501111
Indonesia	001 800 61 009
Japan	03 5783 1270
Malaysia	1800 801 777
New Zealand	0800 446 398
Pakistan	+61 2 9937 5083
Philippines	1235 61 266 2602
P.R. of China	10800 61 00137 or 021 6350 1590 or 00800 0638 3266
Singapore	800 6161 463
S. Korea	82 2 3455 6455
From anywhere in S. Korea:	00798 611 2230
From Seoul:	00798 611 2230
Taiwan, R.O.C.	0080 611 261
Thailand	001 800 611 2000

(continued)

Country	Telephone Number
Europe, Middle East and Africa From anywhere in these regions, call: Or access the following Internet site:	0870 24713901 http://www.3com.co.uk/support/emea.html #belgium
Europe and South Africa From the following countries, you may use the toll-free numbers: Austria Belgium Denmark Finland France Germany Hungary Ireland Israel Italy Luxembourg Netherlands Norway Poland Portugal South Africa Spain Sweden Switzerland U.K.	8088 33 25 0800 78354 8088 33 25 0800 1 019387 0800 91 7736 0800 100 0427 06800 14370 1 800 553 117 18009431983 800 780557 800 29727 0800 023 0245 800 1 0767 00800 4411 349 800 844 029 0800 991183 900 95 8966 020 796980 0800 835283 0800 085 1816
Latin America Brazil Mexico Puerto Rico Central and South America	0800 13 3266 01 800 849CARE 800 666 5065 AT&T +800 998 2112
North America	1 800 527 8677 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
Central and South America	525 201 0075	
Argentina	0810 222 3266	
Bolivia	511 241 1691	
Brazil	0800 133266 or 55 11 5643 2700	
Caribbean	525 201 0004	
Chile	562 240 6200	
Colombia	525 201 0004	
Ecuador	525 201 0004	
Mexico	525 201 0004	
Paraguay	525 201 0004	
Peru	511 241 1691	
Uruguay	525 201 0004	
Venezuela	525 201 0004	

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 3111206	
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	1 800 527 8677 Enterprise Customers: 1 800 876 3266	1 408 326 7120 (not toll-free)

Index

Numerics

- 100BASE-TX
 - cable requirements 17
 - Link LED 81
- 10BASE-T
 - cable requirements 17
 - Link LED 81
- 168-bit encryption, see 3DES
- 3C99X.LAN file 55
- 3Com Advanced Server features 9, 44
- 3Com Configuration and Diagnostics Program for DOS 75
- 3Com DMI Agent
 - client PC requirements 99
 - installing 100
 - network management requirements 100
 - overview 99, 107
- 3Com icon, in Windows system tray
 - removing 94
 - showing 94
- 3Com Knowledgebase Web Services 109
- 3Com logo, disabling 79
- 3Com NIC Diagnostics program
 - installing 29
 - removing 95
 - starting 75, 94
- 3Com Remote System Alert Manager 7
- 3Com Security Software Utility, see Security Software Utility
- 3Com support services, accessing 82
- 3Com URL 109
- 3CR990 NIC
 - features 4
 - specifications 97
- 3DES, defined 34
- 56-bit encryption, see DES
- 802.1p packet priority offload 5, 52
- 802.1p support property 45

A

- accessing Help 82
- ACT (activity) LED 81
- activity on the network, verifying 94, 95
- adding NICs to a group
 - NetWare 66, 67
 - Windows 47
- administration with
 - Advanced Server software 49
 - DynamicAccess software 49

- Advanced Server features
 - overview 9
 - protocol bindings, modifying 44
 - verifying installation 44
- Windows
 - adding NICs to a group 47
 - creating a group 47
 - creating a VLAN 49
 - deleting or editing a VLAN 50
 - removing the NIC from a group 50
 - window, defined 46
- Windows 2000
 - accessing the program 46
 - installing 43
 - protocol bindings, modifying 44
- Windows NT
 - installing 43
 - protocol bindings, modifying 44
 - starting the program 47
- Alert Standard Forum (ASF) 7
- Alert Type 74
- alerts, remote system
 - overview 7
 - requirements 7
- asymmetric flow control 8
- auto negotiation 8
- auto play, CD-ROM 104
- AUTOEXEC.NCF file
 - changing to install the NetWare 3.12 driver 57
 - changing to support multiple NICs 61
 - samples 63, 66, 68

B

- bidirectional load balancing 10, 45, 66
- BIOS 14
- BIOS issues 7
- boot disk 15
- boot ROM, MBA 4
 - booting from network 78
 - default setting 73
 - enabling or disabling 77
 - overview 6
- broken installation, cleaning up 83

