USER'S GUIDE

DURALAN FAST ETHERNET NICS

ANA™-69000/62000 FAMILY

Adaptec, Inc.
691 South Milpitas Boulevard
Milpitas, CA 95035

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DuraLAN Fast Ethernet NICs

ANA™-69000/62000 Family

User's Guide

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Federal Communications Commission Radio Frequency Interference Statement

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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. 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 instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. However, if this equipment does cause interference to radio or television equipment 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 equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.
- Use a shielded and properly grounded I/O cable and power cable to ensure compliance of this unit to the specified limits of the rules.

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.

Adaptec, Inc.

ANA-62011
ANA-69011
ANA-62022
ANA-62044

Tested To Comply With FCC Standards

FOR HOME OR OFFICE USE

Canadian Compliance Statement

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

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

European Compliance Statement

WARNING: This is a Class B product. In domestic environments this product may cause radio interference in which case the user may be required to take adequate measures.

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- UL 1950 Standard for Safety of Information Processing and Business Equipment
- IEC 950 Safety of Information Technology Equipment in Electrical Business Equipment
- CAN / CSA-C22.2 # 950 Safety of Information Technology Equipment including Electrical Business Equipment

To ensure safe operating conditions, it is recommended that these products be installed in UL Listed computers.

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For more information on how to obtain warranty service, write or telephone Adaptec at 691 South Milpitas Boulevard, Milpitas, CA 95035, (800) 959-7274.

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Getting Started

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This user's guide describes how to install and configure the Adaptec® DuraLAN Fast Ethernet network interface cards (NICs). Please review the system requirements before you begin.

User's guide summary:

- Part 1, *Installing the DuraLAN NIC*, describes how to install your Adaptec DuraLAN NIC.
- Part 2, *Installing the DuraLAN Standard Driver*, describes how to install and configure the DuraLAN Standard NIC driver in NetWare® and Windows® environments.
- Part 3, *Installing Duralink64 Failover*, describes how Duralink64™ Failover adds value to your network and provides installation instructions for Windows® NT and NetWare-based servers.

- Part 4, *Installing Duralink64 Port Aggregation*, describes how to create a virtual port by grouping ports to maximize bandwidth for your mission-critical applications.
- Part 5, *Appendices*, provides supplemental information that may be required for a proper installation.

System Requirements

Hardware Requirements

The minimum hardware system requirements for using the Adaptec DuraLAN NIC are as follows:

System Component	Requirements
NIC	■ Available bus mastering PCI slot. ■ The most recent PCI system BIOS is recommended. ■ Intel x86 platform with single or multiprocessor. ■ 16-MByte RAM.
Dual and Quad Port NICs	■ System BIOS supporting PCI-to-PCI bridge chip. ■ Multi-port NICs require PCI 2.1 compliant bus.

Software Requirements

The minimum software system requirements are as follows:

- **Windows**—Windows NT 3.51 or 4.0 Workstation or Server, Windows® 95, or Windows® 98.
- **NetWare**—NetWare 4.11.

Fast Ethernet

Fast Ethernet is a networking standard defined by the Institute of Electrical and Electronic Engineers (IEEE) in the IEEE 802.3u Specification. Fast Ethernet runs at 100 Mbps or 200 Mbps in Full Duplex mode.

Fast Ethernet uses the same Carrier Sense Multiple Access with Collision Detection (CSMA / CD) architecture used on 10BASE-T and 10BASE-2 10 Mbps network specifications, which allows for easy integration with existing networks.

Adaptec DuraLAN NICs

Adaptec provides the following PCI Ethernet and Fast Ethernet NIC models:

- **ANA-69011**—a single port 32-bit NIC supporting autosensing between 10 and 100-Mbps line speeds.

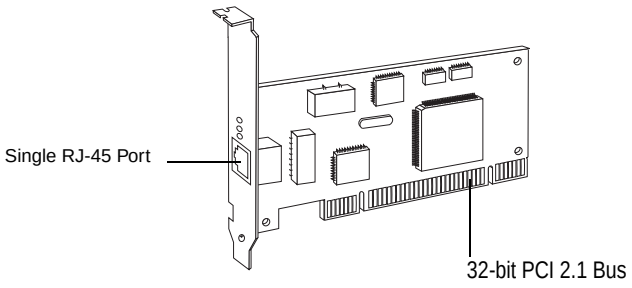

Figure 1-1. ANA-69011 DuraLAN NIC

- **ANA-62011**—a single port 64-bit NIC supporting autosensing between 10 and 100-Mbps line speeds.

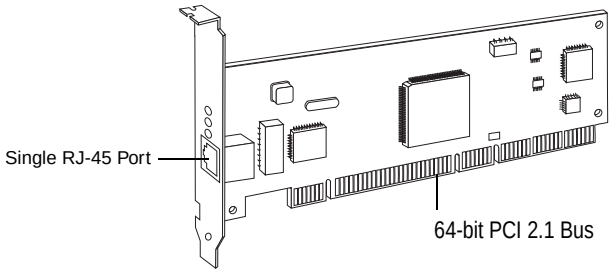

Figure 1-2. ANA-62011 DuraLAN NIC

- **ANA-62022**—a dual port NIC that offers two high performance Ethernet / Fast Ethernet ports on a single 64-bit NIC. Each port runs at independent speeds for maximum flexibility. This NIC supports Full Duplex to deliver speeds up to 400-Mbps cumulative throughput using Duralink64 Port Aggregation.

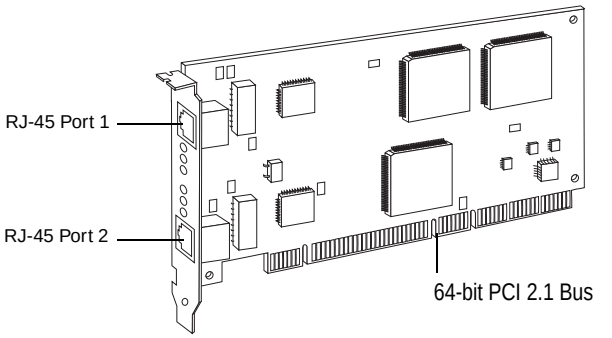

Figure 1-3. ANA-62022 DuraLAN NIC

- **ANA-62044**—a quad port NIC that offers four high performance Ethernet / Fast Ethernet ports on a single 64-bit NIC. Each port runs at independent speeds for maximum flexibility. This NIC supports Full Duplex to deliver speeds up to 800-Mbps cumulative throughput using Duralink64 Port Aggregation.

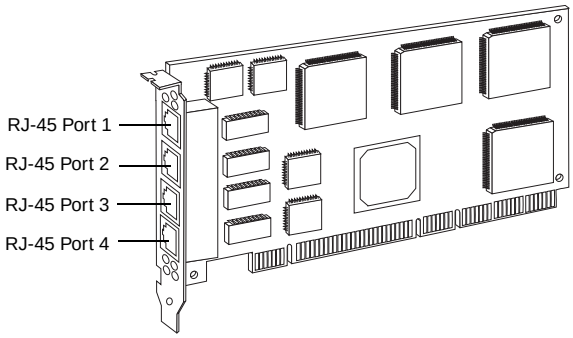

Figure 1-4. ANA-62044 DuraLAN NIC

Duralink64 Failover

Duralink64 Failover software provides protection from network-link failures on Fast Ethernet servers running mission-critical applications. During a port failure, Duralink64 Failover keeps the connection to the server live by moving all traffic on the affected segment to a backup port. When a failure is detected on the primary port, that port is disabled and the backup port takes over to continue data transmission, keeping the connection running without interruption.

Duralink64 Failover is often used in a troubled environment to provide failover capabilities when any of the following conditions exist:

- An Ethernet link loss
- A watchdog timer expires
- An abnormal hardware interrupt occurs

- Abnormal Send / Receive counters, such as too many collisions or errors, occur on the segment

Duralink64 Failover supports Windows NT 4.0 and 3.51, and Novell NetWare 4.11-based servers.

Duralink64 Failover is compatible with Adaptec ANA™-69011 and ANA-62011 single port NICs, ANA-62022 dual port NICs, and ANA-62044 quad port NICs.

Duralink64 Port Aggregation

Duralink64™ Port Aggregation is a software package that provides network path redundancy and increased bandwidth for Fast Ethernet servers running mission-critical applications. Duralink64 Port Aggregation works by load balancing the throughput over multiple ports.

With Duralink64 Port Aggregation, you can create a virtual port by grouping multiple ports together. This grouping distributes the network load by sharing the resources of all ports in a group. In the Port Aggregation group, one port becomes the "primary" port and its MAC address is given to the protocol. Thus, the group behaves as a single interface, allowing the software to manage the combined resources of the group efficiently. In the event of a port failure, the remaining ports carry the load and keep the network running and uninterrupted.

Duralink64 Port Aggregation supports Windows NT 4.0 and 3.51, and Novell NetWare 4.11-based servers.

Duralink64 Port Aggregation is compatible with Adaptec ANA-69011 and ANA-62011 single port NICs, ANA-62022 dual port NICs, and ANA-62044 quad port NICs.

Advisories

This document includes three kinds of advisories.

Note: Notes are reminders, tips, or suggestions that might simplify the procedures included in this document.

Caution: Cautions alert you to actions that might cause damage to your system or your data.

WARNING: Warnings alert you to actions that might cause injury to you or someone else.

To avoid injury to people or damage to equipment and data, be sure to follow the cautions and warnings in this document. Adaptec does not claim to have included in this document every condition or situation that might require a caution or warning notice. Be sure to consult the documentation for your computer and any connected equipment when you are installing the equipment or changing its configuration.

WARNING: *Always* use caution when handling electrical equipment!

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▾▾▾▾ Part 1

Installing the DuraLAN NIC

2

DuraLAN NIC Installation

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This chapter provides instructions on installing your Adaptec DuraLAN NIC. If you're a Windows 95 user, please read *Important Note for Windows 95 Users!* before proceeding with this installation.

Important Note for Windows 95 Users!

Before installing the DuraLAN NIC, verify which version of Windows 95 is installed. (You either have OSR1 or OSR2.) You'll need to know which version you have if you install the DuraLAN Standard Driver. Use the following instructions for help.

1. Start Windows 95.
2. Click the Start menu, point to **Settings**, and then click **Control Panel**.
3. Double-click the **System** icon. The General tab displays your version of Windows 95.

Windows 95 Versions	
4.00.950	OSR1
4.00.950A	OSR1
4.00.950B	OSR2
4.00.950C	OSR2

4. Click **OK** to exit the General tab.
5. Shut down the system, and then turn OFF power.
6. Continue with *Installing the DuraLAN NIC* on page 2-4.

Installing the Appropriate NIC

The following table describes which DuraLAN NIC to install for your operating system and Adaptec driver.

	DuraLAN Standard driver	Duralink64 Failover	Duralink64 Port Aggregation/Cicso's Fast Ethernet Channel
Windows 95 OSR1[1]	ANA-69011 ANA-62011 ANA-62022		
Windows 95 OSR2[1]	ANA-69011 ANA-62011 ANA-62022		
Windows 98	ANA-69011 ANA-62011 ANA-62022		
Windows NT Workstation	ANA-69011 ANA-62011 ANA-62022 ANA-62044	ANA-69011[2] ANA-62011[2] ANA-62022 ANA-62044	ANA-69011[2] ANA-62011[2] ANA-62022 ANA-62044
Windows NT Server 3.51/4.0	ANA-69011 ANA-62011 ANA-62022 ANA-62044	ANA-69011[2] ANA-62011[2] ANA-62022 ANA-62044	ANA-69011[2] ANA-62011[2] ANA-62022 ANA-62044
NetWare 4.11	ANA-69011 ANA-62011 ANA-62022 ANA-62044	ANA-69011[2] ANA-62011[2] ANA-62022 ANA-62044	ANA-69011[2] ANA-62011[2] ANA-62022 ANA-62044

[1] Windows 95 OSR1 and OSR2 use two different Adaptec drivers, see the appropriate installation instructions.
[2] Requires at least two DuraLAN NICs.

Installing the DuraLAN NIC

WARNING: Before you begin, turn OFF power to the PC, and disconnect the power cord!

1. Ground yourself by touching an unpainted surface of the PC case.
2. Remove the cover from your computer. Refer to the manufacturer's documentation for help.
3. Locate an unused PCI expansion slot.
   - For best performance, install the 64-bit DuraLAN NIC in a 64-bit PCI expansion slot. (32-bit PCI expansion slots may be used also.)
   - Some non-compliant 32-bit PCI expansion slots *do not* support 64-bit NICs. This is because the slot's outside notch is not deep enough to allow the bus contacts to fit around the slot. If the 64-bit DuraLAN NIC does not fit in the slot, contact Adaptec to purchase a 32-bit DuraLAN NIC.
4. Unscrew the bracket screw, and then remove the expansion slot bracket cover.

   Note: PCI slots and NICs come in two varieties: 3.3-volt, and the more common 5-volt. All Adaptec PCI NICs support 5-volt and 3.3-volt slots.

5. Carefully remove the DuraLAN NIC from its antistatic container.
6. Verify the model name on the NIC (such as, ANA-69011/TX, ANA-62011/TX, etc.).
7. Check the NIC for any visible signs of damage which may have occurred during shipment. If you find a problem, immediately notify your network supplier and the shipping service which delivered your NIC.
8. Insert the NIC into the expansion slot, pressing down firmly until the bus contacts are seated in the slot.

9 Replace the screw that was removed in step 4.

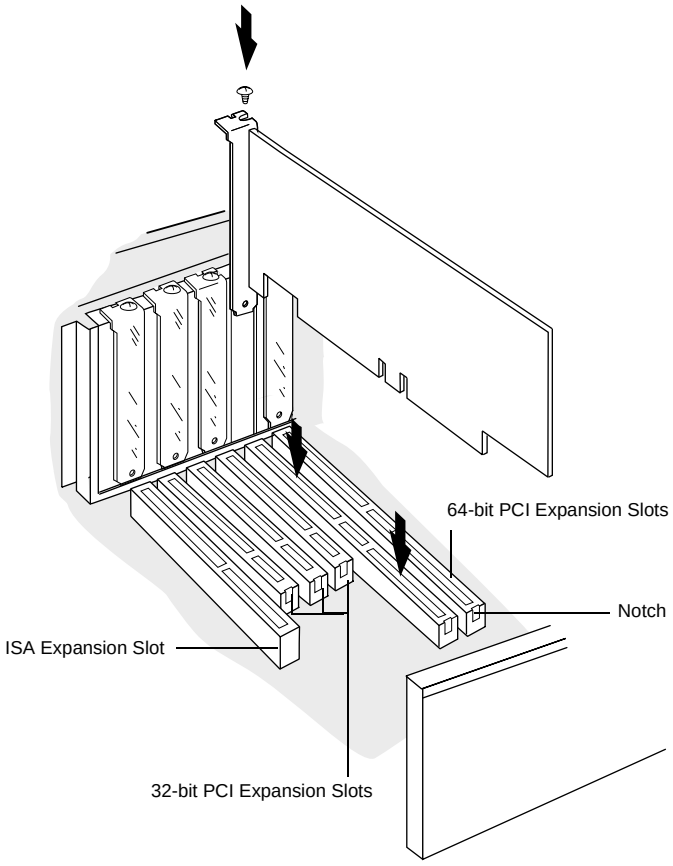

Figure 2-1. Install the DuraLAN NIC in a 64-bit PCI expansion slot.

10 Replace the computer cover.

11 Continue with *Connecting the Network Cable* on page 2-6.

Connecting the Network Cable

Cable requirements for Adaptec DuraLAN NICs vary according to network speed, cabling standard, and the connector to be used. See Appendix A, *Cables and LEDs* for detailed information on cabling.

1. Determine the appropriate cabling for your network.
2. Connect the cable to the NIC connector. (For multi-port NICs, connect a cable to each port.)
3. Connect the other end of the cable to your hub, switch, or client.
4. Continue with *Installing the Appropriate NIC Driver*.

Installing the Appropriate NIC Driver

After installing the DuraLAN NIC, you must install the appropriate DuraLAN NIC driver. You may install one of three drivers: the DuraLAN Standard driver, Duralink64 Failover, *or* Duralink64 Port Aggregation. Please note that you may install one type only.

- **DuraLAN Standard Driver**

  The Standard driver uses each DuraLAN port independently. See Part 2, *Installing the DuraLAN Standard Driver*.

  Note: Windows 95, Windows 98, and Novell Client32 *do not* support Duralink64 Failover. Install the DuraLAN Standard driver for these operating systems.

- **Duralink64 Failover**

  Duralink64 Failover groups two ports in a failover combination, one as the primary port and the other as the backup port. The ports may be connected to a hub or switch. See Part 3, *Installing Duralink64 Failover*. (*Duralink64 Failover* on page 1-5 describes this software.)

The LAN AND DURALINK64 FAILOVER diskettes provide the following drivers:

Disk 1	Disk 2
Windows NT 4.0	NetWare 4.11
Windows NT 3.51	Client32 for DOS
Windows 95	NetWare Failover
Windows 98	DOS Diagnostics
Windows NT 4.0 Failover	
Windows NT 3.51 Failover	

- **Duralink64 Port Aggregation**

  Duralink64 Port Aggregation groups up to twelve ports together and must be used with a switch. See Part 4, *Installing Duralink64 Port Aggregation*. (*Duralink64 Port Aggregation* on page 1-6 describes this software.)

  The DURALINK64 PORT AGGREGATION diskettes provide the following drivers:

Disk 1	Disk 2
Windows NT 4.0	NetWare 4.11
Windows NT 3.51	

Always use the latest software version available for your DuraLAN NIC. Drivers are updated regularly on Adaptec's World Wide Web, FTP, and BBS sites to provide enhanced performance and new features. See *Technical and Product Support* on page iii.

❒

▾▾▾▾ Part 2

Installing the DuraLAN Standard Driver

3

DuraLAN Standard Driver for Windows

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This chapter describes how to install the DuraLAN Standard driver for Windows. Please refer to the *Installation Tips* at the end of this chapter for additional help.

Before You Begin

- Verify that all system, memory, and NIC requirements are met, see *System Requirements* on page 1-2.
- Verify that the new Adaptec DuraLAN NIC is installed properly in the server, see Chapter 2, *DuraLAN NIC Installation*.
- Check your system for installed DuraLAN NIC drivers. If a DuraLAN Standard, Duralink64 Failover, or Duralink64 Port Aggregation driver exists, remove it! See
  - *Removing the DuraLAN Standard Driver* on page 3-14.
  - *Removing Duralink64 Failover* on page 6-13.
  - *Removing Duralink64 Port Aggregation* on page 9-22.

WARNING: This procedure is critical. Only one DuraLAN driver may exist in a system.

Windows NT 4.0

To install the DuraLAN Standard driver, use the following steps. If you're installing Windows NT at this time, start at step 7 when prompted DuraLAN NIC.

1. Start Windows NT 4.0.
2. Double-click **My Computer**.
3. Double-click **Control Panel**.
4. Double-click **Network**.
5. In the Network window, click the **Adapters** tab.
6. In the Adapters tab, click **Add**.
7. In the Select Network Adapter window, click **Have Disk**.
8. Insert the LAN AND DURALINK64 FAILOVER DRIVERS WINDOWS DISK (disk 1 of 2) into the floppy disk drive.
9. In the Insert Disk window, type **a:** and then click **OK**.

10 From the Select OEM Option window, click the DuraLAN NIC model or **Adaptec DuraLAN Fast Ethernet NIC**, and then click **OK**.

11 Continue to *Configuring the Ports*.

Configuring the Ports

To configure the ports in Windows NT 4.0, follow these steps:

1 In the Adaptec DuraLAN NIC Configuration window, click the appropriate connection type for your network, and then click **OK**.

Note: Use **Autodetect Default Connection** if you do not know the connection type. (*Connection Types* on page A-2 provides descriptions.)

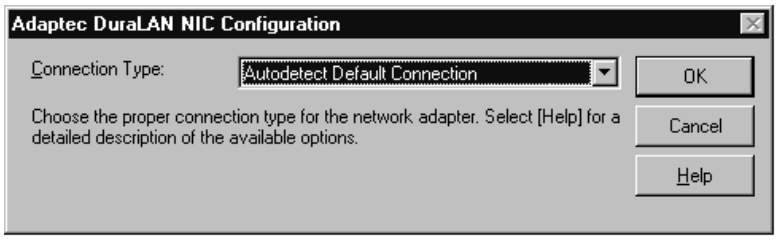

Figure 3-1. Adaptec DuraLAN NIC Configuration Window

2 Repeat step 1 for each additional port.

3 **OPTIONAL.** If SNMP is not set up on the server, you'll receive a message which you may ignore in this installation. Click **OK**.

4 In the Adapters tab, click **Close**.

5 Consult your Microsoft® Windows NT 4.0 documentation for help configuring the protocol.

6 When you're done, click **Close** in the Network window.

7 Remove the floppy disk from the floppy disk drive.

8 Restart the system.

Note: If you were required to insert the Windows NT CD, you must re-install the latest version of the Microsoft Windows NT Service Pack, and then restart the system.

Windows NT 3.51

To install the DuraLAN Standard driver, use the following steps. If you're installing Windows NT at this time, skip to step 6 when prompted for the DuraLAN NIC.

1 Start Windows NT 3.51.

2 In the Main window, double-click **Control Panel**.

3 In the Control Panel, double-click **Network**.

4 In the Network Settings window, click **Add Adapter**.

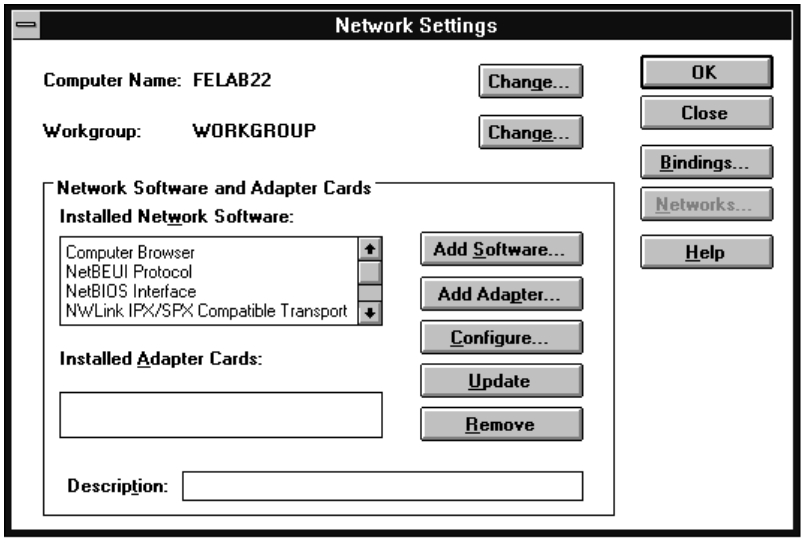

Figure 3-2. Network Settings Window

5 **OPTIONAL**. You may receive the following message: The service database is locked.

   a Click **OK**.

   b Wait for the Service Control Manager window to appear, and then click **OK**.

   c In the Network Settings window, click **Add Adapter** again.

