Intel® PRO/100 Family of Adapters

Installation Guide
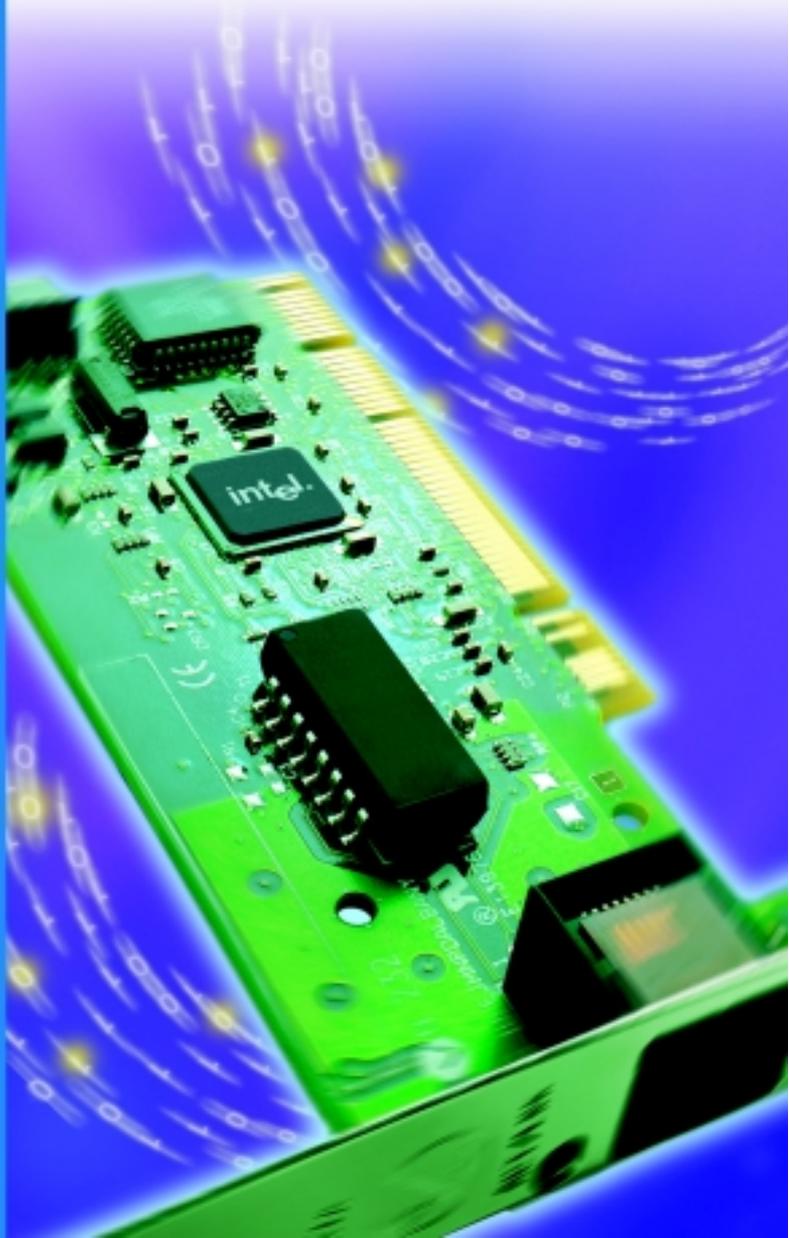
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Intel® PRO/100
Family of Network Adapters

Installation Guide

Where to go for more information

Readme Files

For more information about installing drivers for NetWare*, Microsoft Windows* NT* and other operating systems, see the readme text files. To view the files, go to the **\info** folder on the CD. Open the files with any text editor.

Online Services

You can use the Internet to download software updates, troubleshooting tips, installation notes, and more. Online services are on the World Wide Web at:

http://support.intel.com

Late Breaking News

Look for a *Late Breaking News* document, which is often included in your shipping container. This document provides useful information about adapter compatibility and gives special installation release notes.

Put the Adapter in the Computer

NOTE: If your network adapter is already installed, skip to the appropriate operating system section.

NOTE: Some adapters are designed to be plugged in to the CNR slot on the motherboard, rather than a PCI slot. This will be apparent when you install the adapter.