C

- cabling
 - requirements 98
 - specifications, RJ-45 port 17
 - troubleshooting 85
 - unshielded twisted-pair (UTP) 17

- CD-ROM, auto play 104
- changing configuration, DOS 77
- chassis intrusion 7
- checksum offload (TCP/IP), enabling for NetWare 65
- cleaning up a broken installation 83
- commands for Netware server features
 - display status 69
 - group 69
 - help 70
 - link timeout 70
 - probe interval 70
 - receive timeout 70
 - retry count 71
 - send timeout 71
 - ungroup 71
 - wait tmo 72
- computer requirements 14
- configuration guidelines for VLANs 45
- configuration parameters
 - NetWare
 - changing 65
 - ENABLE_CHKSUM 65
 - enabling driver warning and error messages 65
 - enabling TCP/IP checksum offload 65
 - MEDIA_SELECT 65
 - monitoring levels for self-healing driver conditions 65
 - Node Address 65
 - setting the media speed 65
 - SHD_LEVEL 65
 - Slot Number 65
 - VERBOSE 65
 - Windows
 - Alert Type 74
 - Error Tolerance 74
 - flow control 74
- Configuration tab 92
- configuring
 - Managed PC Boot Agent (MBA) 77
 - NIC 76
 - offloads using Windows 2000 52
 - VLANs 45, 49
- connection, losing 7
- conventions, text, About This Guide 2
- CRC errors, viewing 7
- creating
 - group
 - NetWare 62, 67
 - Windows 47
 - security policy 38
 - VLAN, Windows 49
- crossover cable 87

D

data encryption, see encryption
 dedicated IP address 48
 deleting or editing a VLAN,
 Windows 50
 DES 34
 Desktop Management Interface (DMI),
 overview 6
 diagnostics program for DOS 75
 Diagnostics program, starting 30
 Diagnostics tab 92
 diagnostics tests, running 92
 diagnostics, offline 5
 disabling encryption 41
 disabling load balancing for a group,
 Windows 50
 diskettes
 creating 15
 making a DOS boot 15
 obtaining 15
 display status command 69
 displaying
 group properties, Windows 51
 NIC properties, Windows 51
 DMI (Desktop Management Interface),
 overview 6
 DOS
 3Com Configuration and
 Diagnostics Program 75
 boot disk 15
 changing settings 77
 configuration program, changing
 settings 77
 diagnostics program 91
 driver installation requirements
 NetWare 56, 107
 Windows 21, 107
 drivers
 NetWare, installing 55
 Windows 2000
 installing 22
 removing 87
 Windows 95
 Build 950, installing 27
 installing 27
 OSR2, installing 28
 Windows 98, installing 26
 Windows Me, installing 25
 Windows NT 4.0, installing 23
 duplex mode
 configuring 76
 default setting 73
 duplex setting 73
 DynamicAccess server features
 NetWare
 commands 69
 configuration guidelines 66
 Windows
 adding NICs to a group 47
 changing the primary NIC 50
 creating a group 47
 creating a VLAN 49
 deleting or editing a VLAN 50

 removing a NIC from a group 50
 removing the NIC from a
 group 50
 window, defined 46
 Windows 2000
 accessing the program 46
 installing 43
 protocol bindings, modifying 44
 Windows NT
 installing 43
 protocol bindings, modifying 44
 starting the program 47
 DynamicAccess server features
 removing 89
 verifying installation 44
 DynamicAccess Software Setup
 window 49

E

editing
 NIC properties, Windows 50
 VLAN, Windows 50
 efficient multicast control,
 configuring 49
 EIA/TIA 568 standards 98
 ENABLE_CHKSUM 65
 encryption (3C990B NIC)
 disabling 37
 enabling 34
 installing 36
 overview 33
 upgrading 37
 encryption (Windows 2000)
 binding a filter 40
 binding a filter action 41
 creating a policy 38
 defining a Console 38
 disabling 41
 enabling 41
 filter action, creating a 40
 filter, creating a 39
 environmental conditions 7
 error messages, sending to NetWare
 console 65
 Error Tolerance 74
 exclamation point (!) (yellow) in
 Windows Device Manager 83

F

failover
 about 10
 Advanced Server feature 9
 fan speed 7
 FAQs 83
 flow control 8, 74
 forced link 8
 foreign NIC
 defined 11
 designating as primary 45
 in NetWare groups 66
 in Windows groups 45
 frames, sent and received, viewing 95
 frequently asked questions (FAQs) 83

fresh install
 NetWare 107
 Windows 2000 107
 Windows NT 107
 full-duplex
 configuring 73