6 In the Add Network Adapter window, click **<Other> Requires disk from manufacturer** from the Network Adapter Card list, and then click **Continue**.

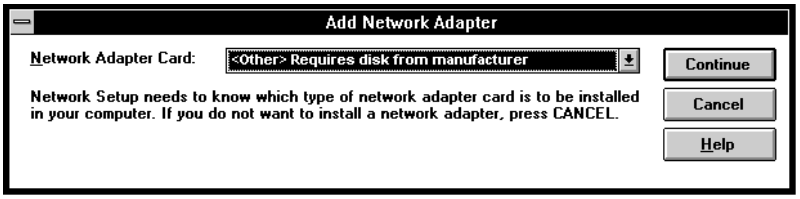

Figure 3-3. Add Network Adapter Window

7 Insert the LAN AND DURALINK64 FAILOVER DRIVERS WINDOWS DISK (disk 1 of 2) into the floppy disk drive.

8 In the Insert Disk window, type **a:** and then click **OK**.

9 In the Select OEM Option window, click the DuraLAN NIC model or **Adaptec DuraLAN Fast Ethernet NIC**, and then click **OK**.

10 In the Adaptec DuraLAN NIC Configuration window, click the appropriate connection type for your network or use the default, **Autodetect Default Connection**, and then click **OK**.

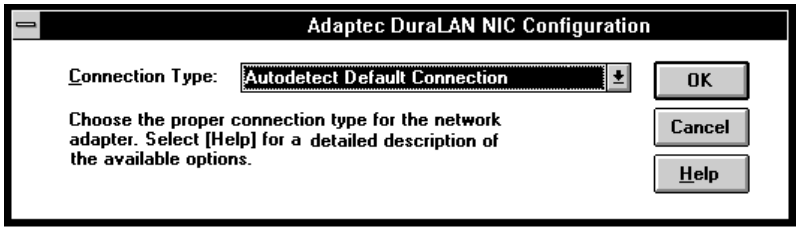

Figure 3-4. Adaptec DuraLAN NIC Configuration Window

11 Repeat step 10 for each additional port.

12 The Network Settings window displays the configured ports. At this point, you may either click **OK**, or click **Bindings** to select the protocols you want to bind.

13 Consult your Microsoft® Windows NT 3.51 documentation for help configuring the protocol.

14 When you're done, remove the floppy disk from the floppy disk drive.

15 In the Network Setting Change window, click **Restart Now**.

Note: If you were required to insert the Windows NT CD, you must re-install the latest Microsoft Windows NT Service Pack, and then restart the system again.

Windows 95

This section provides instructions for installing the DuraLAN Standard Driver in Windows 95 OSR1 and OSR2. To verify which version of Windows 95 is installed, see *Important Note for Windows 95 Users!* on page 2-2.

Windows 95 OSR2

To install the DuraLAN Standard Driver, follow these steps:

1 Start Windows 95. The Update Device Driver wizard opens.

2 In the wizard, click **Next**.

3 In the second window, click **Other Locations**.

4 Insert the LAN AND DURALINK64 FAILOVER DRIVERS WINDOWS DISK (disk 1 of 2) into the floppy disk drive.

5 In the Select Other Location window, type **a:** and then click **OK**. The system indicates that it has found the Adaptec Fast Ethernet NIC driver.

6 Click **Finish**.

7. In the Insert Disk window, click **OK**.
8. Type **a:** and then click **OK**.
9. In the Insert Disk window, insert the Windows 95 CD, and then click **OK**.
10. Enter the path to the Windows 95 installation directory, and then click **OK**. (For example **d:\win95**.[1] Consult your Microsoft Windows 95 documentation for help.)
11. Remove the floppy disk from the floppy disk drive.
12. Restart the system, if prompted.
13. **OPTIONAL**. To verify the driver installation, see *Installation Tips* starting on page 3-16.

Note: As the system restarts, Windows 95 applies the driver files to each additional port detected.

14. Continue to *Configuring the Ports* on page 3-8.

Windows 95 OSR1

To install the DuraLAN Standard Driver, follow these steps:

1. Start Windows 95. The New Hardware Found wizard opens.
2. In the wizard, click **Driver from disk provided by hardware manufacturer**, and then click **OK**.
3. Insert the LAN AND DURALINK64 FAILOVER DRIVERS WINDOWS DISK (disk 1 of 2) into the floppy disk drive.
4. In the Install from Disk window, type **a:\win95a** and then click **OK**.

Caution: If you accept the default path, **a:** , the system will copy the wrong files which will cause errors in Windows 95 OSR1 version.

[1] In this example, d:\ represents the CD-ROM drive letter.

5. In the Insert Disk window, insert the Windows 95 CD, and then click **OK**.
6. Enter the path to the Windows 95 directory, and then click **OK**. (For example, **d:\win95**.[1] Consult your Microsoft Windows 95 documentation for help.)
7. Remove the floppy disk from the floppy disk drive.
8. If the System Setting Change window appears, click **Yes** to restart the system.

Note: As the system restarts, Windows 95 applies the driver files to each additional port detected.

9. **OPTIONAL**. To verify the driver installation, see *Installation Tips* starting on page 3-16.
10. Continue to *Configuring the Ports* on page 3-8.

Configuring the Ports

To configure ports in Windows 95 OSR2 or OSR1, follow these steps:

1. From the Start menu, point to **Settings**, and then click **Control Panel**.
2. In the Control Panel, double-click **Network**.

[1] In this example, d:\ represents the CD-ROM drive letter.

3 In the Network window, click the appropriate DuraLAN NIC, and then click **Properties**.

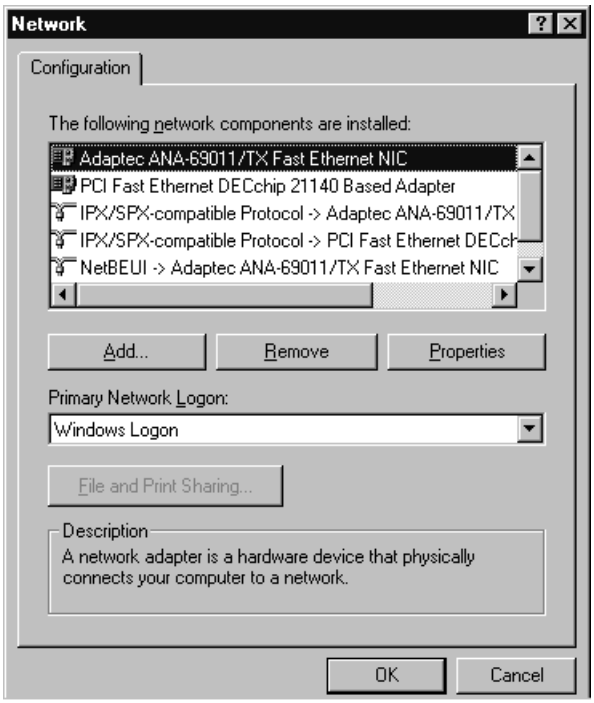

Figure 3-5. Windows 95 Configuration Tab

4 In the Properties window, click the **Advanced** tab.

5 In the Property box, click **Connection Type**.

6 In the Value list, click the appropriate connection type. (*Connection Types* on page A-2 provides descriptions.)

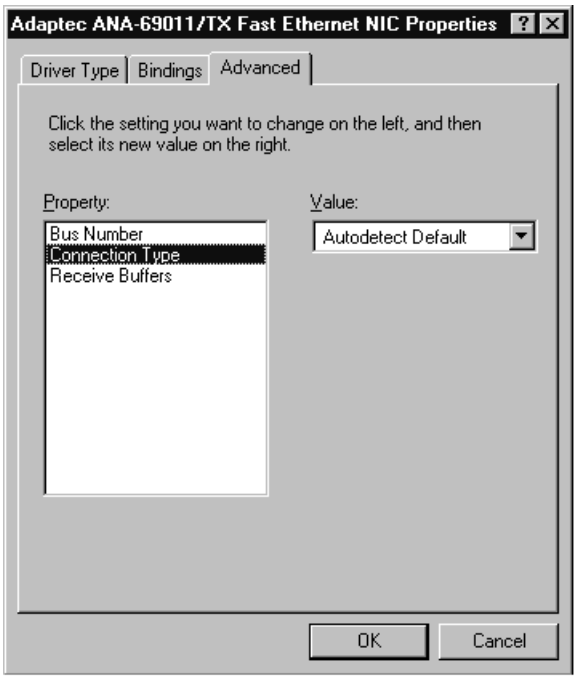

Figure 3-6. Advanced Tab

7 Click **OK**.

8 In the Configuration tab, click **OK**.

9 Restart your system.

Windows 98

To install the DuraLAN Standard Driver, follow these steps:

1. Start Windows 98, and then wait for the Add New Hardware wizard to open.[1]
2. In the first screen, click **Next**.
3. In the next window, click **Search for the best driver for your device. (Recommended)**, and then click **Next**.
4. In the next window, click **Floppy Disk Drives**.
5. Insert the LAN AND DURALINK64 FAILOVER DRIVERS WINDOWS DISK (disk 1 of 2) into the floppy disk drive, and then click **Next**.

Note: If you don't insert the floppy disk, this message appears: Windows was unable to locate a driver for this device. If you do not want to install a driver now, click Next. To search again, click Back.

6. The system indicates that the driver file was found. Insert the same Windows 98 CD you used to install Windows 98, and then click **Next**.

Note: You may receive the following Version Conflict message: A file being copied is older than the file currently on your computer. It is recommended that you keep your existing file. Do you want to keep the file? Click **Yes**.

7. Click **Finish**.
8. Remove the floppy disk.
9. If the System Settings Change window appears, click **Yes** to restart the system.
10. Continue to *Configuring the Ports* on page 3-12.

[1] If the wizard doesn't open, refer to the *Installation Tips* on page 3-17.

Configuring the Ports

To configure ports in Windows 98, follow these steps:

1. From the Start menu, point to **Settings**, and then click **Control Panel**.
2. In the Control Panel, double-click **Network**.
3. In the Configuration tab, click the appropriate DuraLAN NIC, and then click **Properties**.

Figure 3-7. Windows 98 Configuration Tab

4. In the Adaptec DuraLAN NIC Properties window, click the **Advanced** tab.

5 In the Property box, click **Connection Type**.

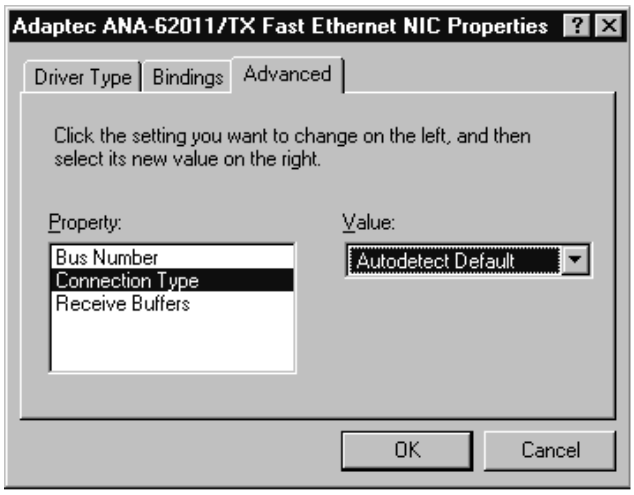

Figure 3-8. Advanced Tab

6 In the Value list, click the appropriate connection type. (*Connection Types* on page A-2 provides descriptions.)

7 Click **OK**.

8 In the Configuration tab, click **OK**.

Removing the DuraLAN Standard Driver

This section provides instructions for removing the DuraLAN Standard driver which is necessary if you are installing another Duralink driver.

Windows NT 4.0

To remove the DuraLAN Standard driver, follow these steps:

1. Double-click **My Computer**.
2. Double-click **Control Panel**.
3. Double-click **Network**.
4. In the Network window, click the **Adapters** tab.
5. In the Network Adapters list, click the Adaptec DuraLAN NIC you want to remove, and then click **Remove**.
6. When asked if you wish to continue, click **Yes**.
7. Repeat step 5 until all Adaptec DuraLAN drivers are removed.
8. When you're done, click **OK**.
9. Click **Close** to close the Network window.
10. Click **Yes** to restart your computer.

Note: When you restart Windows NT, a message may indicate that at least one service failed to start. This message will not appear after you add the new driver. Click **OK**.

Windows 95 OSR2

To remove the DuraLAN Standard driver, follow these steps:

1. From the Start menu, point to **Settings**, and then click **Control Panel**.
2. In the Control Panel, double-click **System**.
3. In the Device Manager tab, click the DuraLAN NIC, and then click **Remove**.

4 Repeat step 3 for each existing DuraLAN NIC.

5 Restart the system.

Windows 95 OSR1

To remove the DuraLAN Standard driver, follow these steps:

1 From the Start menu, point to **Settings**, and then click **Control Panel**.

2 In the Device Manager, click the DuraLAN NIC, and then click **Remove**.

3 Open an MS-DOS command line box, and then type one of the following commands:

- To update an existing OSR1 driver, type **del %windir%\inf\adpts95a.inf**
- To correct an OSR2 driver installed under OSR1, type **del %windir%\inf\adptsf9x.inf**

4 Restart the system.

Windows 98

To remove the DuraLAN Standard driver, follow these steps:

1 From the Start menu, point to **Settings**, and then click **Control Panel**.

2 In the Control Panel, double-click **System**.

3 In the Network window, go to the Configuration tab.

4 Click the DuraLAN NIC, and then click **Remove**.

5 Repeat step 4 for each additional DuraLAN NIC.

6 Click **OK** when you're done.

7 *Do not* restart the system until you remove the following files:

windows\system\adptsf40.sys

windows\inf\adptsf9x.inf

8 Restart the system.

Installation Tips

This section provides tips to assist you in the DuraLAN Standard driver installation.

Windows 95

How do I verify that the DuraLAN Standard Driver driver is installed properly?

1. From the Start menu, point to **Settings**, then click **Control Panel**.
2. In the Control Panel, double-click **System**.
3. In the Device Manager tab, look under Network adapters.

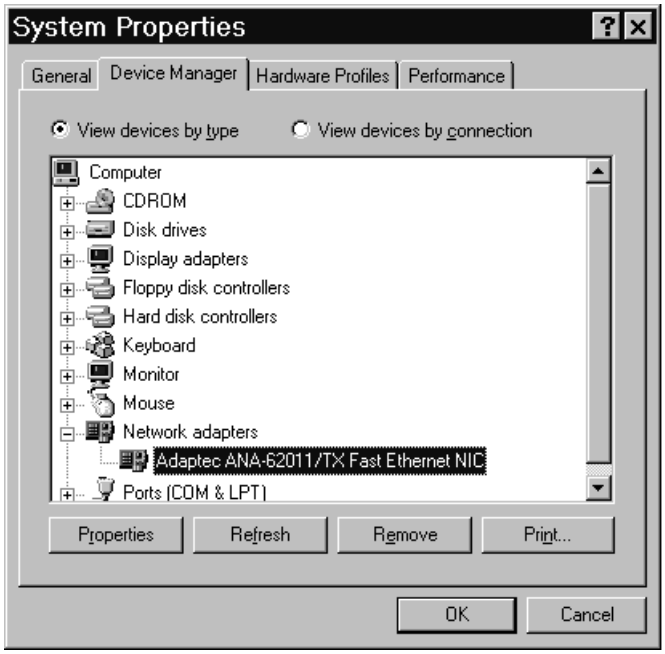

Figure 3-9. The DuraLAN NIC appears under Network adapters.

4. The DuraLAN NIC appears under Network Adapters. Click **OK**.

A yellow exclamation ! appears beside the DuraLAN NIC. What should I do?

Remove the current DuraLAN Standard driver and then re-install it.

Windows 95 Version	Solution	Page
OSR2	Remove the DuraLAN Standard Driver.	3-14
OSR1	Remove the DuraLAN Standard Driver.	3-15

In the Device Manager, the new NICs replace the older NICs, but the Network window lists both. What should I do?

Remove the older NIC(s).

1. In the Network window, click the old NIC and then click **Remove**. Repeat this step for each appropriate NIC.
2. Click **OK** when you're done.

Windows 98

How do I access the Add New Hardware wizard if it doesn't open?

1. Click the Start menu, point to Settings, and then click the **Control Panel**.
2. In the Control Panel, double-click **Add New Hardware**.

Windows Clients Using Novell Client32

Connecting clients to the NetWare Duralink64 server requires the NDIS driver. Do not use an ODI driver! See the appropriate section:

- *Connecting Clients to the NetWare Failover Server* on page 7-17.
- *Connecting Clients to the NetWare Port Aggregation Server* on page 10-16.

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▼▼▼▼ 4

DuraLAN Standard Driver for NetWare

In This Chapter

Before You Begin	4-2
Installing the DuraLAN Standard Driver	4-3
Configuring the Ports	4-5
Configuring the Protocols	4-7
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This chapter provides instructions for installing and configuring the DuraLAN Standard driver for NetWare 4.11.

Before You Begin

You will use inetcfg to complete this installation. Please be sure to check the following:

- Verify that all system, memory, and NIC requirements are met, see *System Requirements* on page 1-2.
- Verify that the new Adaptec DuraLAN NIC is installed properly in the server, see Chapter 2, *DuraLAN NIC Installation*.
- Check your system for installed DuraLAN NIC drivers. If a DuraLAN Standard driver, Duralink64 Failover driver, or Duralink64 Port Aggregation driver exists, remove it! See
  - *Removing the DuraLAN Standard Driver* on page 4-12.
  - *Removing Duralink64 Failover* on page 7-16.
  - *Removing Duralink64 Port Aggregation* on page 10-16.

Note: This procedure is critical. Only one DuraLAN driver may exist in a system!

- Verify that IntraNetWare Service Pack 5 or later is installed. You can download this pack from http://support.novell.com.

Installing the DuraLAN Standard Driver

Note: This driver uses 32 receive buffers for each port. Therefore, if you're using multiple ports, the number of receive buffers must be increased.
Type **load edit c:\nwserver\startup.ncf**, and then insert the following commands at the *end* of the file:
SET MINIMUM PACKET RECEIVE BUFFERS = 512
SET MAXIMUM PACKET RECEIVE BUFFERS = 1024

The figures in this chapter are based on screens from inetcfg Version 3.3 and may differ slightly from other versions of inetcfg. If you're installing NetWare on a new server, *do not* add the DuraLAN NIC at this time. When prompted to add the NIC, select **No**, and then continue with the NetWare installation.

Note: An Adaptec DuraLAN NIC cannot be used as a Multi Server Link (MSL) NIC in an SFT-III environment.

1. At the server prompt, type **load inetcfg** and then press **ENTER**.
2. From the Internetworking Configuration menu, select **Boards**, and then press **ENTER**.

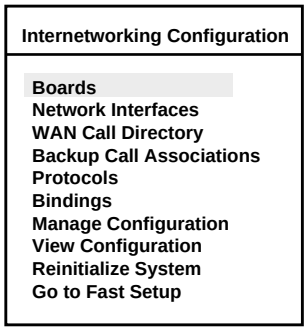

Figure 4-1. Internetworking Configuration Menu

3. In the Configured Boards screen, press **INS**. A list of drivers appears.

4 In the Select a Driver box, press **INS**.

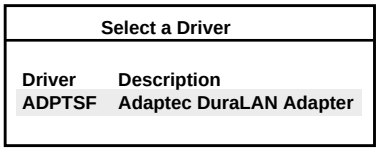

Figure 4-2. Select a Driver Box

5 Insert the LAN & DURALINK64 FAILOVER DRIVERS NETWARE 4.X DISK (disk 2 of 2).

6 In the New Driver box, type

<floppy disk drive letter>**:\nwserver\adptsf.lan**

and then press **ENTER**.

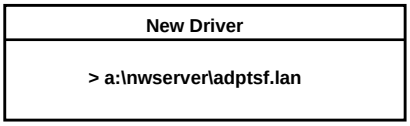

Figure 4-3. a:\ represents the floppy disk drive.

7 In the Select a Driver box, select **Adptsf**, and then press **ENTER**. (**Adptsf** may appear at the end of the list.)

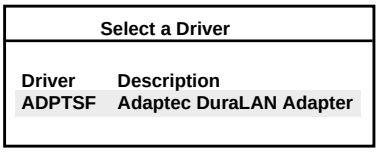

Figure 4-4. Adptsf may appear at the end of the list.

8 Continue to *Configuring the Ports* on page 4-5.

Configuring the Ports

The NetWare Board Configuration screen does not distinguish single-port NICs from multi-port NICs.

1 Select the **Slot** field. (See *Note on Ports in NetWare* on page 4-15.)

- **SINGLE-PORT NIC.** Type the port slot number, and then press **ENTER**.
- **MULTI-PORT NIC.** Type the port slot number, and then press **ENTER**. You will return to the Board Configuration screen for each additional port.

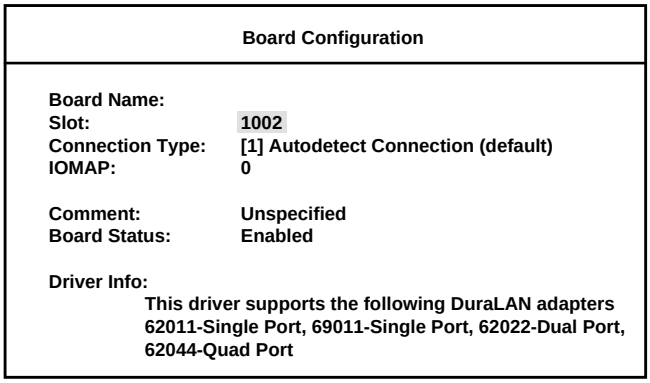

Figure 4-5. This single-port NIC is physically seated in Slot 2. The valid slot number for this system happens to be 1002.

Note: If an invalid slot number is assigned, a list of valid slot numbers will be displayed at reboot. At that time, you may reassign the slot number.

2 Select the **Board Name** field. This field is used to identify the port. Reference the slot number to better identify the port later.

- **SINGLE-PORT NIC.** Type the Port name, and then press **ENTER**.

– **MULTI-PORT NIC.** Type the Port name, and then press **ENTER**. You will return to the Board Configuration screen for each additional port.

3 In the Connection Type field, the **Autodetect Connection** default is recommended. However, to select a different connection type, follow these steps:

a In the Connection Type field, press **ENTER** to access the Connection Type box.

b In the Connection Type box, select the appropriate type, and then press **ENTER**. For descriptions, see *Connection Types* on page A-2.

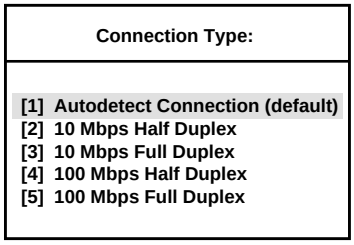

Figure 4-6. Connection Type Box

4 **OPTIONAL**. In the Comment field, you may enter a comment up to 50 characters, and then press **ENTER**.