NOTE: If you are replacing an existing adapter with a new adapter in Windows* 95 or Windows 98, see the section *Removing an Existing Adapter in Windows 95 and Windows 98* later in this guide. For replacing an adapter in Windows NT* or Windows 2000*, see the sections *Removing an Existing Adapter in Windows NT* or *Removing an Existing Adapter in Windows 2000* later in this guide.

1   Shut down Windows (if it's running) by clicking the Start button, and then clicking Shut Down.
2   Turn off the computer and unplug the power cord. Then, remove its cover.

WARNING: Turn off and unplug power to the computer before removing its cover. Failure to do so could shock you and may damage the adapter or computer.

3   Remove the cover bracket from a PCI busmaster or CNR adapter slot by unscrewing the screw which secures it. Most computers have busmaster-enabled slots. If you have configuration problems, see your computer's documentation to determine if the PCI slots are busmaster-enabled.
4   If you are installing an Intel® PRO/100+ Management Adapter or Intel® PRO/100 S Management Adapter and you want to enable the Wake on LAN* feature, see the section *Connect the Wake On LAN Power Cable* later in this guide.
5   Insert the adapter into a PCI or CNR slot and push it into the slot until it's firmly seated. Then secure the adapter bracket with the screw.
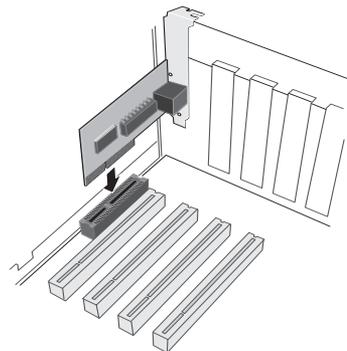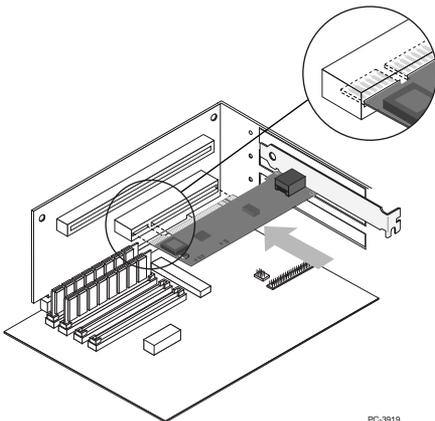
PC-3919

Note: Your specific adapter model may differ from that shown.   1

6   Replace the computer cover and plug in the power cord. Then, continue to the section *Connect the Network Cable*.

Connect the Network Cable

1   Connect a Twisted Pair Ethernet (TPE) network cable to the port of the adapter as shown below.

   •   For 100BASE-TX, your network cable must be Category 5, twisted-pair wiring. If you want to run the adapter at 100 Mbps, it must be connected to a 100BASE-TX hub or switch (not a 100BASE-T4 hub).

   •   For 10BASE-T, use Category 3, 4, or 5 twisted-pair wiring. If you want to use this adapter in a residential environment, you must use a Category 5 cable.

   NOTE: Use a Category 5 TPE cable and an RJ-45 connector for this adapter. Do not use Category 3 wiring at 100 Mbps. At 100 Mbps, connect to a TX hub, not a T4 hub.
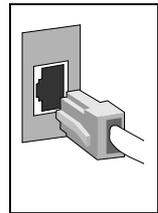
   •   For home phoneline network products, use a standard telephone extension cord with RJ-11 modular jacks on each end.

2   To configure the adapter, continue with the procedures specific to your operating system outlined in the section *Configure the Adapter and Install the Drivers*.

Connect the Wake on LAN* Power Cable (Optional)

NOTE: The Wake on LAN* feature and Wake on LAN cable are only available on PRO/100 S and PRO/100+ Management Adapters. They are not available on PRO/100+ Client Adapters or PRO/100 VE, VM, and 82562EH based Phoneline Desktop Adapters or Network Connections.

NOTE: The Wake on LAN cable is not necessary for PCI 2.2 compliant systems, since power is supplied to the PME pin through the PCI slot. However, even though the Wake on LAN cable is unnecessary for these systems, you can connect the cable on these systems with no adverse effect.