G

GARP Multicast Registration Protocol
 specification (GMRP) 46
 General tab 92
 GMRP 46
 GRN/10 LED, troubleshooting with 81
 group command 69
 groups 9
 adding NICs to
 NetWare 66
 Windows 47
 adding, NetWare 67
 configuring during NetWare driver
 installation 62
 displaying properties of,
 Windows 51
 removing NICs from, Windows 50
 Windows
 creating 47
 disabling load balancing for 50

H

half-duplex, configuring 73
 hardware, installation 18
 heartbeat 7
 heartbeat packets 5
 help command, NetWare server
 features 70
 Help system, accessing 21, 82
 Host ID 48
 hot plug NIC installation 5, 8
 HP OpenView Network Node
 Manager 7
 hubs, troubleshooting 87

I

icon, 3Com 94
 IEEE 802.1p support property 45
 installation
 3Com DMI Agent 100
 Advanced Server software 43
 broken 83
 cleaning up broken 83
 connecting to the network 19
 diskettes
 creating 15
 obtaining 15
 DynamicAccess server software 43
 failed, cleaning up 83
 fresh install
 NetWare 107
 Windows 2000 107
 Windows NT 107
 hardware 18
 hot plug 5

- NetWare NOS 107
 - NetWare, verifying 64
 - overview 13
 - Remote Wake-Up cable 19
 - requirements, hardware and software 14, 20
 - server features, NetWare 62
 - steps involved 13
 - Windows 2000 NOS 107
 - Windows NT NOS 107
 - installing drivers
 - NetWare 55
 - Windows 2000 22
 - Windows 95 27
 - Windows 98 26
 - Windows Me 25
 - installing multiple NICs 31
 - integrated boot ROM 4
 - Intel LANDesk Client Manager 7
 - IP address
 - changing 48
 - dedicated 48
 - IP and TCP checksum offload 5, 52
 - IPSec
 - configuring in Windows 2000 38
 - defined 33
 - IPSec offload 5, 52
- K**
- keep-alive packet, workgroup 7
 - Knowledgebase topics 83
 - accessing through diagnostics program 83
 - accessing through Web site 82
- L**
- LAN connections, relating to miniport connections 52
 - LANDesk Client Manager 7
 - LEDs
 - description 81
 - troubleshooting 82
 - viewing in Diagnostics program 93
 - viewing in diagnostics program 82
 - link
 - negotiation 8
 - speed, viewing 95
 - timeout command 70
 - Link LED, viewing 82, 94
 - link negotiation 8
 - Load Balance/RSL window 46
 - load balancing
 - bidirectional 10, 45, 66
 - dedicated IP address 48
 - failure 10
 - defined 9
 - disabling for Windows 50
 - groups
 - adding NICs to, Windows 47
 - adding, NetWare 67
 - configuring during NetWare driver installation 62
 - creating, Windows 47
 - maintaining, NetWare 66
 - maintaining, Windows 44
 - removing NICs from, Windows 50
 - resilient server links (RSLs) 9
 - transmit 10, 45
 - troubleshooting
 - NetWare 72
 - Windows 51
 - logo, 3Com, disabling 79
 - loss of connection 7
- M**
- MAC address 17, 57, 65
 - maintaining server features
 - NetWare 66
 - Windows 44
 - Managed PC Boot Agent (MBA)
 - configuring 77
 - network booting 78
 - overview 6
 - MBA see Managed PC Boot Agent
 - media speed, setting for NetWare 65
 - media type 74
 - configuring 76
 - default setting 74
 - MEDIA_SELECT 65
 - memory requirements
 - client and server minimums 14
 - NetWare 56
 - messages, sending to NetWare
 - console 65
 - MIBs 109
 - Microsoft Systems Management Server 7
 - Microsoft Task Offload support 45
 - miniport connections, relating to LAN connections 52
 - multicast control, configuring 49
 - multiple NICs
 - configuring offloads for 54
 - in NetWare 57
 - in Windows 31
- N**
- NetBoot ROM
 - default setting 73
 - description 73
 - NetWare
 - adding a group 67
 - adding NICs to a group 66
 - changing settings using DOS Diagnostics program 77
 - configuration parameters 65
 - configuring server features 62
 - correlating slot numbers and physical NICs 57
 - driver 55
 - driver installation requirements 56, 107
 - DynamicAccess server feature commands 69
 - maintaining server features 66
 - NLMs 55
 - packet receive buffer sizes 56
 - server features installation 62
 - slots for multiple NICs 57
 - system requirements 56, 107
 - verifying driver installation and configuration 64
 - Netware Loadable Modules (NLMs) 55
 - network
 - activity, verifying 94, 95
 - booting 78
 - connecting to 19
 - connection
 - testing 93
 - troubleshooting 86
 - connection, troubleshooting 84
 - driver optimization, configuring 76
 - statistics, viewing 94
 - supplier support 110
 - test, running 93
 - Network ID 48
 - NIC
 - configuration parameters, NetWare installation program 65
 - diagnostic tests 92
 - driver installation 55
 - duplex setting 73
 - foreign
 - defined 11
 - designating as primary 45
 - in NetWare groups 66
 - in Windows groups 45
 - groups 9
 - primary 9, 45, 50
 - properties
 - displaying, Windows 51
 - editing, Windows 50
 - secondary 9
 - software, removing 87
 - speed setting 74
 - test, running 93
 - virtual 9
 - NIC diagnostic program
 - Configuration tab 92
 - Diagnostics tab 92
 - General tab 92
 - starting 30
 - Statistics tab 92
 - Support tab 92
 - Utilities tab 92
 - NIC installation, hot plug 5
 - Node Address 65
 - Novell, see NetWare
- O**
- offline diagnostics 5
 - offload support 45
 - offloading
 - 802.1P packet priority for Windows 2000 5, 52
 - disabling 53
 - enabling 53