5 This completes the port configuration. Press **ESC**.

6 In the Save Changes box, select **Yes**, and then press **ENTER**. The Configured Boards screen displays the new configuration settings, as shown in Figure 4-7.

NOTE ON MULTI-PORT NICS. The Configured Boards screen displays each port name under Board Name.

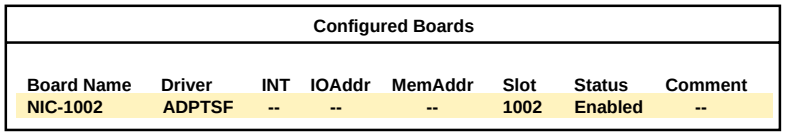

Figure 4-7. Example of a configured single-port NIC.

7 To enable or disable the port, select it, and then press **TAB**.

8 **OPTIONAL**. To configure another single or multi-port NIC:

   a Press **INS** in the Configured Boards screen.

   b In the Select a Driver box, select **ADPTSF**, and then press **ENTER**.

   c Repeat steps 1-8.

9 When you're done, press **ESC** to return to the Internetworking Configuration menu.

10 Continue to *Configuring the Protocols*.

Configuring the Protocols

You can configure one or more protocols for each port.

1 From the Internetworking Configuration menu, select **Protocols**, and then press **ENTER**.

2 In the Protocol Configuration box, select the appropriate protocol, and then press **ENTER**.

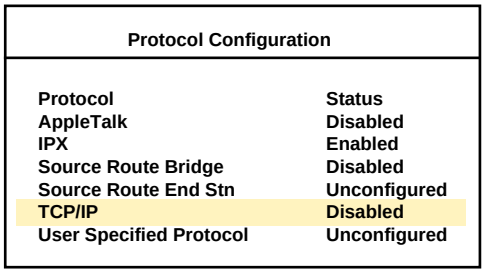

Figure 4-8. Protocol Configuration Box

3 In the configuration box of the specified protocol enter the value for each appropriate field.

4 To save the settings and exit the configuration box, press **ESC**.

5 To configure another protocol, repeat steps 2-4.

6 Press **ESC** to return to the Internetworking Configuration menu.

7 Continue to *Binding Protocol(s)* on page 4-8.

Binding Protocol(s)

To bind protocols to the ports, use the following steps:

1. From the Internetworking Configuration menu, select **Bindings**, and then press **ENTER**.
2. In the Protocol to Interface / Group Bindings box, press **INS**.

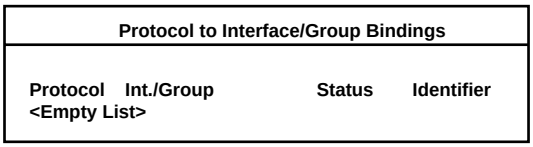

Figure 4-9. Protocol to Interface/Group Bindings Box

3. In the list of configured protocols, select the protocol to be bound to the port, and then press **ENTER**.

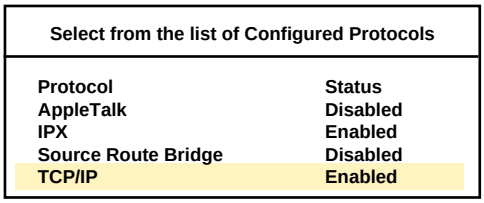

Figure 4-10. This screen displays available protocols.

4. In the Bind To? box, select **A Network Interface**, and then press **ENTER**.

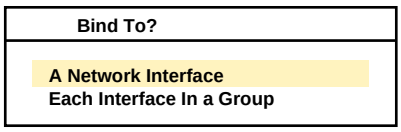

Figure 4-11. Bind To? Box

5 In the Configured Network Interface box, select the appropriate port, and then press **ENTER**.

NOTE ON MULTI-PORT NICS. Port names are listed under Board Name.

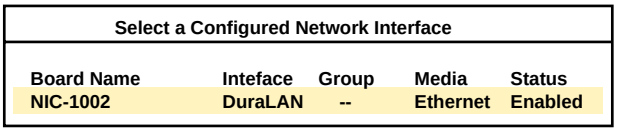

Figure 4-12. Configured Network Interface Box

6 In the next screen, select the binding settings for the selected protocol.

7 Press **ESC** when you're finished, and then save the current changes.

8 In the Update <Protocol> Configuration box, select **Yes**, and then press **ENTER**.

9 **OPTIONAL**. To bind multiple protocols or frame types to the port, repeat steps 2-8.

10 When you're finished, press **ESC** to return to the Internetworking Configuration menu.

11 To bind protocols to another port, repeat steps 1-10.

12 Continue to *Viewing the Configuration* on page 4-10 to verify the NIC configuration.

Viewing the Configuration

Before exiting inetcfg and restarting the server, you should review the NIC configuration. To modify the configuration, refer to the appropriate section(s) in this chapter for help.

1. In the Internetworking Configuration menu, select **View Configuration**, and then press **ENTER**.
2. In the View Configuration menu, select **All INETCFG Commands**, and then press **ENTER**.

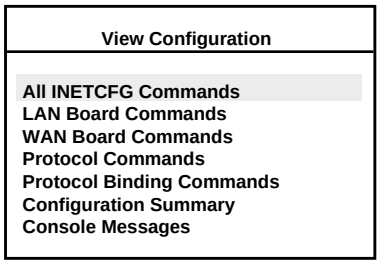

Figure 4-13. View Configuration Menu

3. In the View All INETCFG Generated Commands screen, you can review all the "load" and "bind" commands. Press **ESC** when you're done.
4. Use the View Configuration menu to review any other areas of the NIC configuration.
5. When you're ready to exit the View Configuration menu, press **ESC**.
6. Continue to *Restarting the Server* on page 4-11.

Restarting the Server

After installing the Standard driver and configuring the ports, you must restart the server.

1. In the Internetworking Configuration menu, press **ESC**.
2. In the Exit INETCFG box, select **Yes**, and then press **ENTER**.
3. In the Add Initialize Commands to autoexec.ncf box, select **Yes**, and then press **ENTER**.
4. The next screen indicates that the configuration will be activated. Press **ENTER**.
5. At the server console type **down** and then press **ENTER**.
6. Type **restart server** and then press **ENTER**.
7. **OPTIONAL**. After the server is restarted you can review the current settings. Type **config** at the console prompt, and then press **ENTER**.

Troubleshooting Tip

At system reboot, I receive a message that the NIC configuration contains invalid settings. What should I do?

1. Follow the instructions at the server prompt.
2. Document each of your selections.
3. Return to inetcfg.
4. Use the Internetworking Configuring menu to access those screens you must modify.

Removing the DuraLAN Standard Driver

To remove the DuraLAN Standard Driver in NetWare, use the following steps:

1. At the server prompt, type **load inetcfg** and then press **ENTER**.
2. In the Internetworking Configuration menu, select **Boards**, and then press **ENTER**. A list of NICs appears.
3. In the Configured Boards screen, delete all existing Adaptec NICs drivers by selecting the NIC(s) and pressing **DEL**.
4. When you're finished, press **ESC**.
5. In the Internetworking Configuration menu, select **Manage Configurations**, and then press **ENTER**.
6. To save changes, select **Yes**.
7. Press **ESC** twice.
8. To exit inetcfg, select **Yes**.
9. At the server console, type **down** and then press **ENTER**.
10. Type **restart server** and then press **ENTER**.

Installing Novell Client32

DOS

This section provides instructions on installing the ADPTSF 32-bit driver for Novell Client32 using the ODI driver. Please note that Adaptec does not support 16-bit drivers.

1. Download the latest version of Novell NetWare Client32 via the Novell web site, www.novell.com.
2. Start DOS.

3 Insert your Novell NetWare Client32 package.

4 Type **install** and then press **ENTER**.

5 Follow the instructions on your screen. Please refer to *Selecting Options* if you're not sure which option to select.

6 When you're done, you may confirm settings in startnet.bat.

Note: This installation setup assigns settings to one port only. To assign settings to multiple ports, you must edit startnet.bat. See *Editing startnet.bat* on page 4-14.

Selecting Options

This section provides the option you must choose in a given screen. These screens vary depending on which NetWare Client32 package you're using.

Screen Name/Message	Option
Client Installation	Choose either **NetWare Client32 for DOS and Windows 3.1x** or **IntranetWare DOS/Windows for DOS/Windows**.
Driver Type	Choose **32-Bit**.
32-Bit Network Board Drivers	Choose **User Specified 32 Bit Driver**. *Do not* choose Adaptec PCI Ethernet Driver Failover!
When asked to insert the NetWare Client32 for DOS/Windows 3.1x 32-bit disk	Insert the DURALINK64 FAILOVER DRIVERS NETWARE 4.X (disk 2 of 2), and then type **a:\nwserver**.
32-Bit Network Board Drivers	Choose **Adaptec DuraLAN Network Adapters**.
Settings for Adaptec DuraLAN Network Adapter	Set IOMAP to **1**. Set Connection Type to **Autodetect Default** or **None**.

Editing startnet.bat

To assign multiple ports, follow these steps:

1. Load c:\novell\client32\adptsf.lan.
2. In startnet.bat, type **slot=[port slot number]** at the end of each line. The following example shows the setting assigned to port 1:

   iomap=1 Frame=ETHERNET_802.2 slot=1
3. For the next port, enter

   iomap=1 Frame=[frame type] slot=[port slot number]

   To assign multiple frame types, repeat this step changing the frame type setting.
4. Repeat step 3 for each additional port.
5. Save your changes.
6. Exit startnet.bat.

Connecting Clients to the NetWare Server

Connecting clients to the NetWare Duralink64 server requires the NDIS driver. Do not use an ODI driver! See the appropriate section:

- *Connecting Clients to the NetWare Failover Server* on page 7-17.
- *Connecting Clients to the NetWare Port Aggregation Server* on page 10-16.

Windows

This section describes how to install the ADPTSF 32-bit driver for Novell Client32. Please note that Adaptec does not support 16-bit drivers.

Note: This procedure requires the NDIS driver with Client32. Do not use an ODI driver!

1. If you're using Windows NT 4.0, install the Microsoft Windows NT Service Pack 3 or later and then restart the system.

2 Install the DuraLAN Standard driver. Instructions are provided on the following pages:

   – *Windows NT 4.0* on page 3-2.

   – *Windows NT 3.51* on page 3-4.

   – *Windows 95* on page 3-6.

3 Install the Client32 software, see your Novell documentation for instructions.

Connecting Clients to the NetWare Server

Connecting clients to the NetWare Duralink64 server requires the NDIS driver. Do not use an ODI driver! See the appropriate section:

- *Connecting Clients to the NetWare Failover Server* on page 7-17.
- *Connecting Clients to the NetWare Port Aggregation Server* on page 10-16.

Note on Ports in NetWare

When you're installing Adaptec NICs, it's a good idea to document where each port physically resides in the server, especially when two or more identical NICs exist. This is important because ports are identified by generic port names, such as Adptsf1, Adptsf2, Adptsf3, etc.

Port names are assigned to ports in the order that the system scans these ports at boot time. Consequently, whenever you physically rearrange the network cards, the port names change as well.

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▾▾▾▾ Part 3

Installing Duralink64 Failover

5

Network Configuration Examples

In This Chapter

Network Without Duralink64 Failover Protection	5-2
Single Hub or Switch on an Ethernet Segment	5-2
Dual Hubs	5-3
Dual Hubs with an Ethernet Switch	5-4
Dual Hubs with Routers	5-5
Dual Hubs with a Quad-Port NIC	5-6

This chapter describes the benefits of using Duralink64 Failover and some typical network configurations. The primary and backup Adaptec DuraLAN Fast Ethernet NICs or ports reside in the server. Duralink64 Failover operates on these NICs to provide redundancy on the server. The backup port does not operate until the primary port fails.

Network Without Duralink64 Failover Protection

This configuration uses one NIC connected to a hub or switch on an Ethernet segment. If the NIC fails, all network traffic is stopped.

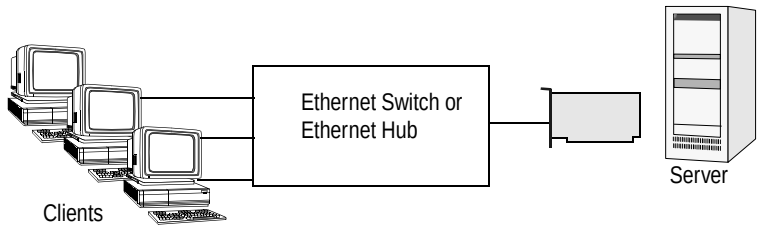

Figure 5-1. Network without Duralink64 Failover protection.

Single Hub or Switch on an Ethernet Segment

This configuration uses two NICs connected to a hub or switch on an Ethernet segment. Duralink64 Failover provides failover capability if one NIC fails.

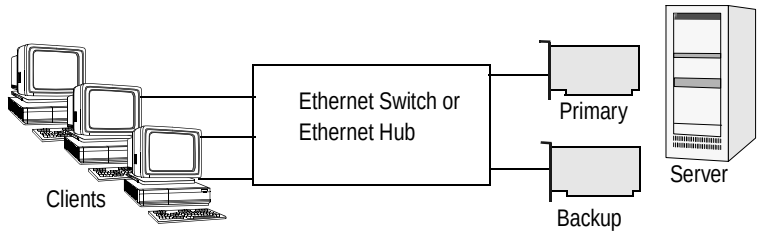

Figure 5-2. Single hub or switch on an Ethernet segment.

Dual Hubs

In this example, each NIC is connected to a separate hub to provide redundancy. If the hub port being used by the primary NIC fails, the backup NIC becomes active and all network traffic is immediately directed through it.

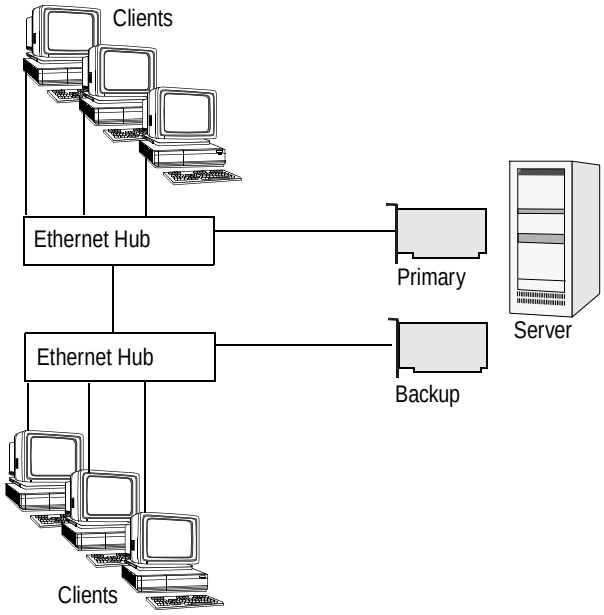

Figure 5-3. Two NICs connected to separate hubs.

Dual Hubs with an Ethernet Switch

This example shows how Duralink64 Failover provides network redundancy to a switched network. Ethernet switches provide network traffic segmentation.

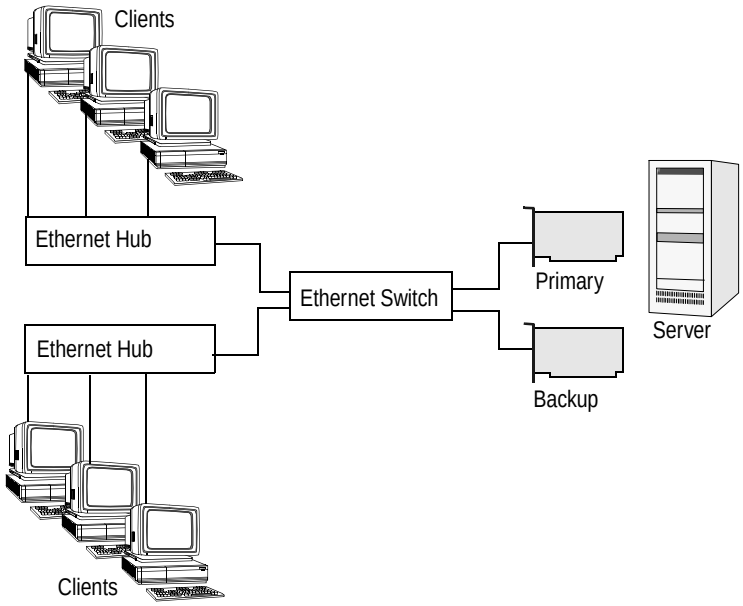

Figure 5-4. Duralink64 Failover on a network with dual hubs and an Ethernet switch.

Dual Hubs with Routers

The following example shows how to set up Duralink64 Failover in a network configuration using routers. Routers provide WAN and LAN connectivity and allow physical network protocol redundancy.

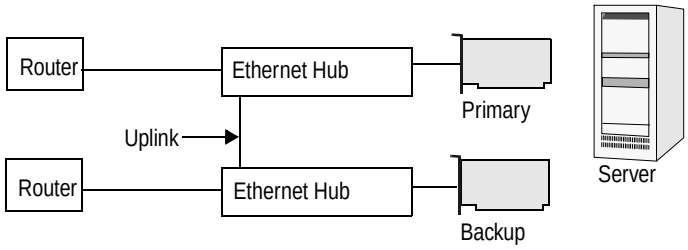

Figure 5-5. Duralink64 Failover in a network configuration using routers.

Dual Hubs with a Quad-Port NIC

This example shows port redundancy, using Duralink64 Failover, within a 4-port NIC. As shown in the illustration below, ports 1 and 3 are used as the primary ports to each Ethernet hub. Ports 2 and 4 are backup ports connected to each hub.

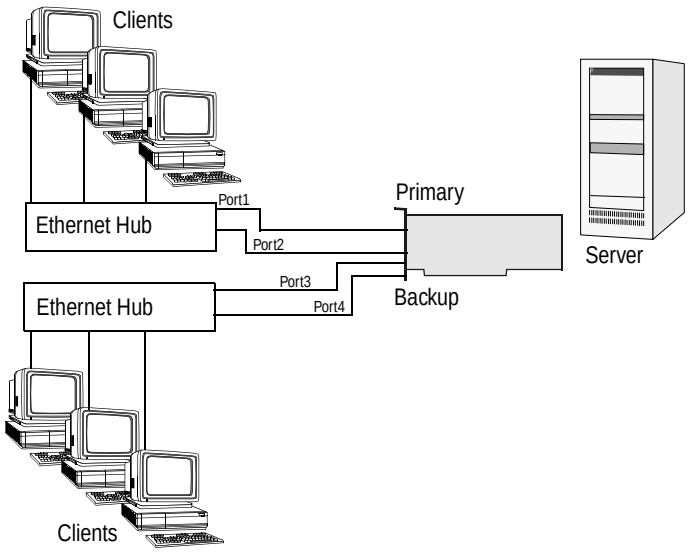

Figure 5-6. A 4-Port NIC provides port redundancy.

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6

Duralink64 Failover for Windows NT

In This Chapter

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Installing Duralink64 Failover	6-3
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This chapter provides instructions for installing Duralink64 Failover on a server running Windows NT versions 4.0 and 3.51.

Before You Begin

- Verify that all system, memory, and NIC requirements are met, see *System Requirements* on page 1-2.
- Verify that the new Adaptec DuraLAN NIC is installed properly in the server, see Chapter 2, *DuraLAN NIC Installation*.
- Check your system for installed DuraLAN NIC drivers. If a DuraLAN Standard driver, Duralink64 Failover driver, or Duralink64 Port Aggregation driver exists, remove it! See
  - *Removing the DuraLAN Standard Driver* on page 3-14.
  - *Removing Duralink64 Failover* on page 6-13.
  - *Removing Duralink64 Port Aggregation* on page 9-22.

WARNING: This procedure is critical. Only one DuraLAN driver may exist in a system!

Tip

Installation, configuration, and optional parameters for the software are updated regularly. The file path a:\ntfailover\i386\readme.txt contains supplemental installation instructions, as well as up-to-date software information, and should be read before installing Duralink64 Failover.

Installing Duralink64 Failover

Instructions for installing the Duralink64 Failover driver in Windows NT 3.51 start on page 6-4.

Windows NT 4.0

To install the Duralink64 Failover driver, follow these steps:

1. Start Windows NT 4.0.
2. From the Start menu, point to **Settings**, and then click **Control Panel**.
3. In the Control Panel, double-click **Network**.
4. In the Network window, click the **Adapters** tab.
5. In the Adapters tab, click **Add**.
6. Insert the LAN AND DURALINK64 FAILOVER DRIVERS WINDOWS DISK (disk 1 of 2) into the floppy disk drive.
7. In the Select Network Adapter window, click **Have Disk**.

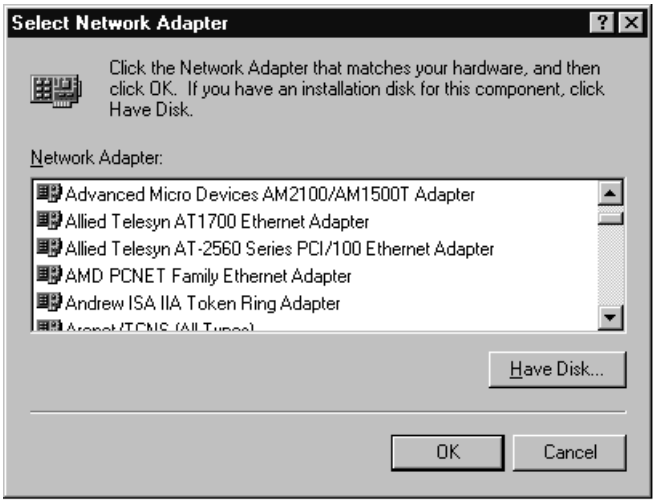

Figure 6-1. Select Network Adapter Window

8 In the Insert Disk Window, type **a:\ntfailover\i386** and then click **OK**.

9 In the Select OEM Option window, select **Adaptec DuraLAN Fast Ethernet NIC** or the appropriate NIC model, and then click **OK**.