For the Wake on LAN* (WOL) feature to work correctly, the adapter must be connected to a continuous power source. This allows the adapter to "listen to" the network even when the computer is turned off. To install the WOL power cable, carefully follow the procedure below.

WARNING: Turn off and unplug power to the computer before installing the WOL cable. The WOL connector on your motherboard is live when the computer is plugged in to a power outlet. Failure to do so could damage the adapter or computer. Likewise, always turn off and unplug the computer prior to removing an adapter from the computer.

1   Make sure your computer is unplugged from the power outlet.
2   Locate the 3-pin WOL connector on the adapter. Attach one end of the WOL cable to the adapter as shown in the diagram that follows.
    Note that the connector is notched so as to prevent incorrect attachment.

Note: Your specific adapter model may differ from that shown.

Wake on LAN cable

PC-3920
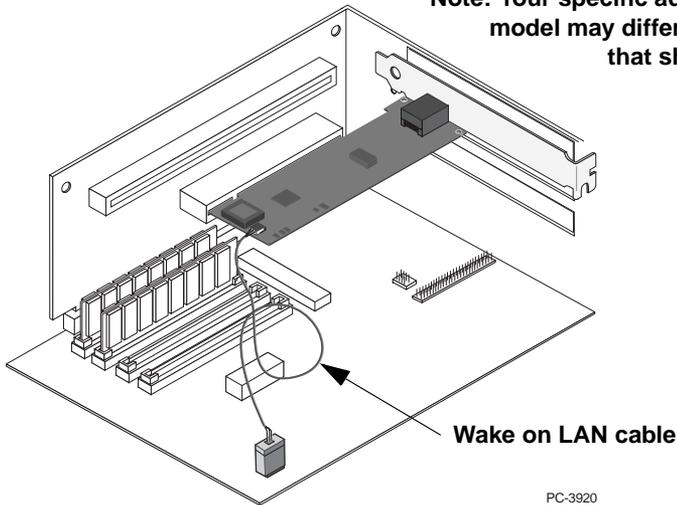
3   Locate the WOL connector on your motherboard. The location varies, depending on the vendor and model of motherboard. The WOL connector is usually located near other power connectors, such as the LED connectors.
4   Connect the other end of the WOL cable to the connector on the motherboard as shown in the diagram.
5   Some computers may require you to change a setting in your computer's BIOS or Setup program to enable the WOL feature. Check your computer owner's manual or contact your dealer for more information.
6   Replace the computer cover and plug in the power cord.
7   See the section on using Wake on LAN below, then continue to the section *Configure the Adapter and Install the Drivers*.

Using Wake on LAN

The Wake on LAN feature operates according to a published specification. In simple terms, the specification allows designers to build network adapters that are capable of "listening" to network activity even when the computer is turned off.

WOL adapters have a special low-power standby mode that is active when the rest of the computer is without power. The adapter will respond to a special "wake-up" packet sent by another computer or network device.

Typically, this wake-up packet causes the adapter to signal the computer to power up and run a pre-defined program.

The wake-up packet structure and behavior are defined in a WOL information brief, available on the Web at:

http://www.us.pc.ibm.com/infobrf/iblan.html

See the *Troubleshooting and FAQs* section later in this guide for general trouble-shooting and a listing of common problems and solutions for Wake on LAN operability.

Make a Setup Floppy Disk (Optional)

If you need to use a floppy disk to install the adapter drivers, use the MAKEDISK.BAT utility located in the \MAKEDISK directory on the Intel adapter CD.

```
MAKEDISK [operating system] [destination]
```

where [operating system] is the OS for which you are creating the diskette, and [destination] is the drive letter and path (such as A:).

The possible [operating system] options are:

W2K	Microsoft Windows 2000
NT	Microsoft Windows NT
W95	Microsoft Windows 95
W98	Microsoft Windows 98
NW	Novell NetWare servers and clients
DOS	Microsoft MS-DOS*, Windows 3.1 and IBM OS/2*

NOTE: This utility MUST be run from the \MAKEDISK directory. Also, make sure you have a 1.44 MB formatted, non-bootable diskette in the floppy drive when using this utility.