- IP and TCP checksum for Windows 2000 5, 52
- IPSec for Windows 2000 5, 52
- TCP segmentation for Windows 2000 5, 52
- Windows 2000 networking and security tasks 5, 52
- offloads
 - configuring for a group of different NICs 54
 - disabling 53
 - enabling 53
 - enabling TCP/IP checksum for NetWare 65
 - support 45
- online Help 82
- online Knowledgebase 82
- online technical services 109
- OpenView Network Node Manager 7

P

- packet priority (802.1p) offload 5, 52
- packet receive buffers, NetWare 56
- packets, viewing 94, 95
- pause frames 8
- PC requirements 14
- PCI slot, identifying 17
- physical security 7
- pin assignments 98
- pinouts, crossover cable 87
- policy (security), creating 38
- Preboot Execution Environment (PXE)
 - specification 4, 6
 - primary NIC 9, 45, 50
 - binding protocol, NetWare 63
 - changing, Windows 50
 - probe interval command 70
 - properties
 - group, displaying, Windows 51
 - NIC
 - displaying, Windows 51
 - editing, Windows 50
 - property settings, changing in Windows 2000 52
 - PXE, see Preboot Execution Environment

R

- Receive LED, viewing 82, 94
- receive timeout command 70
- received frames, viewing 95
- reception flow control 8
- red X in Windows Device Manager 83
- release notes, accessing 83
- remote control 7
- Remote Control and Management Protocol, see RMCP
- Remote System Alert Manager 7
- remote system alerts 5
- Remote Wake-Up
 - cable, connecting 19
 - multiple NIC Installations 6
 - overview 5

- requirements 6
- troubleshooting 85
- removing
 - NIC from a group, Windows 50
 - NIC software 87, 88
 - server features
 - NetWare 90
 - Windows 2000 89
 - Windows NT 89
- requirements
 - 3Com DMI Agent 99
 - cabling 98
 - computer 14
 - driver installation
 - NetWare 56, 107
 - Windows 21, 107
 - hardware and software 14, 20
 - memory 14
 - PC 14
 - Remote Wake-Up 6
 - resilient server links (RSLs) 9
 - retry count command 71
 - returning products for repair 112
 - RJ-45 port, pin assignments 98
 - RMCP 7
 - ROM initialization 7
 - RWU 5

S

- safety precautions 13
- secondary NICs 9, 50
- security
 - physical 7
 - security policy, creating 38
- Security Software Utility
 - downloading 34
 - installing encryption through 36
- self-healing drivers (SHDs) 9
 - configuring for NetWare 65
 - default setting 74
 - overview 9
- send timeout command 71
- sent frames, viewing 95
- server features 9
 - configuring
 - NetWare 44, 62, 65
 - Windows NT 44
 - installing NetWare 62
 - maintaining
 - NetWare 66
 - Windows 44
 - removing 89, 90
- SHD_LEVEL 65
- Slot Number 65
- slots
 - multiple NICs, NetWare 57
 - obtaining numbers, NetWare 57
- software
 - 3Com NIC Diagnostics program, installing 29
 - NetWare drivers, installing 55
 - removing 87
 - updating 31