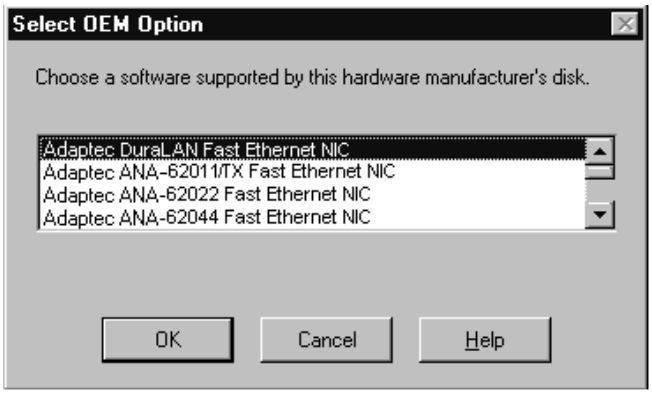

Figure 6-2. Select OEM Option Window

10 Continue with *Configuring the Ports* on page 6-7.

Windows NT 3.51

To install the Duralink64 Failover driver, follow these steps:

1 Start Windows NT 3.51.

2 In the Main window, double-click **Control Panel**.

3 In the Control Panel, double-click **Network**.

4 In the Network Settings window, click **Add Adapter**.

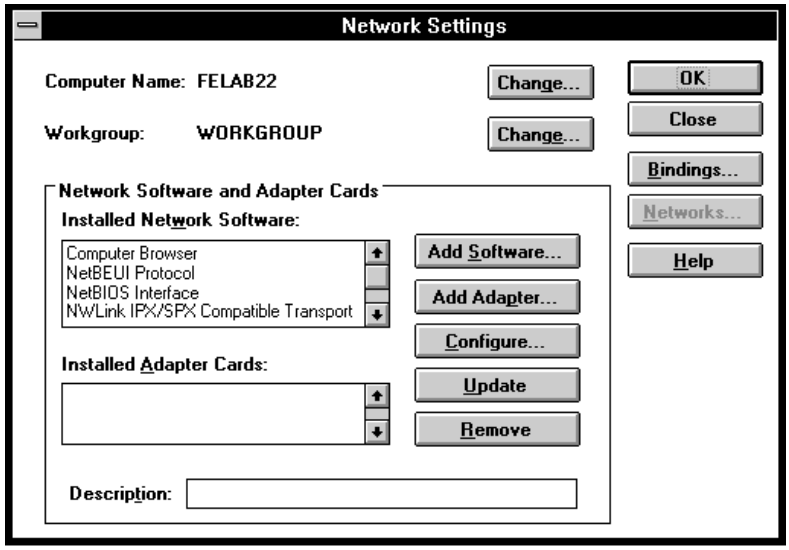

Figure 6-3. Network Settings Window

5 In the Add Network Adapter window, click **<Other> Requires disk from manufacturer** from the Network Adapter list, and then click **Continue**.

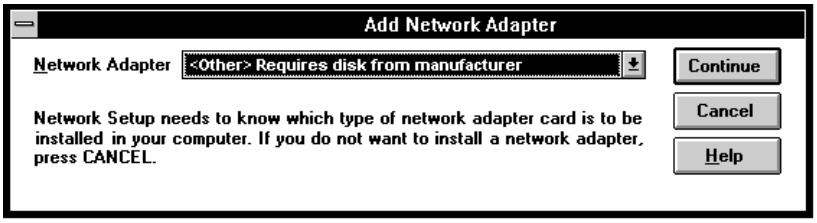

Figure 6-4. Add Network Adapter Window

6 Insert the LAN AND DURALINK64 FAILOVER DRIVERS WINDOWS DISK (disk 1 of 2) into the floppy disk drive.

7 In the Insert Disk window, type **a:\ntfailover\i386** and then click **OK**.

8 In the Select OEM Option window, click **Adaptec DuraLAN Fast Ethernet NIC** or the appropriate NIC model, and then click **OK**.

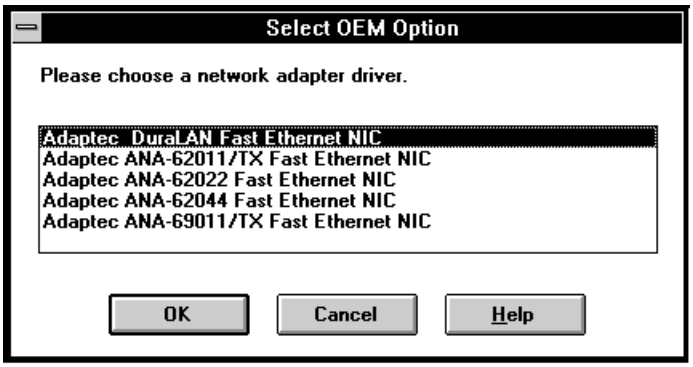

Figure 6-5. Select OEM Option Window

9 Continue to *Configuring the Ports* on page 6-7.

Configuring the Ports

In the Adaptec New Hardware Found window, each port is assigned to Autodetect, the default connection type that will always detect port connection and negotiate a compatible speed and transmission mode.

1 In the Adaptec New Hardware Found window, make sure all the DuraLAN NIC ports appear.

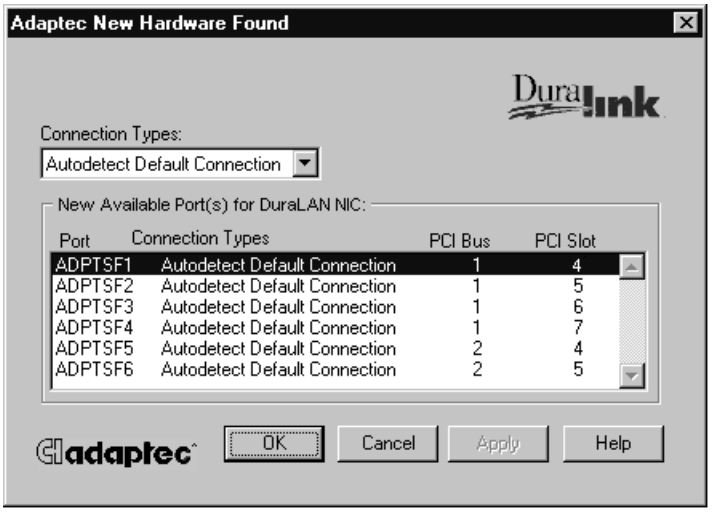

Figure 6-6. This window identifies each port's PCI bus and PCI slot.

Note: Generally, PCI Bus 0 is the PCI Bus on the motherboard. PCI Bus 1 or above is an ANA-62022 or ANA-62044 NIC. In Figure 6-6, PCI Bus 1 is ANA-62044 and PCI Bus 2 is ANA-62022. The PCI Slot represents the port on the NIC starting from the top. The top port starts at PCI Slot 4.

2 In the New Available Port(s) for DuraLAN NIC box, click the appropriate port.

3 In the Connection Types list, click the connection type for your network or use **Autodetect Default Connection**. For descriptions, see *Connection Types* on page A-2.

4 Click **Apply**.

5 Repeat steps 1-4 for each existing port.

6 When you're done, click **OK**.

7 Continue with *Creating the Failover Pair* on page 6-8.

Creating the Failover Pair

You can create Failover pairs in the Configuration tab. A Failover pair consists of two ports only—the primary port and the backup port. Windows NT 3.51 instructions start on page 6-11.

Windows NT 4.0

To create Failover pairs, follow these steps:

1 From the Available Adaptec Ports box, click a port to be designated as a primary port.

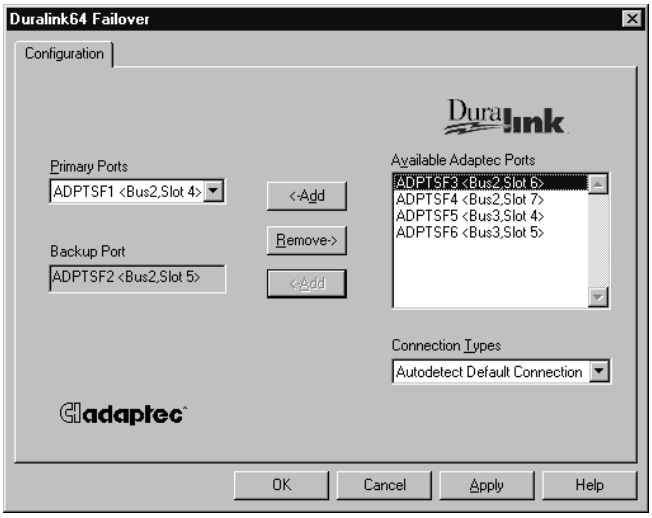

Figure 6-7. Failover Configuration Tab

2. Click **Add**. The port is added under Primary Port in the Failover Pair list.
3. To assign a backup to the primary port, click the appropriate port from the Available Adaptec Ports box, and then click **Add**. The port is added in the Backup Port field.
4. Click **Apply**.
5. **OPTIONAL**. Repeat steps 1-5 to create another Failover pair.
6. **OPTIONAL**. To remove a Failover pair
   a. Click the port from the Primary Ports list, and then click **Remove**. Both ports return to the Available Adaptec Ports box.
   b. Click **Apply**.
7. When you're done, click **OK**. You'll return to the Adapters tab.

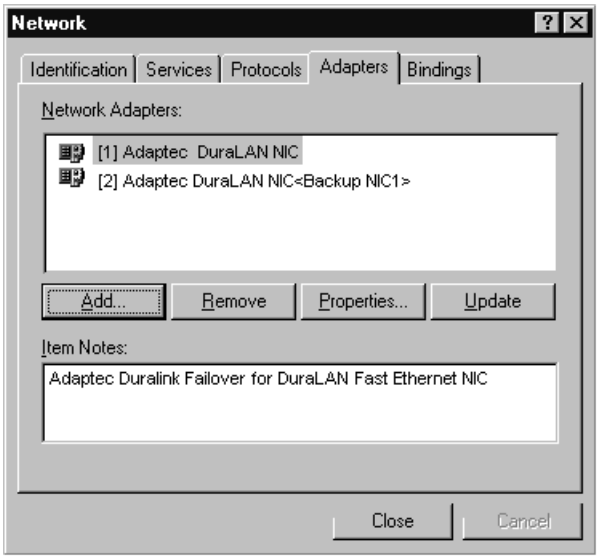

Figure 6-8. <Backup NIC1> indicates that Port 2 is the backup port for Port 1.

Note: The Adapters tab identifies one model only, even when several DuraLAN NIC models are installed. The DuraLAN NIC model displayed is the same as the first model you chose in step 9 from *Installing Duralink64 Failover* on page 6-3.

8 If SNMP is not set up, you'll receive the Setup Message below. Click **OK**.

Figure 6-9. This message may be ignored during this installation.

9 Enter the protocol information. Consult your Microsoft Windows NT 4.0 documentation for help configuring the protocol.

10 When you're done, remove the floppy disk from the floppy disk drive.

11 Restart the system.

Note: If you were required to insert the Windows NT CD, you must re-install the latest version of Microsoft Windows NT Service Pack, and then restart the system.

Windows NT 3.51

To create Failover pairs, follow these steps:

1. From the Available Adaptec Ports box, click the port you want as the primary port.

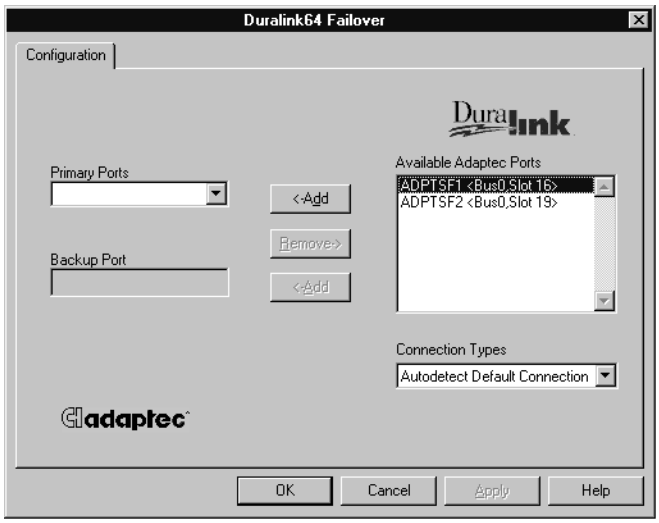

Figure 6-10. Configuration Tab

2. Click **Add**. The port is added to the Primary Ports list.
3. To create the backup port, click the appropriate port from the Available Adaptec Ports box.
4. Click **Add**. The port is added to the Backup Ports list.
5. Click **Apply**.
6. **OPTIONAL**. Repeat steps 1-5 to create another Failover pair.

7 **OPTIONAL**. To remove a Failover pair

a Click the port from the Primary Ports list, and then click **Remove**. Both ports return to the Available Adaptec Ports box.

b Click **Apply**.

8 When you're done, click **OK**. You'll return to the Network Settings Window.

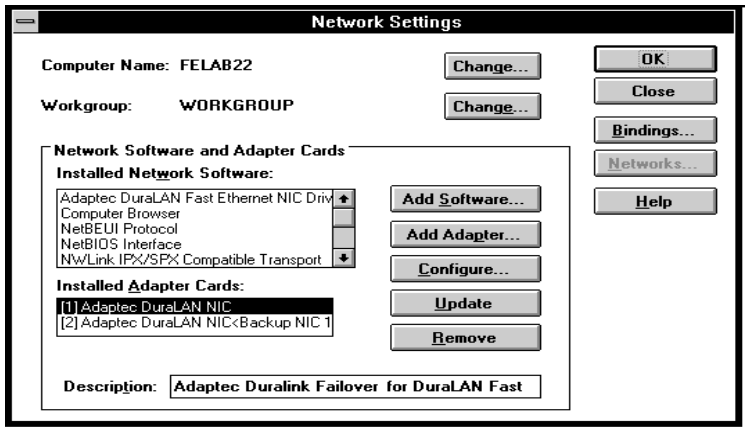

Figure 6-11. <Backup NIC1> indicates that Port 2 is the backup port for Port 1.

9 In the Network Settings window, click **OK**.

10 Consult your Microsoft Windows NT 3.51 documentation for help configuring the protocol (such as entering values for TCP/IP).

11 When you're done, remove the floppy disk from the floppy disk drive.

12 In the Network Setting Change window, click **Restart Now**.

Note: If you were required to insert the Windows NT CD, you must re-install the latest Microsoft Windows NT Service Pack, and then restart the system again.

Monitoring Failover Pairs

There are two ways to monitor the status of Failover Pairs:

- SNMP Manager—when failover occurs SNMP traps are sent to network management stations and error logs are updated through the operating system event log. In order to manage SNMP agents, compile the following MIB file on the SNMP management station:

  a:\snmpmibs\duralink.mib

- Event Viewer Dialog Box—the local event viewer dialog box will log port failures in Windows NT.

Removing Duralink64 Failover

This section provides instructions for removing the Duralink64 Failover driver which is necessary if you are installing another Duralink driver. Instructions for Windows NT 3.51 start on page 6-14.

Windows NT 4.0

To remove the Duralink64 Failover driver, follow these steps:

1. Double-click **My Computer**.
2. Double-click **Control Panel**.
3. In the Control Panel, double-click **Network**.
4. In the Network window, click the **Adapters** tab.
5. In the Network Adapters box, click the Adaptec DuraLAN NIC you wish to remove, and then click **Remove**.
6. The warning message displays This will be permanently removed from the system. Click **Yes**.
7. Repeat steps 5 and 6 for each additional DuraLAN NIC.
8. When you're done, click **Close**.
9. Click **Yes** to restart your computer when prompted.

10 To install the Duralink64 Failover driver, continue with *Installing Duralink64 Failover* on page 6-3.

Note: When the system restarts, you may receive a message that at least one service failed to start. Click **OK**. (This message does not appear after you add the new Duralink64 Failover drivers.)

Windows NT 3.51

To remove the Duralink64 Failover driver, follow these steps:

1 In the Main window, double-click **Control Panel**.

2 In the Control Panel, double-click **Network**.

3 In the Network Settings window, click the Adaptec DuraLAN NIC from the Installed Adapter Cards box, and then click **Remove**.

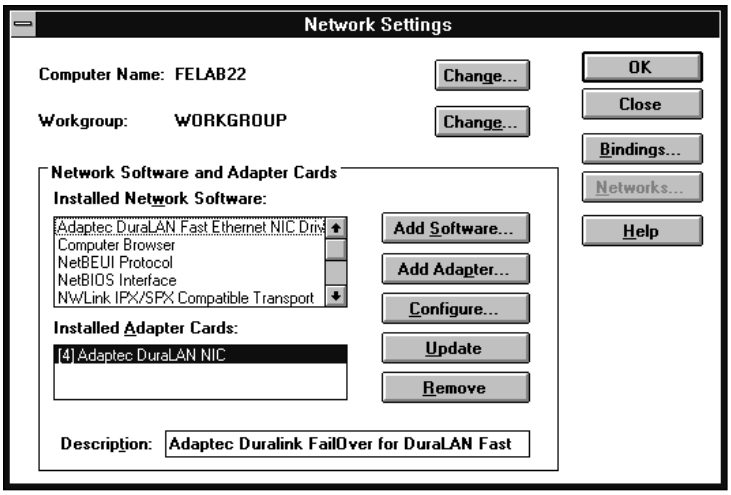

Figure 6-12. Network Settings Window

4 In the Network Settings message, click **Yes**.

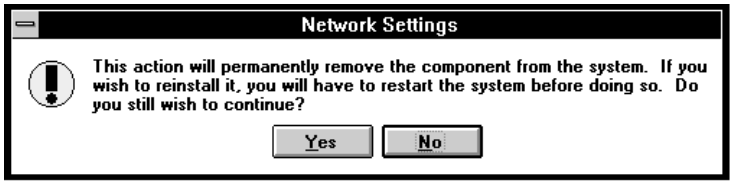

Figure 6-13. Network Settings Message Box

5 Repeat steps 3-4 for each additional Adaptec DuraLAN NIC.

6 When you're done, click **OK** to exit the Network Settings window.

7 In the Network Settings Change window, click **Restart Now**.

Note on DuraLAN NIC Ports

When you're installing Adaptec DuraLAN NICs, it's a good idea to document where each port physically resides in the server, especially when two or more identical NICs exist. This is important because ports are identified by generic port names, such as Adptsf1, Adptsf2, Adptsf3, etc.

Port names are assigned to ports in the order that the system scans these ports at boot time. Consequently, whenever you physically rearrange the network cards, the port names change as well.

❒

▼▼▼▼ 7

Duralink64 Failover for NetWare

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This chapter provides instructions for installing Duralink64 Failover on a server running NetWare 4.11.

Before You Begin

You will use fosetsf to complete this installation. Before you begin, please be sure to check the following:

- Verify that all system, memory, and NIC requirements are met, see *System Requirements*, page 1-2.
- Verify that the new Adaptec DuraLAN NIC is installed properly in the server, see Chapter 2, *DuraLAN NIC Installation*.
- Check your system for installed DuraLAN NIC drivers. If a DuraLAN Standard driver, Duralink64 Failover driver, or Duralink64 Port Aggregation driver exists, remove it! See
  - *Removing the DuraLAN Standard Driver*, page 4-12.
  - *Removing Duralink64 Failover*, page 7-16.
  - *Removing Duralink64 Port Aggregation*, page 10-16.

Note: This procedure is critical. Only one DuraLAN driver may exist in a system.

- Verify that IntraNetWare Service Pack 5 or later is installed. This pack may be downloaded from http://support.novell.com.

Tips

- After you've installed Duralink64 Failover, use focfgsf to reconfigure the drivers when necessary (see *Modifying the Driver Configuration*, page 7-16).
- Installation, configuration, and optional parameters for Duralink64Duralink64 Failover are updated regularly. The readme file contains supplemental installation instructions.

Installing Duralink64 Failover

If you're installing NetWare on a new server, *do not* add the DuraLAN NIC at this time. When prompted to add the NIC, select **No**, and then continue with the NetWare installation.

Note: This driver uses 32 receive buffers for each port. Therefore, if you're using multiple ports, the number of receive buffers must be increased.
Type **load edit c:\nwserver\startup.ncf**, and then insert the following commands at the *end* of the file:
SET MINIMUM PACKET RECEIVE BUFFERS = 512
SET MAXIMUM PACKET RECEIVE BUFFERS = 1024

F1 provides on-line help for each screen. **F10** allows you to abort any change made within the program and exit the utility.

1. Insert the DURALINK64 FAILOVER DRIVERS NETWARE 4.X (disk 2 of 2).
2. At the system console prompt, type **load a:\nwserver\fosetsf** and then press **ENTER**.
3. In the message indicating that new Adaptec NICs are detected, press **ENTER**.
4. Continue to *Configuring the Ports*, page 7-4.

Configuring the Ports

After installing the Duralink64 Failover driver, use the following steps to configure the ports.

1 In the Main Menu, select **Configure Ports**, and then press **ENTER**.

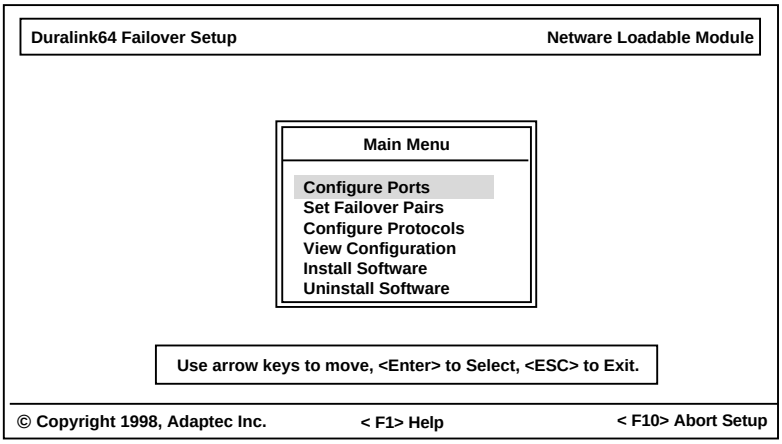


Figure 7-1. Duralink64 Failover Setup Main Menu

2 In the Ports screen, make sure you know which port names are assigned to the actual ports on the NIC. (See *Note on DuraLAN NIC Ports*, page 7-18 for information on identifying multiple ports.)

No.	Port Name	NIC	Connection Type	Status
1	Adptsf1	ANA-62044/TX:[1]	Autodetect (default)	Enabled
2	Adptsf2	ANA-62044/TX:[2]	Autodetect (default)	Enabled
3	Adptsf3	ANA-62044/TX:[3]	Autodetect (default)	Enabled
4	Adptsf4	ANA-62044/TX:[4]	Autodetect (default)	Enabled
5	Adptsf5	ANA-62044/TX:[1]	Autodetect (default)	Enabled
6	Adptsf6	ANA-62044/TX:[2]	Autodetect (default)	Enabled
7	Adptsf7	ANA-62044/TX:[3]	Autodetect (default)	Enabled
8	Adptsf8	ANA-62044/TX:[4]	Autodetect (default)	Enabled

Figure 7-2. The port names (Adptsf1, Adptsf2, etc) do not correspond to the physical PCI slot numbers on the motherboard.

3 **OPTIONAL**. The **Autodetect** default detects which device the port is connected to and negotiates the port speed and transmission mode accordingly. **Autodetect** is recommended; however, to change the connection type(s):

   a Select the port, and then press **ENTER**. (To select multiple ports, select the port, and then press **F5** one at a time.)

   b In the Type of Connection menu, select the type, and then press **ENTER**. (*Connection Types*, page A-2 provides descriptions.)