Configure the Adapter and Install the Drivers

Windows 98

Install Network Drivers from Disk

1   After you put the adapter in the computer and connect the cable, start Windows 98. You'll see the New Hardware Found dialog box.

> **NOTE**: If this dialog box does not appear and Windows 98 starts normally, you may need to manually add the adapter. See the *Manually Installing the Network Drivers* section below.

2   When prompted, insert the Intel adapter disk.
3   For the path, type `D:\` (for a CD-ROM drive) or `A:\` (for floppy), and then click OK.
4   Restart the system when prompted.

Manually Installing the Network Drivers

1   From the Control Panel, double-click the System icon.
2   Click the Device Manager tab.
3   Double-click Other Devices or Network Adapters in the list area.
4   Double-click a PCI Ethernet Controller.
5   Click the Driver tab, then click Update Driver.
6   Click Next at the Update Device Driver Wizard.
7   Select "Display a list of all the drivers..." and click Next.
8   Insert the Intel adapter disk and click Have Disk.
9   Enter the appropriate drive for your disk media (A:, D:, etc.), and click OK.
10 Click OK at the Select Device dialog box.
11 The Update Wizard displays the message that it has found the driver. Click Next.
12 Click Finish.
13 Restart your computer when prompted.

> **NOTE**: For troubleshooting information, see the *Windows Troubleshooting* section earlier in this guide.

Windows 95

Install Network Drivers from Disk

Have your Windows 95 installation CD or diskettes available; you'll be prompted for them when you install the new adapter.

1   After you put the adapter in the computer and connect the cable, start Windows 95. You'll see the New Hardware Found dialog box.

> **NOTE:** If this dialog box does not appear and Windows 95 starts normally, you may need to manually add the adapter. See the MS.TXT readme file in the \INFO\MS directory on the Intel adapter CD for more information.

2   Click "Driver from disk provided by hardware manufacturer," then click OK. You'll see the Install From Disk dialog box.
3   Insert the Intel adapter disk.
4   For the path, type `D:\` (for a CD-ROM drive) or `A:\` (for floppy), and then click OK.
5   Follow the prompts for any Windows 95 installation disks and restart the computer when prompted.

> **NOTE**: If you installed from the CD, the installation files are typically located on your CD-ROM drive at \Win95.

After restarting Windows 95, connect to your network by double-clicking the Network Neighborhood icon on the desktop.

Windows Troubleshooting

If you can't connect to a server or if Windows 95/98 reports an error after you double-click Network Neighborhood, try the suggestions here first, then turn to the *Troubleshooting and FAQs* section if necessary.

•   Make sure you're using the drivers that are on the drivers disk that ships with this adapter.
•   Make sure the driver is loaded and the protocols are bound. Check the Device Properties list for trouble indicators (an X or ! symbol).
•   Test the adapter with the PROSet advanced configuration utility that was installed on your system when you installed the Intel adapter. To start PROSet, double-click the Intel(R) PROSet icon in Control Panel. To run diagnostics, select the adapter and click the Diagnostics tab, then click Run Tests. For additional information, click Help in the PROSet window.
•   Check with your LAN administrator — you may need to install additional networking software.

Windows* 2000

Updating Network Drivers from Disk

After you put the Intel adapter in the computer, you should connect the network cable, plug in the power cord and start the computer. Windows automatically installs a driver for the adapter from its own library of drivers. If it does not have the proper driver, click the Have Disk button and follow the instructions on the screen to install the correct driver from the Intel adapter CD.

Even if Windows has the correct driver, you should install the driver that is included on the Intel adapter CD to ensure you have the complete set of features for your adapter as described in this guide. You can install this driver manually using the following instructions:

1 Insert the Intel adapter CD in the CD-ROM drive. (If the Intel® Product Setup Autorun screen appears, you may close it.)
2 From the Control Panel, double-click the System icon, select the Hardware tab, and click the Device Manager button.
3 Expand the "Network Adapters" listing by clicking the plus sign in front of it. Highlight the Intel(R) adapter listing, right-click to display its menu, and select Properties.
4 From the Properties dialog box, click the Driver tab and click the Update Driver button. The Update Device Driver Wizard appears. Click Next.
5 At the prompt "What do you want the wizard to do?", select the "Search for a suitable driver for my device" radio button and click Next.
6 Select the CD-ROM drives check box and click Next.
7 Select the "Install one of the other drivers" check box and click Next.
8 Select the driver on the Intel adapter CD and click Next.
9 Restart your computer if prompted.