- Windows network drivers, installing 21
- spanning tree 45, 66
- specifications
 - cabling, RJ-45 port 17
 - NIC 97
- speed (media), setting for NetWare 65
- speed, link, viewing 95
- Statistics tab 92
- statistics, network, viewing 94
- straight-through cable 87
- support databases, accessing 82
- Support tab 92
- symmetric flow control 8
- system memory alerts 7
- system requirements
 - NetWare 56, 107
 - Windows 21, 107
- Systems Management Server 7

T

- TCP and IP checksum offload 5, 52
- TCP segmentation offload 5, 52
- TCP/IP checksum offload, enabling for NetWare 65
- technical support
 - 3Com Knowledgebase Web Services 109
 - 3Com URL 109
 - network suppliers 110
 - product repair 112
- temperature alerts 7
- test
 - Network 93
 - NIC 93
- text files, *EtherCD* 105
- timeout 70
- traffic prioritization
 - configuring 49
 - overview 9, 11
- transmission flow control 8
- Transmit LED, viewing 82, 94
- transmit load balancing 10, 45
- troubleshooting
 - cable 85
 - cleaning up a broken installation 83
 - error messages 83
 - group configuration 72
 - hubs 87
 - hubs with crossover cable 87
 - LEDs 82
 - load balancing
 - NetWare 72
 - Windows 51
 - MBA boot ROM 77
 - network connection 84, 86
 - NIC installation 83
 - Remote Wake-Up 85
 - Windows 2000 property settings 52

U

- ungroup command 71
- uninstalling
 - DynamicAccess server features
 - NetWare 90
 - Windows 2000 89, 90
 - Windows NT 89
 - network driver 87
- unshielded twisted-pair (UTP) cable 17
- updating
 - network driver 31
 - NIC diagnostic program 31
- upgrading Windows 95 to
 - Windows 98 14
- upgrading Windows 98 to Windows Me 15
- URL 109
- Utilities tab 92

V

- VERBOSE 65
- virtual NIC 9
- VLANs 9
 - 802.1p Support property 46
 - defined 10
 - Windows 44
 - configuration guidelines 45
 - creating 49
 - deleting or editing 50
 - ID numbers, legal ranges 49
 - number allowed in a server 45
 - window, defined 46
- voltage deviation alerts 7

W

- wait tmo command 72
- warning messages, sending to NetWare console 65
- Windows
 - adding NICs to a group 47
 - changing the primary NIC 50
 - creating a group 47
 - creating a VLAN 49
 - driver installation requirements 21, 107
 - maintaining server features 44
 - system requirements 21, 107
- Windows 2000
 - 802.1p support property 45
 - changing property settings 52
 - duplex, setting 73
 - installing
 - Advanced Server features 43
 - driver 22
 - DynamicAccess 43
 - multiple NICs 31
 - media type, setting 74
 - miniport and LAN connections, identifying 52
 - offload features 5, 52
 - removing NIC software 87
- Windows 95
 - Build 950 27
 - installing
 - driver 27
 - multiple NICs 31
 - OSR2 28
 - removing NIC software 88
 - upgrading to Windows 98 14

Windows 98

- installing
 - driver 26
 - multiple NICs 31
- removing NIC software 88
- upgrading from Windows 95 14
- upgrading to Windows Me 15
- Windows Me
 - installing the driver 25
 - removing NIC software 88
 - upgrading from Windows 98 15
- Windows NT 4.0
 - help, driver installation 21, 107
 - installing Advanced Server features 43
 - installing Advanced Server software 43
 - installing DynamicAccess 43
 - multiple NIC installations 32
 - removing NIC software 88
- Windows system tray, 3Com icon 94
- workgroup keep-alive packet 7
- World Wide Web (WWW) 109

X

- X (red) in Windows Device Manager 83

Y

- YEL/100 LED, troubleshooting with 81
- yellow exclamation point (!) in Windows Device Manager 83

Regulatory Compliance Information

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1 This device may not cause harmful interference, and
- 2 This device must accept any interference received, including interference that may cause undesired operation.

WARNING: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules, and the Canadian Department of Communications Equipment Standards entitled, "Digital Apparatus," ICES-003. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

The user may find the following booklet prepared by the Federal Communications Commission helpful:

The Interference Handbook

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

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FCC Declaration of Conformity

We declare under our sole responsibility that the

Model:	Description:
3C990B-TX-M	3Com 10/100 PCI Network Interface Card with 3XP Processor Client NIC for 3DES (168-bit) encryption and DES (56-bit) encryption
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to which this declaration relates, is in conformity with the following standards or other normative documents:

- ANSI C63.4-1992 Methods of Measurement
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