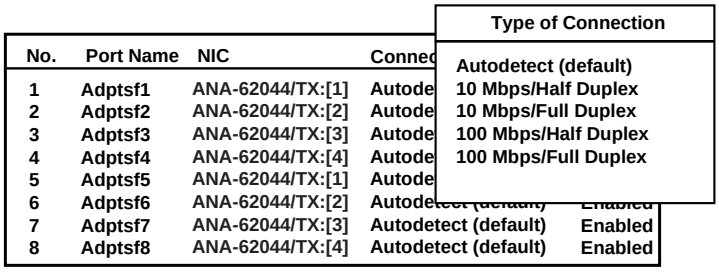


Figure 7-3. Type of Connection Menu

4 **OPTIONAL**. **Enabled** is the default status. To disable a port, select the port, and then press **TAB**.

5 Press **ESC** when you're done.

6 Continue to *Creating the Failover Pairs*.

Creating the Failover Pairs

The Failover pair consists of two ports only: the primary port and the backup port.

1 In the Main Menu, select **Set Failover Pairs**, and then press **ENTER**.

2 In the List of Existing Pairs box, press **INS**.

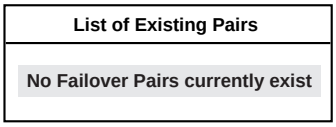


Figure 7-4. List of Existing Pairs Box

3 Select the pair, and then press **ENTER**.

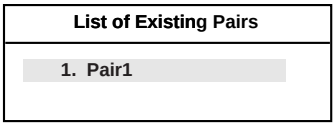


Figure 7-5. A default pair name uses the naming convention: first pair= Pair1, second pair=Pair2, third pair=Pair3, etc.

4 In the Failover Pair Configuration menu, select **Add/Remove Ports**, and then press **ENTER**.

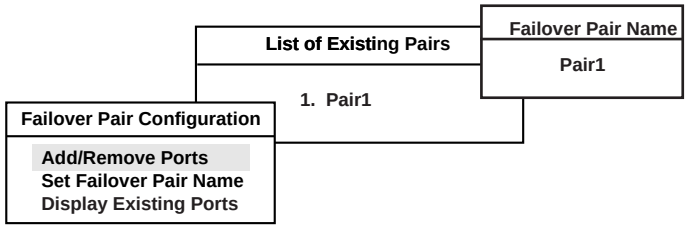


Figure 7-6. Failover Pair Configuration Menu

5 In the Existing Ports box, press **INS**.

Figure 7-7. This message appears the first time you add a new pair.

6 In the Available Ports box, select the primary port, and then press **ENTER**.

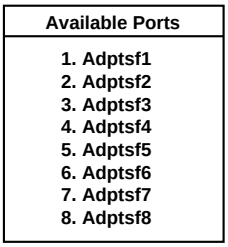


Figure 7-8. Available Ports Box

7 Press **INS** to return to the Available Ports box.

8 Select the secondary port, and then press **ENTER**.

9 **OPTIONAL.** In the Existing Ports box, ✔ indicates the primary port. To change the primary port, select the second port, and then press **ENTER**.

10 Press **ESC** to apply the ports.

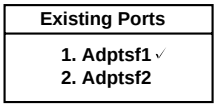


Figure 7-9. The selected ports appear in the Existing Ports box.

11 **OPTIONAL.** To rename the default Failover pair name:

a From the Failover Pair Configuration menu, select **Set Failover Pair Name**, and press **ENTER**.

b In the Failover Pair Name box, type the pair name, and then press **ENTER.**

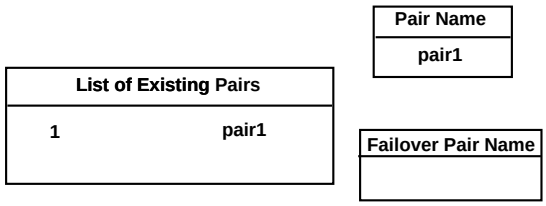


Figure 7-10. Enter the new name in the Failover Pair Name box.

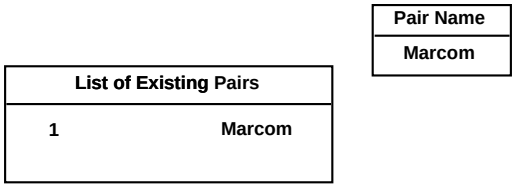


Figure 7-11. The new name appears in the Pair Name box.

12 To review the ports assigned to the pair, select **Display Existing Ports** from the Set Failover Pairs menu, and then press **ENTER.**

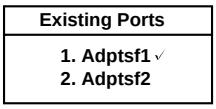


Figure 7-12. When you select Display Existing Ports, this box is displayed as read-only.

13 Press **ESC** until you return to the Main Menu.

14 To create more pairs, repeat Steps 1-13.

15 Continue to *Assigning the Protocols.*

Assigning the Protocols

You can assign IP or IPX protocols to Failover pairs and stand-alone ports.

Note: The IPX protocol supports all four frame types and multiple frame types simultaneously. IP supports either Ethernet_II or Ethernet_SNAP, but never both at the same time.

1. In the Main Menu, select **Configure Protocols**, and then press **ENTER**.
2. In the List of Ports / Failover Pairs box, select the Failover pair or port, and then press **ENTER**.

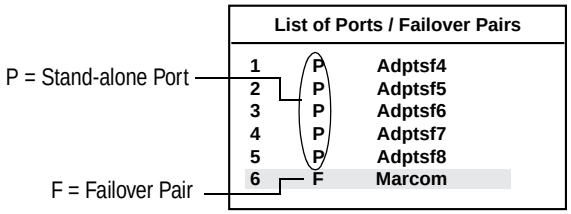


Figure 7-13. List of Ports/Failover Pairs Box

3. In the List of Protocols box, select the protocol for the selected Failover pair or port, and then press **ENTER**.

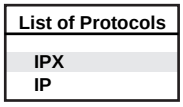


Figure 7-14. List of Protocols Box

Configuring IPX

a In the List of Frame Types box, select the frame type, and then press **ENTER**.

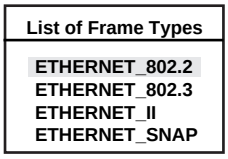


Figure 7-15. List of Frame Types Box

b In the IPX Network Number box, type the network number, and then press **Enter**.

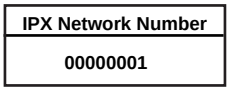


Figure 7-16. IPX Network Number Box

c Repeat steps a and b for each frame type you wish to use.

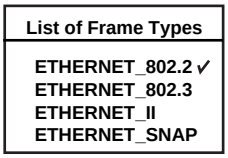


Figure 7-17. ✔ indicates enabled frame types.

d Press **ESC** to return to the List of Protocols box.

Configuring IP

a In the List of Frame Types box, select the frame type, and then press **ENTER**.

b In the IP Parameters box, select **Enter IP Address**, and then press **ENTER**.

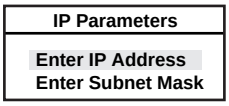


Figure 7-18. IP Parameters Box

c In the IP Address box, type the address number, and then press **ENTER**.

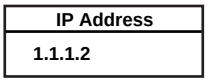


Figure 7-19. IP Address Box

d In the IP Parameters box, select **Enter Subnet Mask**, and then press **ENTER**.

e In the Subnet Mask box, type the corresponding subnet mask, and then press **ENTER**.

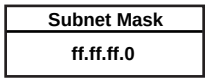


Figure 7-20. Subnet Mask Box

f Press **ESC**.

g Repeat Steps a-f for each appropriate port or pair.

h Press **ESC** until you return to the List of Ports / Failover Pairs box.

4 Repeat Steps 1-3 for any other port or pair you wish to configure.

5 Press **ESC** until you return to the Main Menu.

6 Continue to *Viewing the Configuration*.

Viewing the Configuration

It is important to verify the current port configurations before saving them to the server.

1. From the Main Menu, select **View Configuration**, and press **ENTER**.

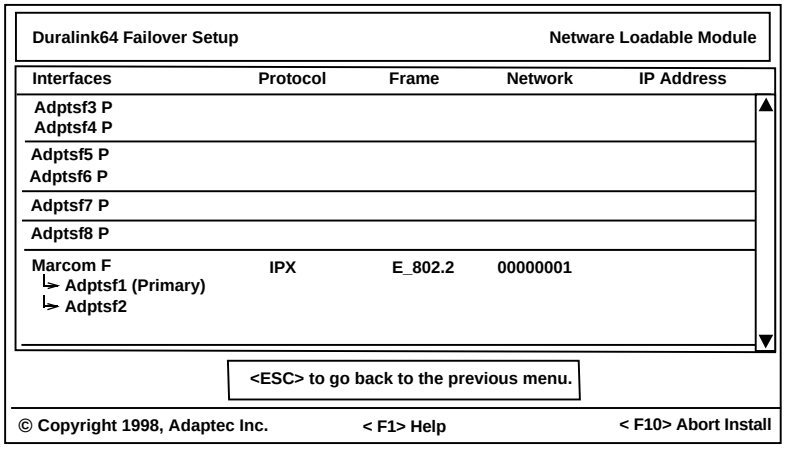


Figure 7-21. View Configuration Screen

2. Press **ESC** to return to the Main Menu.
3. Continue to *Copying and Saving the Configuration*.

Copying and Saving the Configuration

After verifying all port and group configurations, you can install the program and configuration-related files to the server.

1. From the Main Menu, select **Install Software**, and then press **ENTER**.
2. When prompted to copy new files, select **Yes**, and then press **ENTER**.

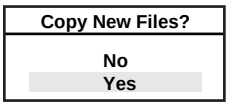


Figure 7-22. Copy New Files Box

3. From the Main Menu, press **ESC** to exit the program.
4. In the Save Configuration box, select **Save and Quit**. The configuration data is saved in sys:\etc\focfgsf.ncf.
   - If you'd rather not save changes, select **Quit Without Saving**, and then press **ENTER**.
   - To return to the Main Menu, select **Return to Previous Menu**, and then press **ENTER**.
5. At the system console prompt, type **Down** and then press **ENTER**.
6. Type **Restart Server**, and then press **ENTER**. The server restarts and opens the Failover Status screen, which must appear before logging on clients or using the server console.
7. Continue to *Viewing the System Status*.

Viewing the System Status

After installing Duralink64 Failover through fosetsf, you can view the system status. This program automatically opens whenever you restart the server.

To manually enter status, at the system console prompt, type

load status

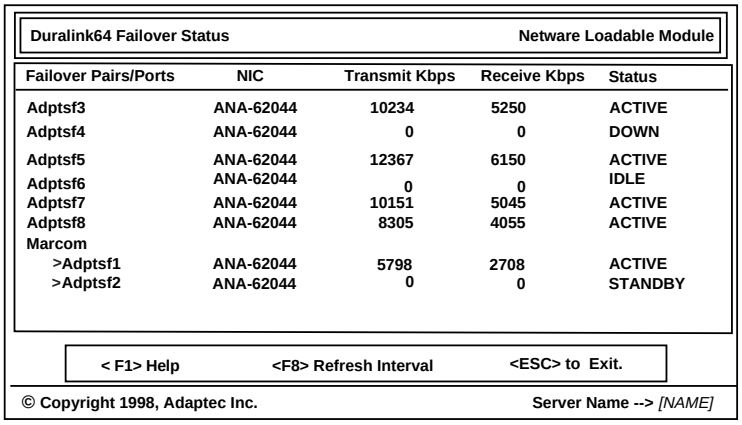


Figure 7-23. Duralink64 Failover Status Screen

Note: This requires that the Failover software be loaded or an error will occur. If you have not rebooted since you installed the software, reboot and the above screen will appear automatically.

This module can be used to identify the physical ports by determining the status when unplugging network connections. Refer to *Note on DuraLAN NIC Ports*, page 7-18 for more information.

Element Descriptions

A status screen is provided, showing the following information:

- NIC model number.
- Transmit Kbps (Kilobits per second) per port.
- Receive Kbps per port.
- The present status of all ports and Failover Pairs.
  - **ACTIVE**: This port is currently used for data transfer, and is connected with data being sent and/or received.
  - **IDLE**: This port is currently used for data transfer, and is connected with no data being sent or received.
  - **STANDBY**: This port currently not used for data transfer, and is connected with no data being sent or received.
  - **DOWN**: Port is not connected, or the link is down.

F Keys

F1— provides on-line help for each screen.

F8— Changes the refresh interval. Refresh interval is a user-selectable refresh cycle in seconds (default is 1 second). This is the interval by which the utility will refresh the status.

Modifying the Driver Configuration

After installing Duralink64 Failover for NetWare, use focfgsf to add, remove, or change a configuration for Adaptec NIC drivers. You'll be familiar with the screens in this program since they're similar to the ones in fosetsf.

1. At the system console prompt, type **load focfgsf** and then press **ENTER**.
2. In the message screen indicating that ports were added / removed, press **ESC**.
3. Refer to *Installing Duralink64 Failover*, page 7-3 for instructions.

Removing Duralink64 Failover

1. Insert the DURALINK64 FAILOVER DRIVERS NETWARE 4.X DISK (disk 2 of 2).
2. At the system console prompt, type **load a:\nwserver\fosetsf** and then press **ENTER**.
3. In the Main Menu, select **Uninstall Software**, and then press **ENTER**.
4. In the Uninstall the Software box, select **Yes**, and then press **ENTER**.
5. In the Main Menu, press **ESC** to exit fosetsf.

Connecting Clients to the NetWare Failover Server

For optimum performance of NetWare Duralink64 Failover, all clients (any brand) should increase their IPX retry count.

- For DOS clients using VLM or Novell Client32

  Type the following lines in net.cfg (indent the second line):

  protocol ipx

  ipx retry count = 255

- For Windows 95 Clients using Novell Client32

  From the Control Panel, locate NetWare Clients, and then enter **255** under the **IPX retry count** in the IPX 32-bit Protocol tab.

- For Windows NT Clients using Novell Client32

  Set the IPX retry count in the registry in NetWareWorkstation Parameters. Use the following steps:

  1. From the DOS prompt, type regedit to enter the Registry Editor.
  2. Double-click **hkey_local_machine**.
  3. Double-click **System**.
  4. Double-click **CurrentControlSet**.
  5. Double-click **Services**.
  6. Double-click **NetWareWorkstation**.
  7. Double-click **Parameters**.
  8. Double-click **Retry Count** to enter the Edit DWORD Value menu.
  9. Change base to decimal, and then change Value data to 255.
  10. Click **OK**.
  11. Close the Registry Editor.
  12. Restart the system.

Note on DuraLAN NIC Ports

When you're installing Adaptec DuraLAN NICs, it's a good idea to document where each port physically resides in the server, especially when two or more identical NICs exist. This is important because ports are identified by generic port names, such as Adptsf1, Adptsf2, Adptsf3, etc.

Port names are assigned to ports in the order that the system scans these ports at boot time. Consequently, whenever you physically rearrange the network cards, the port names change as well.

▾▾▾▾ Part 4

Installing Duralink64 Port Aggregation

8

Introduction to Duralink64 Port Aggregation

In this Chapter

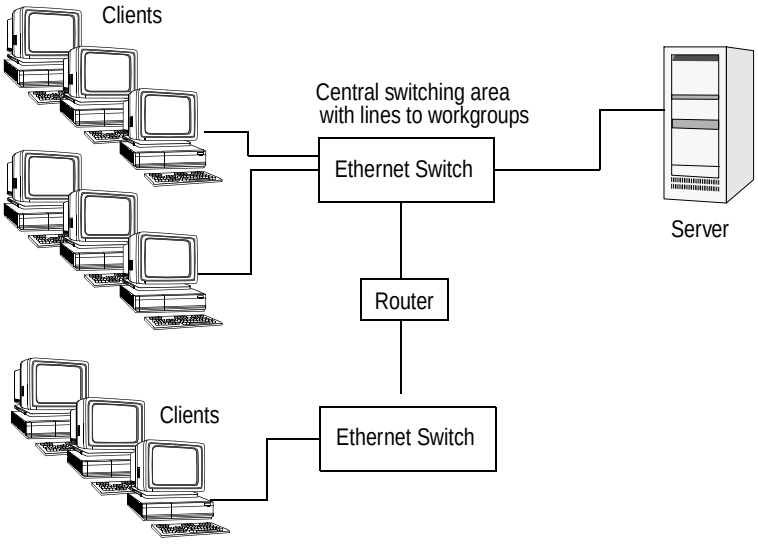
Traditional Network Configurations	8-2
Servers with Duralink64 Port Aggregation	8-4

This chapter compares traditional Ethernet configurations to Ethernet servers using Duralink64 Port Aggregation. These examples show the impact Duralink64 Port Aggregation has on network performance and hardware investment.

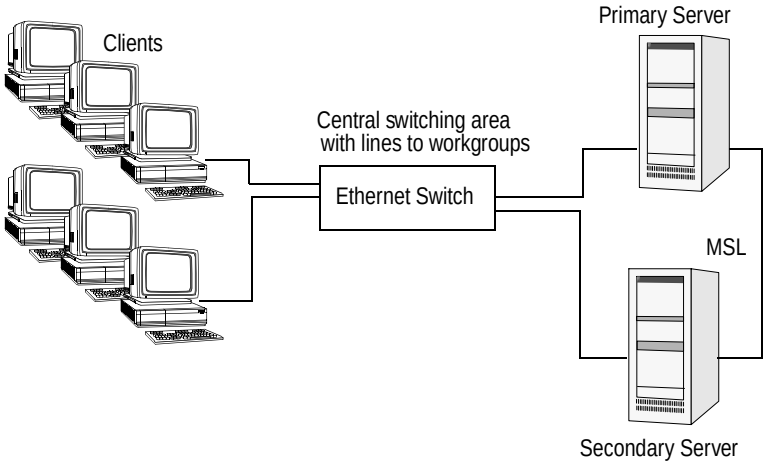
Traditional Network Configurations

The following three examples show some typical configuration methods.

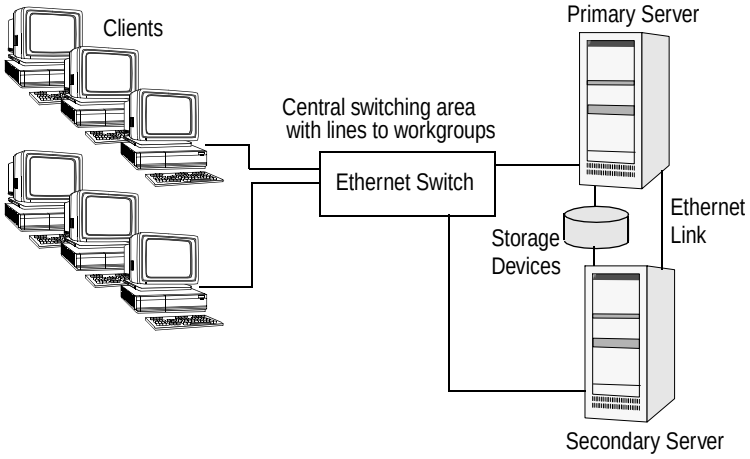
The illustration below shows a single segment server initialized at 100 Mbps with Full Duplex Ethernet (FDE). In this example, the segmented server is limited to 200 Mbps. In addition, if the connection to the server fails, the network may go down.



The next traditional method provides network *Fault Tolerance* through doubling the hardware and addition of a special version of NetWare (SFT3). Data is kept current between servers via a Mirrored Server Link (MSL). In this example, one server is active while the other is ready to take over all duties if the other fails.



The next example shows a configuration with Windows NT Server (Wolfpack).



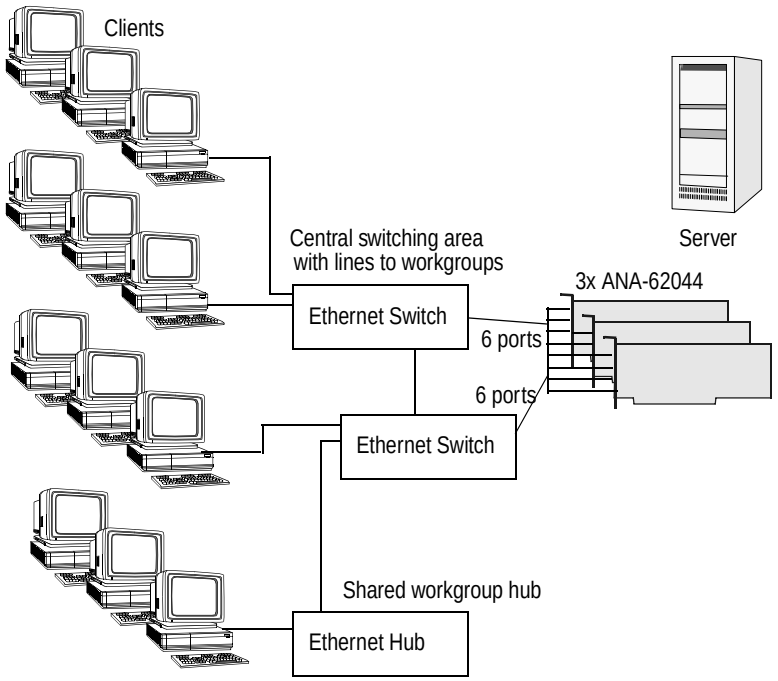
Servers with Duralink64 Port Aggregation

A server with Duralink64 Port Aggregation can use up to 12 Adaptec PCI Fast Ethernet ports in one aggregated group (at 1.2Gbps per group).

If any of the contributing members of a specific aggregated group should fail, that member is excluded from the group. The remaining ports balance the existing load.

Duralink64 Port Aggregation Example

The configuration example below shows a server with 12 ports from three Adaptec ANA-62044 NICs. With this configuration, the server has a cumulative bandwidth of 1.2 Gbps on its single virtual segment (200 Mbps per port). Further, the network segment is fault tolerant, enabling the network to remain alive should any port fail.



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9

Duralink64 Port Aggregation for Windows NT

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This chapter provides instructions for installing Duralink64 Port Aggregation on a server running Windows NT. Be sure to read *Before You Begin* on page 9-2 to check your system setup.

Before You Begin

- Verify that all system, memory, and NIC requirements are met, see *System Requirements* on page 1-2.
- Verify that the NIC(s) have been installed properly in the server, see Chapter 9, *Duralink64 Port Aggregation for Windows NT*.
- Check your system for installed Adaptec NIC drivers. If a DuraLAN Standard driver or Duralink64 Failover driver exists, remove it!
  - *Removing the DuraLAN Standard Driver* on page 3-14.
  - *Removing Duralink64 Failover* on page 6-13.
  - *Removing Duralink64 Port Aggregation* on page 9-22.

WARNING: This procedure is critical. Only one DuraLAN driver may exist in a system.

Installing Duralink64 Port Aggregation

Instructions for installing this driver in Windows NT 3.51 start on page 9-4.

Windows NT 4.0

To install the Duralink64 Port Aggregation driver, use the following steps. If you're installing Windows NT at this time, skip to step 6 when prompted for the DuraLAN NIC.

1. Start Windows NT.
2. From the Start menu, point to **Settings**, and then click **Control Panel**.
3. In the Control Panel, double-click **Network**.
4. In the Network window, click the **Adapters** tab.