NOTE: If you have multiple Intel adapters installed in your computer, you must repeat the steps above for each adapter.

After restarting your computer, connect to your network by double-clicking the My Network Places icon on the desktop.

Windows NT Automatic Configuration

PCI computers automatically detect and configure PCI-compliant adapters while starting the computer. The adapter IRQ level and I/O address are automatically set by the BIOS each time you start your computer.

Start your computer to automatically configure the adapter. Configuration is complete when Windows NT starts or when the DOS prompt appears.

If your computer displays an error while booting, it may require additional steps to configure. See the *PCI Installation Tips* section later in this guide for more information.

Adding an Adapter While Installing Windows NT

The Intel® driver that ships with Windows NT 4.0 is an older driver that may not support the Intel adapter.

Therefore, if you want to install the Intel adapter software while installing Windows NT, you need to either install the adapter after the installation of Windows NT is complete, or install the adapter software from a floppy installation disk created from the Intel adapter CD (using the MAKENT.BAT file on the root of the CD). When running the MAKENT.BAT batch file, you may see an error message indicating that a .CAT file could not be copied. Ignore this message.

Windows NT Version 4.0 Only

After putting the adapter in the computer, connecting the cable, and starting Windows NT; you need to install the correct drivers.

1   Double-click the Network icon in Control Panel.
2   Click the Adapters tab.
3   Click Add. You'll see a list of adapters.
4   Don't select an adapter from this list. Instead, insert the Intel adapter disk or CD into the appropriate drive and click Have Disk.
5   Specify the appropriate drive in the dialog box and click OK. Then follow the prompts to complete installation. When the adapter is added you'll see a new adapter listed in the Network adapters list.
6   Click Close to finish.
7   Restart Windows NT when prompted.

Windows NT Troubleshooting

If Windows NT reports an error or you can't connect to the network, try the suggestions here first, then turn to the *Troubleshooting and FAQs* section later in this guide, if necessary.

- Make sure that you use the drivers for this adapter. Drivers are located on the Intel adapter disk or CD.

- In your computer's BIOS settings, make sure "Plug and Play OS" is set to NO.

- Make sure the driver is loaded and the protocols are bound. Check the Settings in the Control Panel's Network/Bindings dialog box.

- Check the Windows NT Event Viewer for error messages.

- If you are attaching to a NetWare network, check your frame type and verify that NetWare client or server software has been installed.

- Test the adapter with the PROSet advanced configuration utility that was installed on your system when you installed the Intel adapter. To start PROSet, double-click the Intel(R) PROSet icon in the Windows Control Panel. To run diagnostics, select the adapter and click the Diagnostics tab, then click Run Tests. For additional information, click Help in the PROSet window.

- Check with your LAN administrator — you may need to install supplemental networking software.

Novell NetWare* 5.x Only

Use the NWCONFIG program to install the Intel adapter driver in Novell Net-Ware* 5.x. For Novell NetWare 4.2, see the *Novell NetWare 4.2 Only* section later in this guide. For 3.2, see the readme files.

1   From the NetWare console, type NWCONFIG and press Enter.
2   From the Configuration Options screen, choose Driver Options and press Enter.
3   Choose Configure network drivers and press Enter. If any drivers are already loaded, a list of them appears.
4   Choose Select an additional driver and press Enter. A list of drivers appears.
5   Insert the Intel adapter CD and press the Insert key to install an unlisted driver.
6   To specify the correct path to your media (if necessary), press F3. Press Enter to search the floppy or CD-ROM drive.
7   Select the appropriate Intel(R) PRO PCI Adapter and press Enter.
8   Respond to the Copy and Save prompts.
9   Use the arrow keys to select additional protocol types, F3 to manually set

IPX* Frame types, or choose the defaults.