5 Click **Add**, and then wait a few moments.

6 In the Select Network Adapter window, click **Have Disk**.

7 Insert the LAN AND DURALINK64 PORT AGGREGATION DRIVERS WINDOWS DISK into the floppy disk drive.

8 In the Insert Disk window, type the driver letter of your floppy disk drive (for example **a:**).

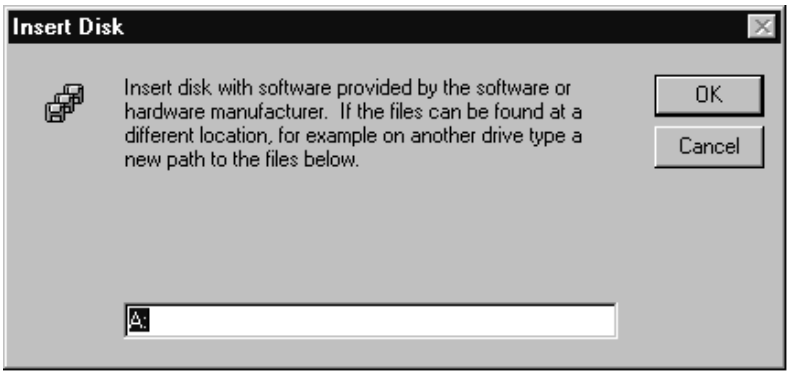

Figure 9-1. Insert Disk Window

9 Click **OK**.

10 In the Select OEM Option window, either click **Adaptec DuraLAN Fast Ethernet NIC** or select the specific model, and then click **OK**.

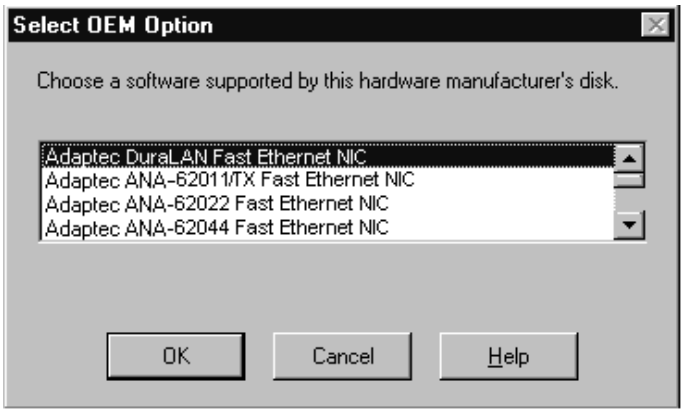

Figure 9-2. Adaptec NIC Drivers.

11 Continue to *Configuring the Ports* on page 9-6.

Windows NT 3.51

To install the Duralink64 Port Aggregation driver, follow these steps:

Note: Before you begin this procedure, be sure to install Microsoft Windows NT Service Pack 5 or later.

1 Start Windows NT 3.51.

2 In the Main window, double-click **Control Panel**.

3 In the Control Panel, double-click **Network**.

4 In the Network Settings window, click the **Add Adapter** button.

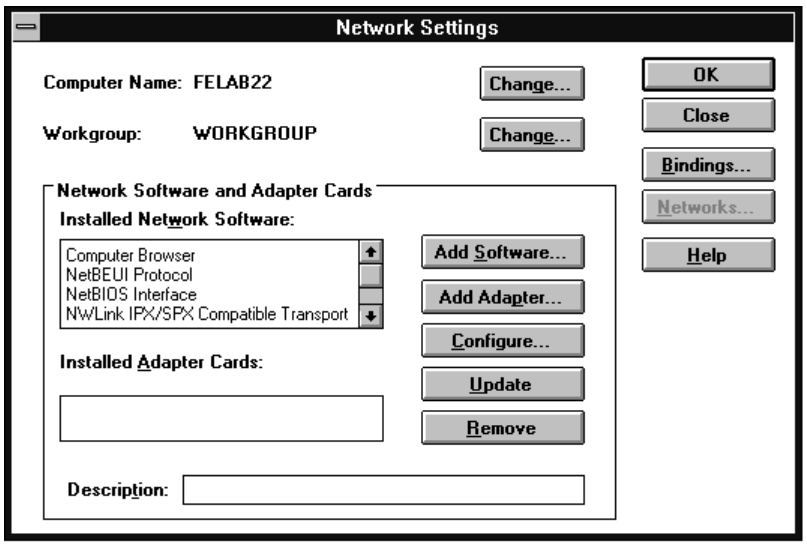

Figure 9-3. Network Settings Window

5 In the Add Network Adapter window, click **<Other> Requires disk from manufacturer** from the Network Adapter list, and then click **Continue**.

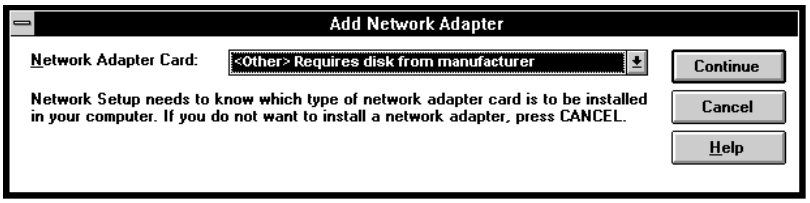

Figure 9-4. Add Network Adapter Window

6 Insert the LAN AND DURALINK64 PORT AGGREGATION DRIVERS WINDOWS DISK into the floppy disk drive.

7 In the Insert Disk window, type **a:** (the floppy disk drive letter), and then click **OK**.

8 In the Select OEM Option window, click **Adaptec DuraLAN Fast Ethernet NIC** or the DuraLAN NIC model, and then click **OK**.

9 Continue to *Configuring the Ports*.

Configuring the Ports

1 Select the port you wish to configure from the list of ports, such as shown in Figure 9-5.

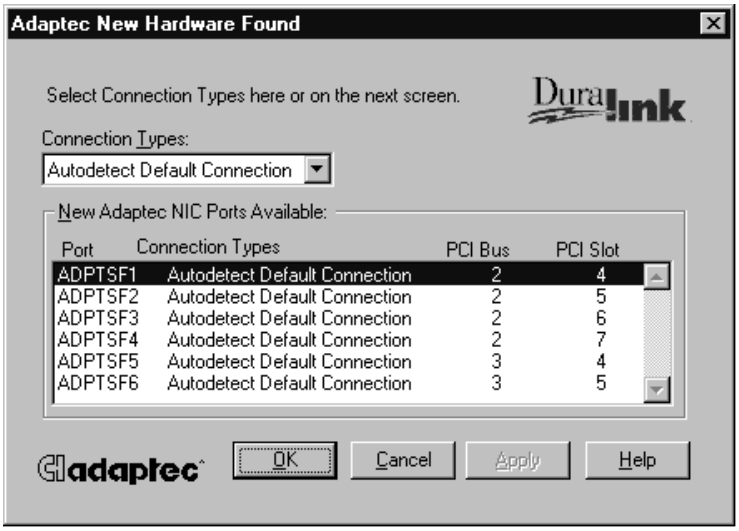

Figure 9-5. Ports Found on the DuraLAN NIC

2 From the Connection Types list, click the appropriate connection type for your network.

Note: The connection type must be compatible with your network! See *Connection Types* on page A-2 for descriptions. If you don't know the connection type, use **Autodetect Default Connection**.

3 Repeat steps 1 and 2 for each additional port.

4 Click **OK**.

5 Continue to *Creating Groups* on page 9-7.

Creating Groups

This section explains how to assign ports to a group, thus, creating a virtual port. If you've installed Duralink64 Port Aggregation already and wish to add or modify existing group or stand-alone port configurations, see *Modifying Groups* on page 9-13.

1 In the Group(s) field, click **Create New Group**, and then type the new group name.

Note: The group name may be up to 20 characters. If you skip this step, the system assigns a default group name (GroupX).

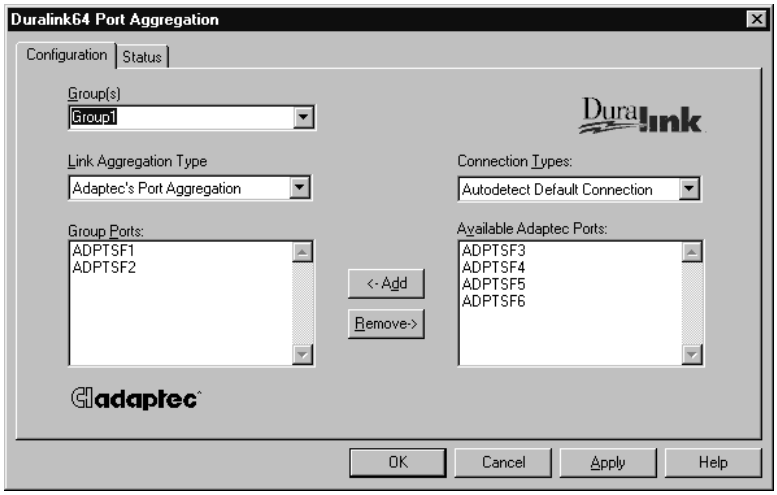

Figure 9-6. Duralink64 Port Aggregation Configuration Tab

2 In the Link Aggregation Type field, click the appropriate link type. For a description of Adaptec's Port Aggregation, see *Duralink64 Port Aggregation* on page 1-6.

Note on Cisco's Fast EtherChannel. This option allows you to fully aggregate two or four ports over transmit and receive under all protocols. The ports that are configured as the Fast EtherChannel group must be physically connected to the Fast EtherChannel ports on the Cisco switch. See your Cisco switch documentation to configure the ports in Fast EtherChannel mode.

If you select Fast EtherChannel on the server, the connection type for each port is automatically configured to 100 Mbps TX/Full Duplex. You must also configure the ports on the Cisco switch (used by the Fast EtherChannel group) to either Auto Negotiation or 100 Mbps/Full Duplex mode.

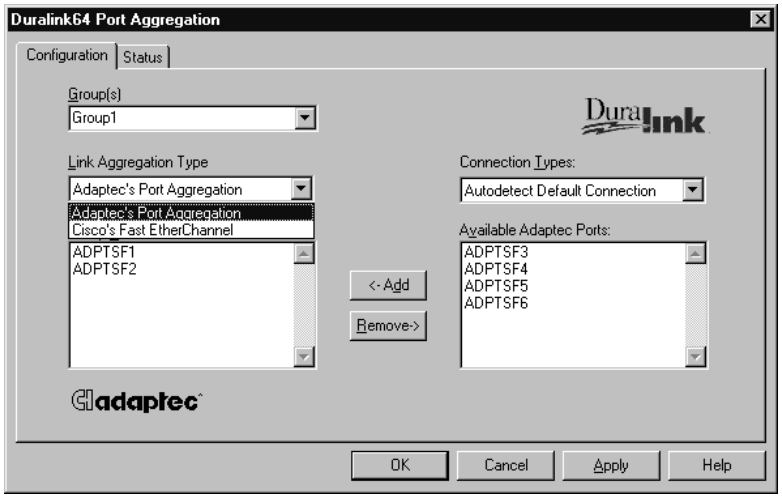

Figure 9-7. The Link Aggregation Type Options

3 In the Available DuraLAN Ports box, click the available port to add to the group, and then click **Add**.

4 Repeat step 3 for each additional port.

Note: You must assign the same connection type to each port in the same group.

5 **OPTIONAL**. To remove a port from the group, click the appropriate port from the Group Ports box, and then click **Remove**.

6 When you're finished configuring the group, click **Apply**.

7 To create another group, repeat steps 1-6.

8 If you want to rename a group:

a Select the default group name in the Group(s) list box.

b Type the new name.

c Click **Apply**.

9 When you're finished configuring all groups, click **OK**.

Figure 9-8. If SNMP is not set up on the computer, you'll receive the message which you may ignore. Click **OK**.

10 In the Network window, click **Close**.

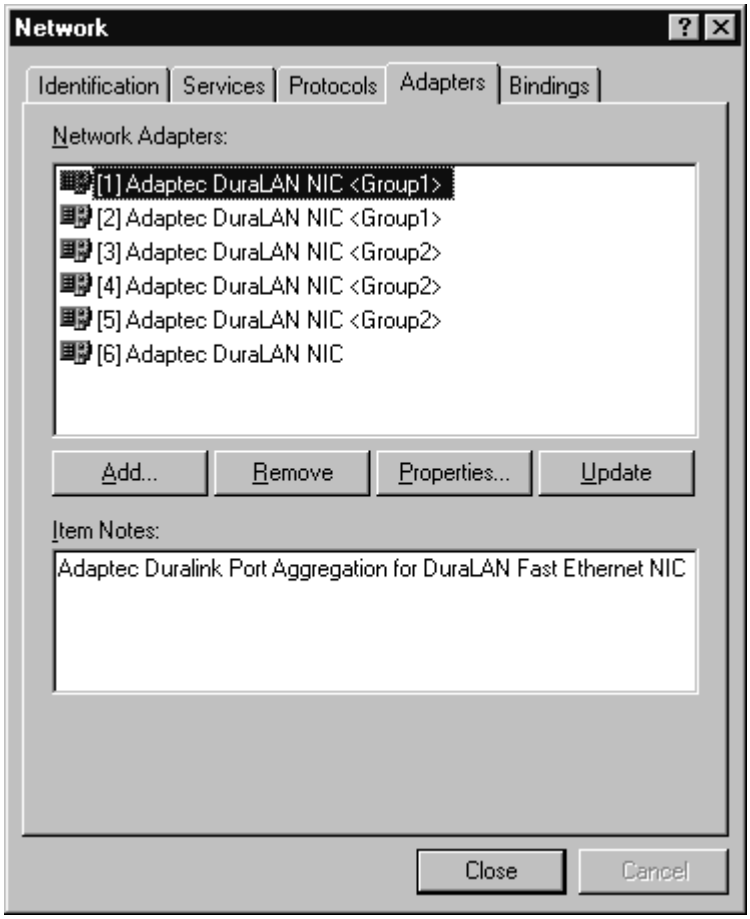

Figure 9-9. Ports and Groups Listed in Adapters Tab.

11 Continue to *Assigning the TCP/IP Address* on page 9-11.

Assigning the TCP/IP Address

Note: If you're an NT Windows 3.51 user, please refer to the Windows NT 3.51 documentation for help configuring protocols.

Once you've configured Duralink64 Port Aggregation, Windows NT prompts you to configure the protocol. IP addresses to groups and stand-alone ports are assigned in the IP Address tab, such as shown in Figure 9-10. Ports assigned to a group use the same IP address; therefore, it must be entered only once.

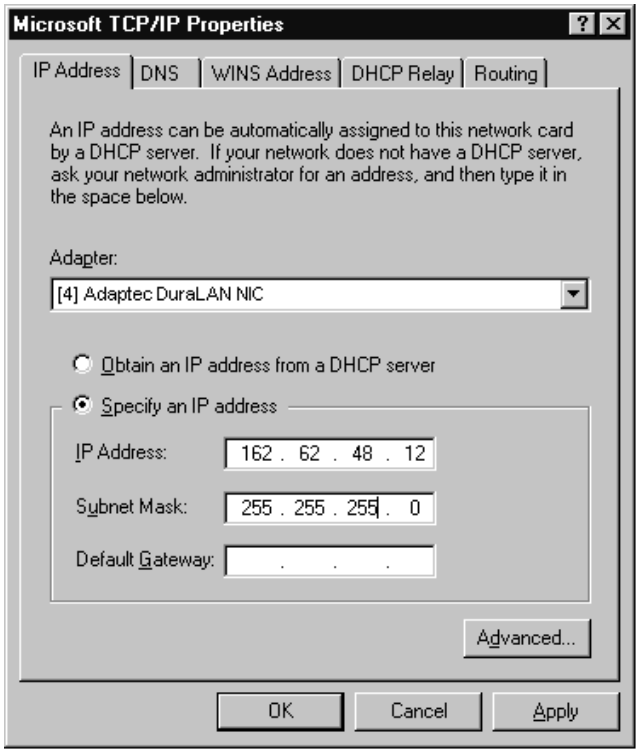

Figure 9-10. IP Address Tab

1. In the IP Address tab, click the DuraLAN NIC port from the Adapter list.
2. In the IP Address field, type the IP address.
3. In the Subnet Mask field, type the subnet mask number.
4. Click **Apply**.
5. Repeat steps 1-4 for any other port or group.
6. Click **OK** when you are finished configuring all groups.
7. Restart your computer to complete the changes.
8. Click **Yes** at the message prompt to restart your computer.
9. Continue to *Checking System Status* on page 9-17.

Once Duralink64 Port Aggregation is installed, you may update group and port configurations using the instructions in *Modifying Groups*.

Modifying Groups

This section provides instructions for modifying the group or port configurations. You may rename groups, as well as add or remove ports from existing groups.

Renaming Groups

1 In the Duralink64 Port Aggregation window, go to the Configuration tab.

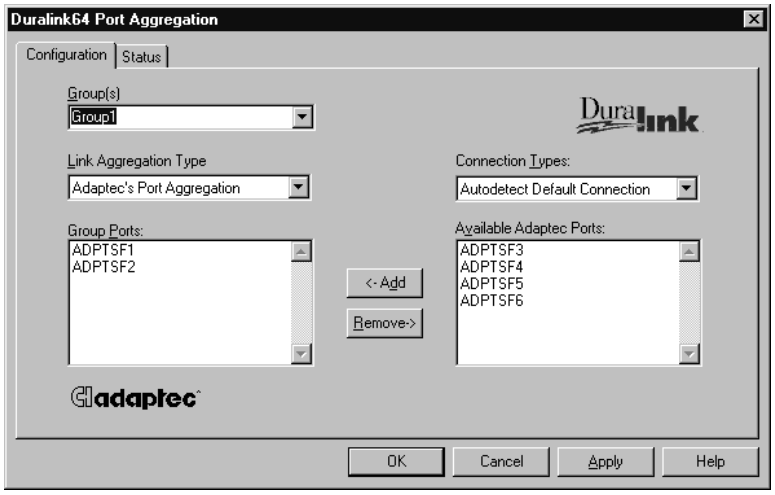

Figure 9-11. Modified groups in the Configuration tab.

2 From the Group(s) field, select the appropriate group, and then type the new name.

3 Click **Apply**.

Adding or Removing Ports

Note: If you add or remove a port to or from a group, any existing group or port IP address is removed automatically. Keep track of any IP addresses you plan to use again.

1. In the Duralink64 Port Aggregation window, go to the Configuration tab, such as shown in Figure 9-11 on page 9-13.
2. In the Group(s) field, click **Create New Group**, and then type the new group name, or select the appropriate group you want to modify.
   - To add ports to the group, click the appropriate port from the Available Adaptec Ports box, and then click **Add**.
   - To remove ports from the group, click the appropriate port from the Group Ports box, and then click **Remove**.
3. Repeat step 2 for each appropriate port.
4. To save changes, click **Apply**.
5. When you're finished, click **OK**.

Note: If SNMP is not set up on the computer, you'll receive the message in Figure 9-12 which you may ignore. Click **OK** to continue.

Figure 9-12. Setup Message

6 When adding or deleting a group or port, you'll receive a message such as shown in Figure 9-13 or Figure 9-14. Click **OK**.

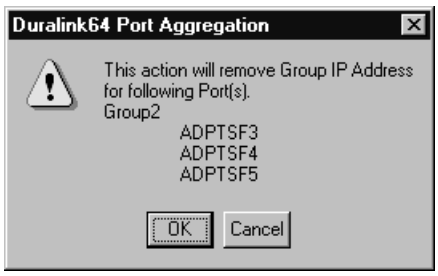

Figure 9-13. This message appears when you add ports with IP Addresses to a new group.

Figure 9-14. This message appears when you add ports with IP Addresses to Group2 with an existing IP Address.

7 In the Network window, click **Close**.

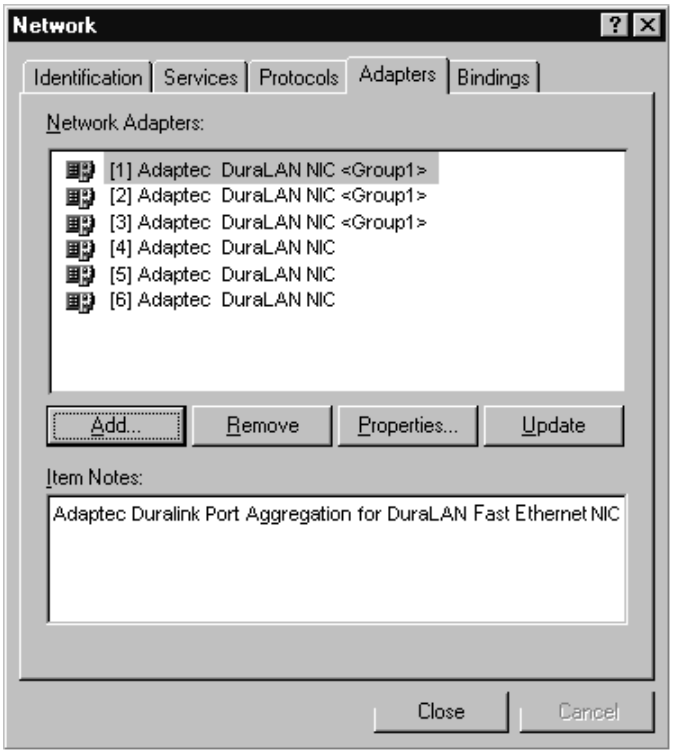

Figure 9-15. Ports and Groups Listed in Adapters Tab.

Checking System Status

You can view group and independent port status. See *Field Descriptions* on page 9-18 for details.

1. From the Start menu, point to **Settings**, and then click **Control Panel**.
2. In the Control Panel, double-click **Network**.
3. In the Network window, click the **Adapters** tab.
4. In the Adapters tab, double-click the adapter driver.
5. Click the **Status** tab to view the group and independent port information, such as shown in Figure 9-16.