10   Enter the slot number. (You can find the slot number by switching to the Console and manually loading the driver. A list of available slot numbers is displayed. Then, abort (press Esc) the manual install and return to the NWConfig screen.)

11   Select Save parameters and load driver to continue.

12   For each additional adapter you want to install, respond to the prompt and then repeat steps 7-11.

13   To complete the driver installation process, press the Esc key until you arrive back at the Installation Options screen.

14   To return to the console prompt, choose Exit.

> **NOTE**: If the adapter cannot transmit or receive following the installation, you may need to modify the frame type in the AUTOEXEC.NCF file.

Novell NetWare 4.2 Only

Use the NetWare Install program to install the Intel adapter driver in Novell Net-Ware 4.2. For Novell NetWare 3.2, see the readme text files in \NWSERVER and \INFO\NETWARE.

The following procedure is a condensed description of the installation process:

NOTE: Prior to installing, either load DOS or NetWare drivers from your computer's CD-ROM drive or create a floppy disk from the CD using the MAKEDISK.BAT utility. See the *Make a Setup Floppy Disk* section earlier in this guide.

1   From the NetWare console, type LOAD INSTALL and press Enter.

2   From the Installation Options screen, choose Driver options and press Enter.

3   Choose Configure network drivers and press Enter. If any drivers are already loaded, a list of them appears.

4   Choose Select an Additional Driver and press Enter. A list of drivers appears.

5   Insert the Intel floppy disk or CD and choose Install an unlisted driver by clicking Insert.

6   If necessary, specify the correct path to your media by pressing F3. Press Enter to search the floppy or CD-ROM drive.

7   The driver name is displayed: Intel(R) PRO PCI adapter. Press Enter to select it.

8   The next screens ask for frame and protocol types. Use the arrow keys to select specific items, or choose the defaults. Select Save parameters and load driver to continue.

9   For each additional adapter you want to install, press Esc, then repeat steps 7-8.

10   To complete the driver installation process, press the Esc key until you arrive back at the Installation Options screen.

11   To return to the console prompt, choose Exit.

> **NOTE**: If the adapter cannot transmit or receive following the installation, you may need to modify the frame type in the AUTOEXEC.NCF file.

Novell NetWare 3.2, Client 32 Only

Refer to the online documents in the \INFO\NETWARE directory. On a DOS computer, view the appropriate readme file for information on installing your network driver.

To view the readme files, insert the Intel adapter disk into a drive, switch to that drive, type SETUP /README and press Enter.

DOS and Windows 3.1 Setup for Novell NetWare DOS ODI Clients

> **NOTE**: Windows 95/98 users should refer to the previous sections on Windows 95/98. NetWare Client 32 users should refer to the NetWare readme files in the \NETWARE directory.

DOS and Windows 3.1 Automatic Configuration

PCI computers automatically detect and configure PCI-compliant adapters when the computer starts. The BIOS sets the adapter IRQ level and I/O memory address automatically each time you start your computer.

Start your computer to automatically configure the adapter. Resource configuration is complete when the DOS prompt appears. You can now continue with the procedure below.

If your computer displays an error during startup, it may require additional steps to configure a PCI adapter. See the *PCI Installation Tips* section later in this guide for more information.

Run Setup to Install Network Drivers

Setup can automatically install NetWare DOS ODI client drivers for you or display a readme file with installation instructions for other Network Operating System (NOS) drivers.

1   If your computer already has network drivers installed, restart the computer without loading them. If the drivers are loaded from the AUTOEXEC.BAT or CONFIG.SYS file, type REM in front of each line that loads a network driver. Or, with DOS 6.x or later, press F5 as DOS starts to bypass the drivers.
2   Insert the Intel adapter disk in a drive, switch to that drive, and at the DOS prompt, type SETUP and press Enter.
3   Select the adapter from the menu.
4   From the Main menu, select Automatic Setup. Then, follow the instructions on the screen. If you want to test the adapter with a responder on the network, see the *Responder Testing on the Network (Optional)* section later in

this guide.