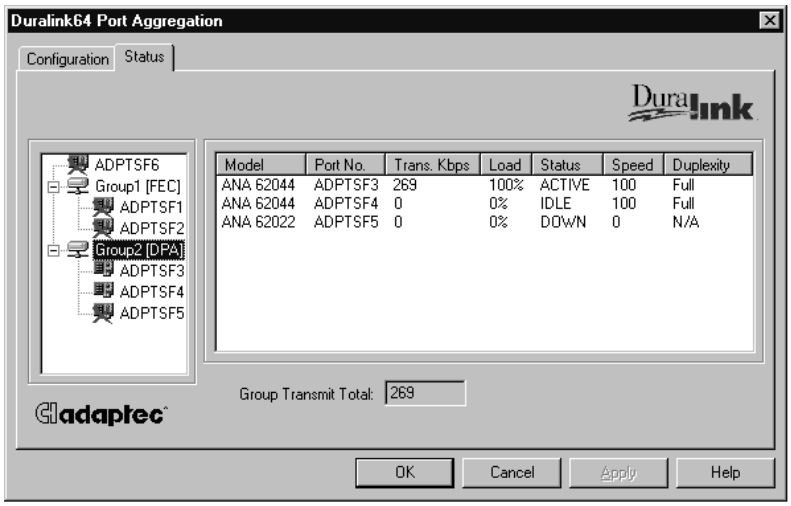

Figure 9-16. Status Tab

6. Refer to *Understanding the Status Tab* on page 9-18 for more information. Click **OK** to exit.

Understanding the Status Tab

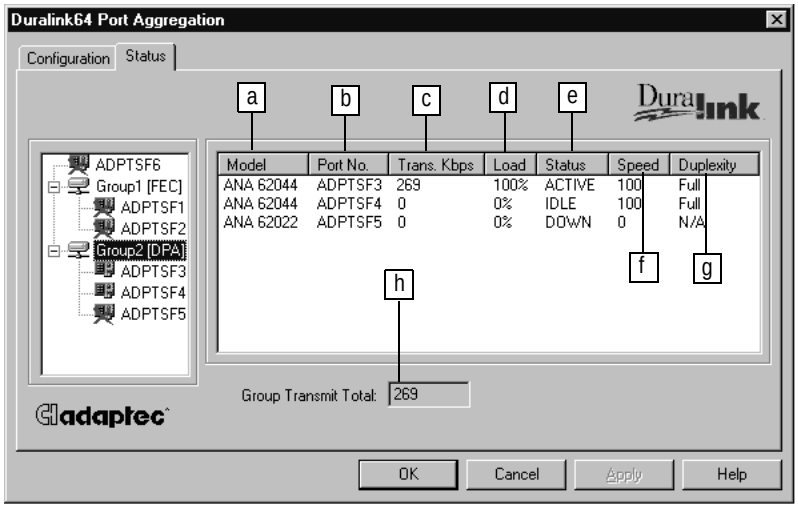

Figure 9-17. Status Tab Fields

Field Descriptions

a	**Model**	Adaptec DuraLAN NIC model number.
b	**Port No.**	Port identification assigned by the system.
c	**Trans Kbps**	Total Kilobits per second (Kbps) transmitted per port (stand-alone and group). The Kbps sum of aggregated ports in a group equals the total Kbps transmitted by their group.
d	**Load**	The percentage of transmit load carried by each port in a group. The percentage of a stand-alone port is always 100%. The percentage for a group is calculated as a percentage of bytes transmitted by the port over bytes transmitted by the group during the last screen refresh interval.
e	**Status**	If the link is up and has transmitted data within the last screen refresh interval, ACTIVE is displayed. If the link is up but the port has not transmitted any data within the time interval, IDLE is displayed. If the link is down, DOWN is displayed.

f	**Speed**	Speed is either 10 or 100. This value depends on the connection type you chose in *Configuring the Ports* on page 9-6.
g	**Duplexity**	Duplexity is either half or full. This value depends on the connection type you chose in *Configuring the Ports* on page 9-6.
h	**Group Transmit Total**	This field appears only when a group is selected.

Viewing the Groups

You can view the groups list in two ways:

- To view ports in a specific group, click the PLUS SIGN [+].
- To hide ports in a specific group, click the MINUS SIGN [-].
- Disabled ports are marked with an [x], such as ADPTSF3 shown in Figure 9-18.

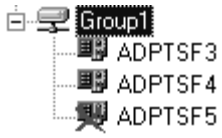

Figure 9-18. Example of disabled ports

Windows NT Performance Monitor

You can view system traffic for selected groups and stand-alone ports in the Performance Monitor, as shown in Figure 9-19. In this window, each line represents the performance of the group or port listed at the bottom of the screen. When a group / port's activity drops, its line drops. Use the following instructions to select ports and groups you wish to view.

1 From the Start menu, point to **Programs**, point to **Administrative Tools**, and then click **Performance Monitor**.

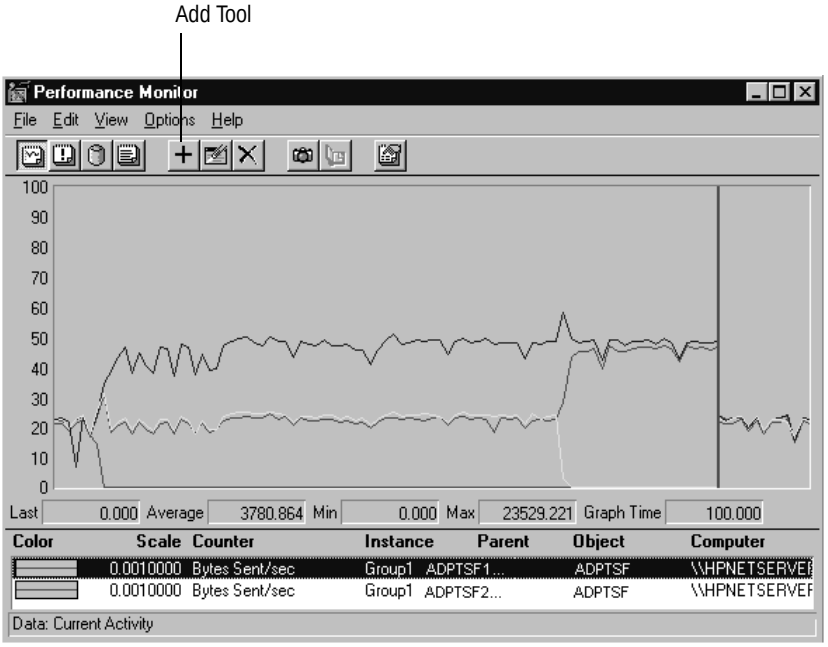

Figure 9-19. Performance Monitor

2 In the Performance Monitor, click the **Add** tool button to enter the Add to Chart window, shown in Figure 9-20.

3 From the Object list box, select **ADPTSF**.

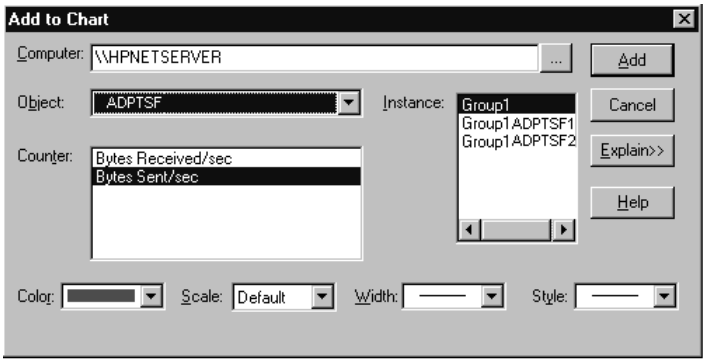

Figure 9-20. Add to Chart Window

4 In the Instance box, click the port or group, and then click the appropriate setting from the Counter box.

5 To distinguish ports and groups in the Performance Monitor, adjust the following parameters:

Color— is preset by the program for each selected group or port. You can set a specific color from the Color list box.

Scale—you can set the scale of the plot for better viewing.

Width—This allows you to set the width of the plot line.

Style—allows you to set the type of line that will be plotted for the selected group.

6 Repeat steps 4-5 for each appropriate port or group.

7 When you're done, click **Done**.

Removing Duralink64 Port Aggregation

Windows NT 4.0

To remove the Duralink64 Port Aggregation driver, follow these steps:

1. In the Control Panel, double-click **Network**.
2. In the Adapters tab, click the DuraLAN NIC, and then click **Remove**.
3. In the warning message, click **Yes** to remove the port.
4. Repeat steps 2 and 3 for each additional port.
5. After deleting all ports, click **Close**. The bindings will be updated.
6. In the Network Settings Change window, click **Yes** to restart the computer.

Windows NT 3.51

To remove the Duralink64 Port Aggregation driver, follow these steps:

1. In the Main window, double-click **Control Panel**.
2. In the Control Panel, double-click **Network** to enter the Network Settings window.
3. In the Installed Adapters Cards box, click the DuraLAN NIC, and then click **Remove**.
4. Repeat step 3 until all DuraLAN NICs have been removed.
5. Click **OK** when you're done.
6. Restart the system.

Note on DuraLAN NIC Ports

When you're installing Adaptec DuraLAN NICs, it's a good idea to document where each port physically resides in the server, especially when two or more identical NICs exist. This is important because ports are identified by generic port names, such as Adptsf1, Adptsf2, Adptsf3, etc.

Port names are assigned to ports in the order that the system scans these ports at boot time. Consequently, whenever you physically rearrange the network cards, the port names change as well.

10

Duralink64 Port Aggregation for NetWare

In this Chapter

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This chapter provides instructions for installing Duralink64 Port Aggregation on a server running NetWare 4.11. Installation, configuration, and optional parameters for Duralink64 Port Aggregation are updated regularly. The \readme\ subdirectory contains supplemental installation instructions.

Before You Begin

To install Duralink64 Port Aggregation and configure DuraLAN NIC ports, you'll use the lbsetsf setup program, described in *Installing Duralink64 Port Aggregation*. To modify groups and ports after the initial installation, you'll use the lbcfgsf program described in *Modifying Driver Configurations* on page 10-15.

- Verify that all system, memory, and NIC requirements are met, see *System Requirements* on page 1-2.
- Verify that the new Adaptec DuraLAN NIC(s) have been installed properly in the server, see Chapter 2, *DuraLAN NIC Installation*.
- Check your system for installed DuraLAN NIC drivers. If a DuraLAN Standard driver, Duralink64 Failover driver, or Duralink64 Port Aggregation driver exists, remove it! See
  - *Removing the DuraLAN Standard Driver* on page 4-12.
  - *Removing Duralink64 Failover* on page 7-16.
  - *Removing Duralink64 Port Aggregation* on page 10-16.

Note: This procedure is critical. Only one DuraLAN driver may exist in a system.

- Verify that IntraNetWare Service Pack 5 or later is installed. This pack may be downloaded from http://support.novell.com.

Installing Duralink64 Port Aggregation

If you're installing NetWare on a new server, *do not* add the DuraLAN NIC at this time. When prompted to add the NIC, select **No**, and then continue with the NetWare installation.

Note: This driver uses 32 receive buffers for each port. Therefore, the number of receive buffers must be increased. Type **load edit c:\nwserver\startup.ncf**, and then insert the following commands at the *end* of the file:
SET MINIMUM PACKET RECEIVE BUFFERS = 512
SET MAXIMUM PACKET RECEIVE BUFFERS = 1024

1. Check your system for installed Adaptec NIC drivers. If a DuraLAN Standard driver, Duralink64 Failover driver, or Duralink64 Port Aggregation driver exists, remove it!
   - *Removing the DuraLAN Standard Driver* on page 4-12.
   - *Removing Duralink64 Failover* on page 7-16.
   - *Removing Duralink64 Port Aggregation* on page 10-16.
2. Insert the Duralink64 Port Aggregation disk into the floppy disk drive.
3. At the system console prompt, type **load a:\nwserver\lbsetsf**.
4. In the message screen indicating that added ports have been detected, press **ENTER**.
5. Continue to *Configuring Ports* on page 10-4.

Configuring Ports

To configure ports in lbsetsf, use the following steps:

1 In the Main Menu, select **Configure Ports**, and then press **ENTER**.

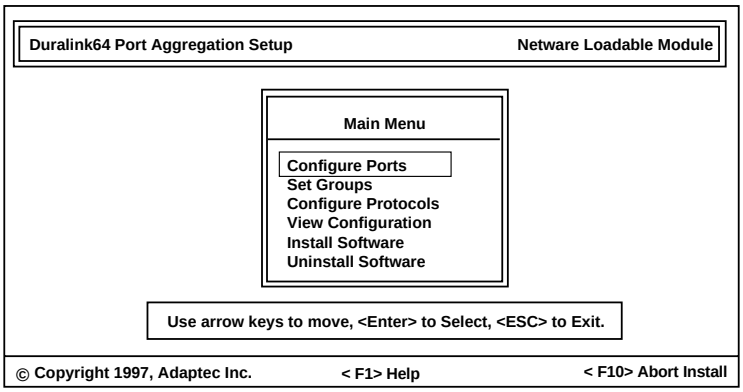


Figure 10-1. Duralink64 Port Aggregation Setup Main Menu

2 In the Configuration Ports screen, make sure you know which port names correspond to the actual ports in the server. (See *Note on DuraLAN Ports* on page 10-17 for help.)

No.	Port Name	NIC	Connection Type	Status
1	Adptsf1	ANA-62044/TX:[1]	Autodetect (default)	Enabled
2	Adptsf2	ANA-62044/TX:[2]	Autodetect (default)	Enabled
3	Adptsf3	ANA-62044/TX:[3]	Autodetect (default)	Enabled
4	Adptsf4	ANA-62044/TX:[4]	Autodetect (default)	Enabled
5	Adptsf5	ANA-62044/TX:[1]	Autodetect (default)	Enabled
6	Adptsf6	ANA-62044/TX:[2]	Autodetect (default)	Enabled
7	Adptsf7	ANA-62044/TX:[3]	Autodetect (default)	Enabled
8	Adptsf8	ANA-62044/TX:[4]	Autodetect (default)	Enabled

Figure 10-2. In this scenario, 2 quad port NICs exist; thus, eight ports are found. [1] is always the top port of a NIC.

3 **OPTIONAL**. The **Autodetect** default detects which device the port is connected to and adjusts the port speed and transmission mode accordingly. **Autodetect** is recommended; however, to change the connection type(s):

a Select the port, and then press **ENTER**. (To select multiple ports, select the port, and then press **F5** one at a time.)

b In the Type of Connection menu, select the type, and then press **ENTER**. (*Connection Types* on page A-2 provides descriptions.)

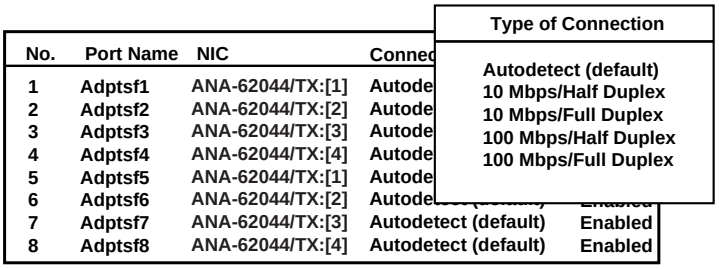


Figure 10-3. Type of Connection Menu

4 **OPTIONAL**. Enabled is the status default. To disable a port, select the port and then press **TAB**.

5 When you're finished, press **ESC** to return to the Main Menu.

6 Continue to *Creating Groups* on page 10-6.

Creating Groups

After configuring ports, you may create Port Aggregation groups using the following steps:

1. In the Main Menu, select **Set Groups**, and then press **ENTER**.
2. In the List of Existing Groups box, press **INS** to add a new group.

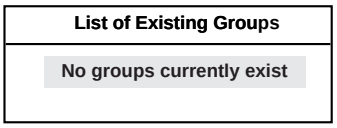


Figure 10-4. This message appears the first time you add a new group.[1]

3. Select the group, and then press **ENTER**.

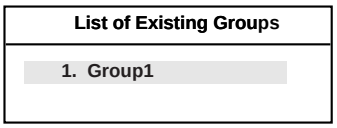


Figure 10-5. Group1 is the new group's default name.

4. In the Group Configuration menu, select **Add/Remove Ports**, and then press **ENTER**.

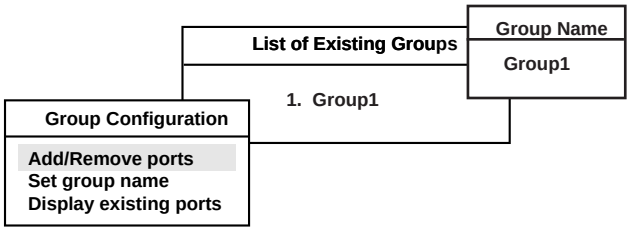


Figure 10-6. Group Configuration Menu

[1] If you're in lbcfgsf, this message appears only when no groups are found.

5 In the Existing Ports box, press **INS**.

Figure 10-7. This message appears the first time you add a new group.

6 In the Available Ports box, use **F5** to select the ports for the new group, and then press **ENTER**.

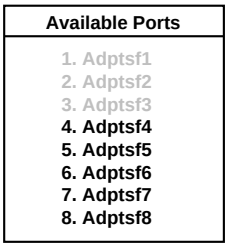


Figure 10-8. For this scenario, three ports are selected for the new group.

7 Press **ESC** to return to the Group Configuration menu.

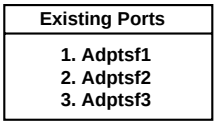


Figure 10-9. The selected ports are transferred to the Existing Ports box.

8 **OPTIONAL.** lbsetsf automatically assigns a name to each new group. For example, the first group=Group1. To assign a unique name to a group:

   a From the Group Configuration menu, select **Set Group Name**, and then press **ENTER**.

   b In the Group Name box, type the group name, and then press **ENTER**.(This field allows up to 20 characters.)

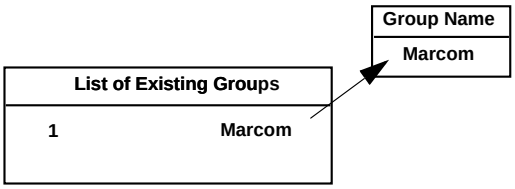


Figure 10-10. This group will be called Marcom for the Marketing Department's network.

9 To create another group, repeat steps 2-8.

10 Press **ESC** until you return to the Main Menu.

11 Continue to *Assigning Protocols* on page 10-8.

Assigning Protocols

You can assign the IP or IPX protocols to groups and stand-alone ports. The IPX protocol supports the following frame types simultaneously:

- ETHERNET_802.2
- ETHERNET_802.3
- ETHERNET_II
- ETHERNET_SNAP

IP supports either ETHERNET_II or ETHERNET_SNAP, but never both at the same time.

1 In the Main Menu, select **Configure Protocols**, and then press **ENTER**.

2 In the List of Ports / Groups box, select the group or port, and then press **ENTER**.

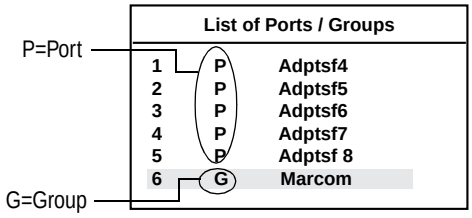


Figure 10-11. The virtual port—Marcom—requires one protocol only.[1]

3 In the List of Protocols box, select the protocol for the current group / port, and then press **ENTER**.

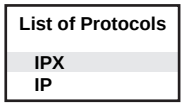


Figure 10-12. Marcom will be bound with IPX.

– If you're configuring IPX:

a In the List of Frame Types box, select the frame type, and then press **ENTER**.

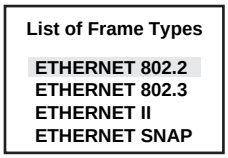


Figure 10-13. Marcom will be bound with ETHERNET 802.2.

[1] Refer to the List of Existing Groups box to verify which ports are assigned to a particular group.

b In the IPX Network Number box, type a unique IPX network number, and then press **ENTER**.

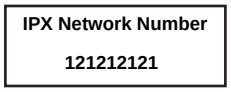


Figure 10-14. Example of an IPX network number.

c Repeat steps a-b for each frame type you wish to use. A check indicates enabled frame types.

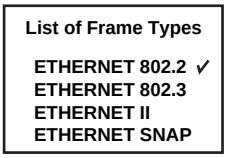


Figure 10-15. Marcom and ETHERNET_802.2 are bound.

d Press **ESC** to return to the List of Protocols box.

– If you're configuring IP:

a Select the frame type, and then press **ENTER**.

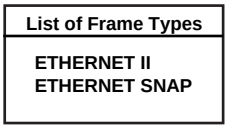


Figure 10-16. List of Frame Types

b In the IP Parameters box, select **Enter IP Address**, and then press **ENTER**.

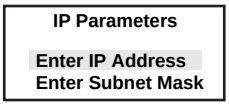


Figure 10-17. IP Parameter Options

c In the IP Address box, type the address number, and then press **ENTER**.

d In the IP Parameters box, select **ENTER Subnet Mask**, and then press **ENTER**.

e In the IP Subnet Mask Number box, type the subnet mask, and then press **ENTER**.

f Repeat steps a-e for each appropriate port or group.

g Press **ESC** twice to return to the List of Protocols box.

4 Repeat steps 2 and 3 for any other group or port you wish to configure.

5 Press **ESC** to return to the Main Menu.

6 Continue to *Verifying Configuration*.

Verifying Configuration

You should verify the current port configurations before saving them to the server.

1 From the Main Menu, select **View Configuration**, and then press **ENTER**.

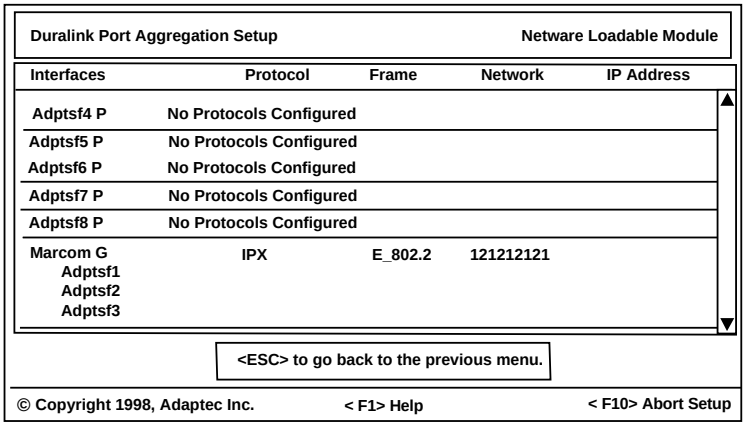


Figure 10-18. Configuration for this scenario.

Figure 10-18 summarizes that currently five stand-alone ports without configurations and one group named Marcom are enabled.[1] Marcom is made up of three ports: Adptsf1, Adaptsf2, and Adapts3. The IPX protocol is assigned to Marcom using ETHERNET_802.2 as the frame type and 121212121 as the IPX Network Number.

2 Press **ESC** to return to the Main Menu.

3 Continue to *Copying and Saving the Configuration*.

Copying and Saving the Configuration

Once you've established and verified all port and group configurations in lbsetsf, you're ready to install program and configuration related files to the server.

1 From the Main Menu, select **Install Software**, and then press **ENTER**.

2 In the next box, select **Yes**, and then press **ENTER**.

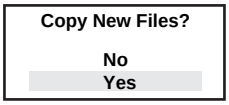


Figure 10-19. Copy New Files Box

3 From the Main Menu, press **ESC** to exit the program.

4 In the Save box, select **Save and Quit** to save the configuration in sys:\etc\lbcfgsf.ncf and quit the program.

- If you'd rather not save changes, select **Quit without Saving**, and then press **ENTER**.
- If you wish to return to the Main Menu, select **Return to Previous Menu**, and then press **ENTER**.

[1] If the ports or group were disabled, **[Disabled]** would appear next to the port/group name.

5 Restart the server.

- In NetWare 4.11:
  - a At the system console prompt, type **Down,** and then press **ENTER**.
  - b Type **Restart Server**.
- In NetWare 3.12:
  - a At the system console prompt, type **Down,** and then press **ENTER**.
  - b Type **Exit**, and then press **ENTER**.
  - c At the DOS prompt, type **Server**, and then press **ENTER**.

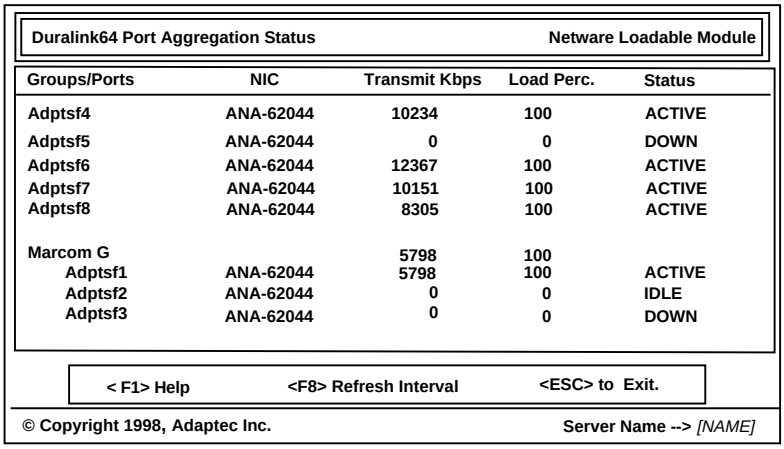
6 Continue to *Viewing System Status* on page 10-14.

Viewing System Status

Once you've installed Duralink64 Port Aggregation using lbsetsf, you can view the system status in status. This program opens automatically whenever you restart the server.

- To manually enter status, at the system console prompt type:

  load status



Duralink64 Port Aggregation Status — Netware Loadable Module

Groups/Ports	NIC	Transmit Kbps	Load Perc.	Status
Adptsf4	ANA-62044	10234	100	ACTIVE
Adptsf5	ANA-62044	0	0	DOWN
Adptsf6	ANA-62044	12367	100	ACTIVE
Adptsf7	ANA-62044	10151	100	ACTIVE
Adptsf8	ANA-62044	8305	100	ACTIVE
Marcom G		5798	100	
Adptsf1	ANA-62044	5798	100	ACTIVE
Adptsf2	ANA-62044	0	0	IDLE
Adptsf3	ANA-62044	0	0	DOWN

Figure 10-20. Data sample provided in the System Status screen.

System Status Data

- Adaptec NIC model number
- Total Kilobits / second (Kbps) transmitted per port (stand-alone and group). Total Kbps transmitted per group. The Kbps sum of aggregated ports in a group equals the total Kbps transmitted by their group.
- Percentage of transmit load carried by each port in a load balancing group. The percentage for a stand-alone port is always 100%. The percentage for a group is calculated as a percentage of bytes transmitted by the port over bytes transmitted by the group for a fixed period of time. (Use **F8** to adjust time intervals.)

- The present status of all ports and groups.
  - If a link is down, DOWN is displayed.
  - If the link is up and has transmitted data within a time interval, ACTIVE is displayed.
  - If the link is up but the port has not transmitted any data within the time interval, IDLE is displayed.

Setting Time Intervals

By default, the System Status screen refreshes every second. You may change the time interval using **F8**.

Modifying Driver Configurations

Once Duralink64 Port Aggregation is installed, use lbcfgsf to add, remove, or change a driver configuration for an Adaptec DuraLAN NIC. You'll be familiar with the screens in this program since they're similar to the ones in lbsetsf.

1. At the system console prompt, type **load lbcfgsf.**
2. In the message screen indicating that ports were added / removed, press **Esc**.
3. Once you've opened lbcfgsf, refer to *Installing Duralink64 Port Aggregation* for more instructions.

Removing Duralink64 Port Aggregation

1. Insert the Duralink64 Port Aggregation disk for NetWare into the floppy disk drive.
2. At the system console prompt, type **load a:\nwserver\lbsetsf** and then press **ENTER**.
3. In the main menu, select **Uninstall Software**, and then press **ENTER**.
4. In the Uninstall Software box, select **Yes**, and then press **ENTER**.
5. In the main menu, press **ESC** to exit lbsetsf.

Connecting Clients to the NetWare Port Aggregation Server

For optimum performance of NetWare Duralink64 Port Aggregation, all clients (any brand) should increase their IPX retry count.

- For DOS clients using VLM or Novell Client32

  Type the following lines in net.cfg (indent the second line):

  protocol ipx

  ipx retry count = 255

- For Windows 95 Clients using Novell Client32

  From the Control Panel, locate NetWare Clients, and then enter **255** under the **IPX retry count** in the IPX 32-bit Protocol tab.

- For Windows NT Clients using Novell Client32

  Set the IPX retry count in the registry in NetWareWorkstation Parameters. Use the following steps:

  1. From the DOS prompt, type regedit to enter the Registry Editor.
  2. Double-click **hkey_local_machine**.
  3. Double-click **System**.

4 Double-click **CurrentControlSet**.

5 Double-click **Services**.

6 Double-click **NetWareWorkstation**.

7 Double-click **Parameters**.

8 Double-click **Retry Count** to enter the Edit DWORD Value menu.

9 Change base to decimal, and then change Value data to 255.

10 Click **OK**.

11 Close the Registry Editor.

12 Restart the system.

Note on DuraLAN Ports

When you're installing Adaptec DuraLAN NICs, it's a good idea to document where each port physically resides in the server, especially when two or more identical NICs exist. This is important because ports are identified by generic port names, such as Adptsf1, Adptsf2, Adptsf3, etc.

Port names are assigned to ports in the order that the system scans these ports at boot time. Consequently, whenever you physically rearrange the network cards, the port names change as well.

▾▾▾▾ Part 5

Appendices

A

Cables and LEDs

This section is not intended to be an exhaustive explanation of connecting Ethernet networks but will provide some useful information on cabling suitable for Adaptec DuraLAN NICs.

The following table outlines the two cable specifications of IEEE 802.3u: 100BASE-TX and 100BASE-FX.

	100BASE-TX	100BASE-FX
Cable supported	CAT 5 UTP	62.5 / 125 multimode fiber
Number of cable pairs	2	1
Node-to-repeater cabling distance	100 meters	137 meters
Node-to-switch to full duplex	100 meters	2000 meters

Connection Types

Here are some of the possible connection type options given when configuring NICs. The options vary depending which operating system the NIC is being configured on.

- Autodetect Default Connection

  Detects the cable type, optimal line speed, and duplexity for the specific Adaptec PCI NIC model in use. This is the default and recommended connection type.

- 10 Mbps UTP / Half Duplex

  Forces the connection to 10 Mbps in Half Duplex mode.

- 100 Mbps TX / Half Duplex

  Forces the connection to 100 Mbps in Half Duplex mode.

- 10 Mbps UTP / Full Duplex

  Forces the connection to 10 Mbps in Full Duplex mode.

- 100 MbpsTX / Full Duplex

  Forces the connection to 100 Mbps in Full Duplex mode.

Full Duplex Support

To implement Full Duplex on your network, you need both a NIC and a switch that supports Full Duplex. Full Duplex support allows a NIC to send and receive data at the same time, doubling available bandwidth.

Note: Full Duplex can also be enabled point-to-point with a crossover cable instead of a switch.

Installation instructions in this user's guide describe how to enable Full Duplex. Additional information can be found in the readme.txt files. Adaptec PCI TX NICs support Full Duplex at both 10 Mbps and 100 Mbps.

Cable Requirements

Cable requirements for Adaptec DuraLAN NICs vary according to network speed, cabling standard, and the connector to be used. The table below identifies appropriate cabling, based on these variables. The table applies to both Half Duplex and Full Duplex (for selected models) environments.

NIC	Connector	10 Mbps	100 Mbps	Cable Pins Used
TX Adapters	RJ-45	CAT 3,4,5 UTP	CAT 5 UTP,	1,2,3, 6
FX Adapters	ST	N / A	62.5 / 125 micron multimode fiber	N / A
	SC	N / A	62.5 / 125 micron multimode fiber	N / A

Straight-through Cable

The majority of twisted-pair environments use twisted-pair cables that are wired straight-through. This means that each pin of the modular plug connector is wired to the same pin on the opposite end of the cable (i.e., pin 1 is wired to pin 1). Straight-through cables connect workstations and servers to repeaters and switches. Cables for 100BASE-TX use two pair (pins 1, 2, 3, and 6).

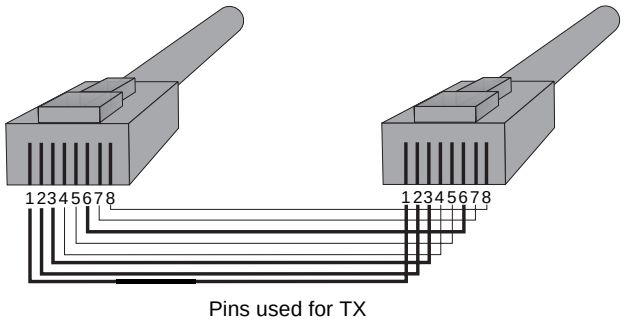


Figure A-1. Straight-through Cable

Pinout and Color Requirements

Straight-through Cable - 10BASE-T or 100BASE-TX	
Pin	**Colors - Both Ends**
1	Orange White
2	Orange
3	Green White
4	Blue
5	Blue White
6	Green
7	Brown White
8	Brown

Diagnostics Loop-Back Cable

The following pin-outs are used for Diagnostics external and autonegotiation tests. Refer to the *Diagnostic Tests* on page D-2.

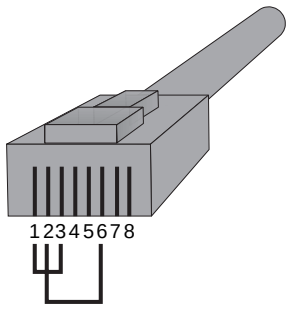


Figure A-2. Loop-Back Cable

Diagnostic LEDs

Diagnostic Light Emitting Diodes (LEDs) provide information about link status (ls) and network activity (act). The figure below shows the locations of LEDs for each board. See the descriptions on the following page for details on each LED display.

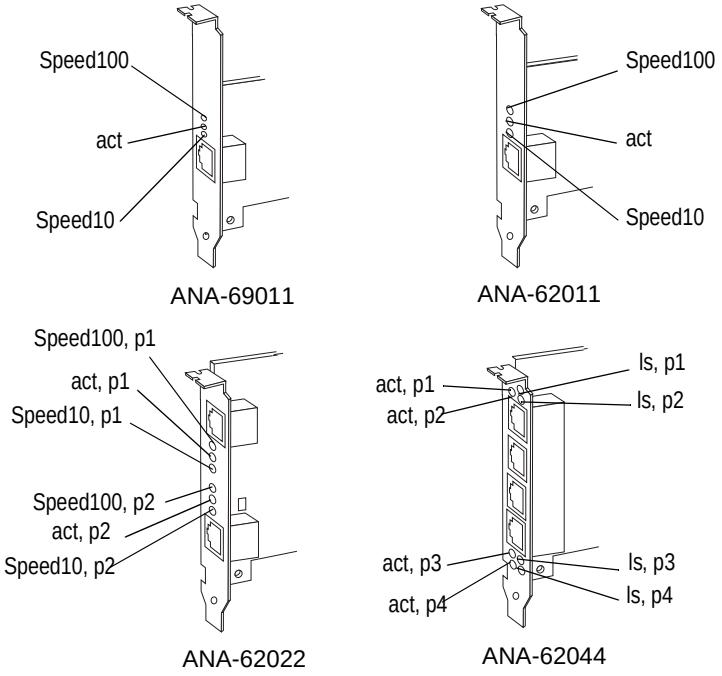


Figure A-3. act = network activity, p = port, ls=link status

LED Functions

For ANA-69011, ANA-62011, and ANA-62022:

- Speed100

  The Speed100 LED is green. When ON, it indicates that a valid 100 Mbps link has been made.

- Speed10

  The Speed10 LED is green. When ON, it indicates that a valid 10 Mbps link has been made. When OFF, no 10 Mbps link has been made.

- ACT

  The ACT LED is amber. The ACT LED lights up to signal the presence of incoming or outgoing traffic.

For ANA-62044:

- LS

  When ON and green, it indicates that a valid 100 Mbps link has been made. When ON and amber, it indicates that a valid 10 Mbps link has been made. When OFF, no valid link has been made.

- ACT

  The ACT LED is amber. The ACT LED lights up to signal the presence of incoming or outgoing traffic.

❒

B

Troubleshooting Tips

This appendix explains how to troubleshoot problems with your DuraLAN NIC. If your NIC is not functioning properly, first make sure that it was set up according to instructions in this User's Guide.

1. Verify that your NIC is installed properly and configured correctly, see Chapter 2, *DuraLAN NIC Installation*.
2. Verify that your network is properly cabled and the NIC is properly connected (see *Connecting the Network Cable* on page 2-6 and Appendix A, *Cables and LEDs*).
3. Verify that the DuraLAN driver is installed correctly (see Part 2, *Installing the DuraLAN Standard Driver*, or Part 3, *Installing Duralink64 Failover*).
4. Verify that you are using the latest BIOS for your computer, and the latest DuraLAN driver.
5. Verify that your cable, terminators, and connectors are functioning properly, or install the NIC in a different slot.
6. See *Adaptec Technical Support and Services* on page ii if you still have trouble.

Isolating Faulty Hardware

If the problem persists, try the following:

- Replace the NIC with the same type of Adaptec NIC which is known to work. If the new NIC functions properly, the problem is related to the original NIC.
- Install the NIC in another functioning computer and run the tests again. If the NIC works in this machine, the problem is related to one of three areas:
  - The computer is faulty
  - There is a hardware conflict
  - There are problems with the cables or connectors

Frequently Asked Questions

Use the following table to help answer common questions. For more information on FAQs, see the www.adaptec.com support site.

Symptom	Solution
Adaptec NIC is conflicting with an installed PCI SCSI Adapter.	Configure the NIC and SCSI adapters to use different interrupts via BIOS, System Configuration Utility (SCU), or EISA Configuration Utility (ECU) provided by the system vendor.
Workstations cannot connect to the NetWare server.	■ Make sure the workstation and server are using the same frame type. ■ Add the following two lines to the NetWare Server startup.ncf file: **set minimum packet receive buffers=512** **set maximum packet receive buffers=1024** ■ For Failover and Port Aggregation NetWare servers, verify that IPX retry count=255 is on each workstation. See *Connecting Clients to the NetWare Failover Server* on page 7-17.
Error messages during NetWare Driver installation.	Install NetWare service pack 5 (iwsp5) or later, select ODI 3.31 specification, and then install the DuraLAN NIC driver.

Symptom	Solution
Driver fails to load or fails to recognize the DuraLAN NIC	Check the BIOS settings. Sometimes the busmaster is disabled by default; therefore, enable the busmaster.
Persistent problems with an adapter card set to IRQ 15.	This occurs in Novell NetWare. Either disable IRQ 15 or change the Adaptec DuraLAN NIC to another interrupt. Please refer to your Novell documentation.
System hangs at boot up.	Make sure the DuraLAN NIC is seated properly in the PCI slot. Check your system vendor for the latest BIOS. For DOS-based operating systems, determine if the problem is a memory conflict by restarting the system again with no memory manager present. If the system restarts, you may need to upgrade to a newer version of EMM386. Contact your operating system vendor for the latest version.
LED does not light when running autonegotiation in the Diagnostics utility.	Use a loop-back cable, see *Diagnostics Loop-Back Cable* on page A-5.

Configuring the BIOS

Your system BIOS *may* determine available NIC resources and configure the Adaptec PCI NICs automatically. However, depending on your system, you may need to configure the PCI BIOS. To do this, enter your computer BIOS Setup and select **Advanced Settings** from the Main Menu. Make sure the following settings are made (your BIOS may not match the following options exactly):

Option	Setting
PCI Slot Enabled	Enable all PCI slots in your system.
Bus Mastering	Enable PCI bus mastering for the slot(s) to be used by the NICs.
PCI INTA	For the 6x011, assign an interrupt (10, 11, 12, etc.) to PCI Interrupt Vector A.
PCI INTA-B	For the 6x022, assign an interrupt (10,11, 12, etc.) to PCI Interrupt Vector A or B.
PCI INTA-D	For the 6x044, assign an interrupt (10,11, 12, etc.) to PCI Interrupt Vector A - D.
PCI Bus Latency	Set to a value between 40 and 80.

Two and four port NICs use a PCI-to-PCI bridge chip. If your system's BIOS does not support the PCI-to-PCI bridge chip these NICs will not be configured properly. Contact your computer manufacturer to obtain a new BIOS version that supports the PCI-to-PCI bridge chip.

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Duralink SNMP Agents

Windows NT and NetWare SNMP agents are provided to support failover and port aggregation capabilities. These agents handle standard port configurations, Failover pairs, and Port Aggregation. Use of the agents allow remote monitoring from any standard network management station with SNMP (version 1) support.

The following information is provided:

- **Information group**—containing card, port and interface counts.
- **Interface statistics table**—listing characteristics and summary statistics for individual port interfaces, failover groups, and multiple port load balancing groups.
- **Port statistics table**—listing all ports grouped by interface and providing characteristics and statistics for each individual port. Port 1 in any multiple group is always the port that is available to be bound to protocol stacks.
- **Card information table**—describing each Adaptec network card on the system.
- **Card port information table**—sorted by network card listing all ports and the interface to which they are assigned.
- **Trap definition**—for traps that are generated when the status of any port changes.

Monitoring the NICs by SNMP

The duralink.mib file must be compiled on the SNMP Management station to manage the NICs. This file is located on the LAN and Duralink64 Failover Drivers Disk 1 in the snmpmibs directory. Please refer to the Duralink Manager Server User's Guide.

SNMP Support

The message !SNMP service is not installed will appear during the installation and configuration of NT if SNMP service is not installed. If SNMP functionality is not desired, ignore this message. If SNMP is desired, install SNMP Service using the Windows NT CD, and then reinstall service pack 3.

The driver installation enables an SNMP agent to provide management information to the SNMP management station. The agent supports both the DuraLAN and older EMPCI NICs. However, if you install your EMPCI drivers after the DuraLAN installation, management information is restricted to the EMPCI configuration.

The MIB file used for your SNMP management console or when using the Duralink Server Manager is located in the following directory: a:\snmpmibs\duralink.mib. After compiling this file on an SNMP management station you will then receive traps or events relative to the DuraLAN network adapter.

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The Diagnostics Utility

Your Adaptec DuraLAN NIC is supplied with a DOS diagnostics utility which is found on the LAN AND DURALINK64 FAILOVER DRIVERS NETWARE DISK (disk 2 of 2). Use the diagnostics utility to check the functionality of your DuraLAN NICs.

Running the Diagnostics

From the Hard Disk Drive

Use the following steps to run the diagnostics utility from your hard disk drive:

1. Make sure himem.sys and emm386.exe are currently in config.sys and that **files=30** is present.
   - If they are not, add the following lines to the top of the config.sys file:

     ```
     device=c:\dos\himem.sys
     device=c:\dos\emm386.exe /noems
     files=30
     ```

     Type the path to the DOS programs if it is not found in c:\dos.
2. Create a directory for the diagnostics on your hard disk drive.
3. Copy all files in this directory to the new diagnostics directory of the hard disk drive.

4 At the DOS prompt, type **go_diags** and then press **ENTER**.

Note: The easiest way of testing a DuraLAN NIC is running the Selftest.

From the Floppy Disk Drive

To prepare a DOS diagnostics boot diskette, use the following steps:

1 Create a bootable DOS diskette.

2 Copy the DOS files himem.sys and emm386.exe to the diskette.

3 Copy all the files in this directory to the root directory of the DOS boot diskette.

4 Start the system from the floppy diskette.

5 At the DOS prompt, type **go_diags** and then press **ENTER**.

Tip: The easiest way of testing a DuraLAN NIC is running the Selftest.

Diagnostic Tests

The following table lists the tests which can be run on the Adaptec DuraLAN Fast Ethernet NIC(s). The diagnostics commands are case sensitive, please type these commands as they appear in the table.

Command	Test
selftest	Verifies a variety of card functions. You should run this test first to isolate common errors.
port *X*	Specifies the port you want to test. If more than one DuraLAN NIC is installed, remove all cards and then test one card at a time.
display	Displays values of all chip registers.

Command	Test
loop	Performs muliple tests consecutively. At the last line before you run the tests, type **end**. For example: Loop>port 1 Loop>selftest Loop>port 2 Loop>selftest Loop>end
eeprom	Tests contents of serial eeprom and displays it on screen.
exit	Exits the diagnostics utility.
hbi_slave	Tests slave accesses, checks serial eeprom, and checks register accesses to the chip.
hbi_dma	Checks dma transfers to and from the board.
mac	Tests registers and various functions of ethernet controller.
address_filter	Tests ethernet packet filtering capabilities
internal_10_mac	Tests internal loop-back at 10 Mbps within the chip.
internal_100_mac	Test internal loop-back at 100 Mbps within the chip.
internal_10_phy	Tests loop-back from phy device at 10 Mbps.
internal_100_phy	Tests loop-back from phy device at 100 Mbps.
external_10	This test requires a loop-back cable. It tests the loop-back from the cable at 10 Mbps.
external_100	This test requires a loop-back cable. It tests the loop-back from the cable at 100 Mbps.
autonegotiate <speed> (speed is one of five options)	Tests the speed the card negotiates. This test has five options: 0—Tests for full autonegotiation (highest speed) 10—Forces test at 10 Mbps half duplex 20—Forces test at 10 Mbps full duplex 100—Forces test at 100 Mbps half duplex 200—Forces test at 100 Mbps full duplex Note: Requires a hub, switch, or loop-back cable. Also, autonegotiate defaults to 10Mb if the cable is not connected.

Command	Test
checksum	Tests the abilitiy to calculate TCP / IP checksum.
statistics	Verifies statistics gathering features of the chip.
echoer # / sender # (where # is the number of packets to send)	This test requires two computers on a private network: one as the sender, and the other as the echoer. This test is useful for testing the network and verifying that data is being passed between the echoer and the sender. Enter the echoer command first, and then enter the sender command in the sender system. *(This command sequence is critical!)* The two commands work in tandem. The echoer system displays the number of packets received and then exits. The sender system displays a summary of packets transmitted and recieved, corrupted packets, number of collisions, and lost packets.
pause	Tests the flow controller features of the chip.
mem (default)	Slave access set to memory mode.
io	Slave access set to io mode.
timer	Tests the interrupt delay time feature of the Ethernet controller.
power-management	Tests the power down features of the Ethernet controller.
mod (mac offset data)	Allows the modification of the Ethernet controller registers.
help or ?	Displays all diagnostics commands.