Setup displays the adapter's configuration and then runs a series of diagnostic tests that make sure the adapter and network are functioning properly. If Setup finds a problem, it displays the results and some possible solutions.

When Setup finishes the tests, you'll see the Install Network Drivers screen.

5   Select the driver you want to install. Setup can install a NetWare client driver for you. If you want to install other drivers, Setup displays a readme file with installation instructions.

To set duplexing options, see the *Duplex Mode (Optional)* section later in this guide.

Troubleshooting

If you can't connect to a server, first try the suggestions here, then turn to the *Troubleshooting and FAQs* section later in this guide.

• Make sure you're using the drivers for this adapter.
• If you're replacing an existing adapter, make sure the LINK statement in your NET.CFG is correct for the new adapter.
• Verify that the frame type in your NET.CFG file matches your network.
• Test the adapter by running diagnostics in Setup. Additional testing is available by using a responder (see the next section).
• Check the readme files.

Responder Testing on the Network (Optional)

Setup can test the adapter more thoroughly if there is a responder on the network while you run the tests.

1   Go to a computer on the network with a comparable Intel network adapter installed.
2   Run the appropriate configuration program for the installed adapter and set it up as a responder.
3   Return to the computer that has the new adapter. Run Setup and test the adapter by running diagnostics.

UNIX*, Banyan VINES*, and Other Operating Systems

Refer to the online documents in the \INFO\OTHER and \UNIX directies. On a DOS computer, view the appropriate readme file for information on installing your network driver.

To view the readme files, insert the Intel adapter disk into a drive, switch to that drive, type SETUP /README and press Enter.

Duplex Mode (Optional)

Duplexing is a performance option that lets you choose how the adapter sends and receives data packets over the network. The adapter can operate at full duplex only when connected to a full duplex 10BASE-T or 100BASE-TX switch, or to another full duplex adapter.

The possible settings for duplexing are:

- **Auto** (requires a full duplex adapter or switch with auto-negotiation capability). The adapter negotiates with the switch to send and receive packets at the highest rate. This is the default setting. If the switch does not provide auto-negotiation, the adapter runs at half duplex.
- **Full duplex** (requires a full duplex switch or adapter). The adapter can send and receive packets at the same time. This mode can increase adapter performance capability. If the full duplex switch provides auto-negotiation, the adapter runs at full duplex. If the full duplex switch does not provide auto-negotiation, you need to set the adapter duplex mode manually (see the following sections), because it defaults to half duplex.
- **Half duplex**. The adapter performs one operation at a time; it either sends or receives.

> **NOTE**: If an adapter is running at 100 Mbps and half duplex, your potential bandwidth is higher than if you run it at 10 Mbps and full duplex.

Manually Configuring for Full Duplex

If your switch supports auto-negotiation with the NWay* standard, duplex configuration is automatic and no action is required on your part. However, many currently-installed switches do not support auto-negotiation. Check with your network system administrator to verify whether your switch supports this feature. Most installations require manual configuration to change to full duplex.

Configuration is specific to the driver you're loading for your network operating system (NOS).

To set up the duplex mode, refer to the section below that corresponds to your operating system.

> **CAUTION**: Adapter performance may suffer or your adapter may not operate if your switch doesn't support full duplex and you configure the adapter to full duplex. The switch settings must always agree with the adapter. Also, make sure to always set the speed when you configure duplex.

Setting Full Duplex in Windows 95/98/NT/2000

While running Windows:

1 Double-click the Intel(R) PROSet icon from the Control Panel.
2 Click the Advanced Tab.

3   Select Duplex.

4   In the Duplex Mode list box, click Full-Duplex.

5   Click OK.

6   Restart your computer if prompted.

Setting Full Duplex in DOS, ODI, NDIS 2.01 Clients

For each adapter, edit the NET.CFG or PROTOCOL.INI file. If editing the NET.CFG file, add the following keywords to the Link Driver section. For the PROTOCOL.INI file, add these keywords anywhere:

`FORCEDUPLEX 2`

`SPEED 100` (or 10 if 10BASE-T)

Setting Full Duplex in NetWare Servers

For each adapter in AUTOEXEC.NCF, edit the LOAD command and add the following options (you must include the equal sign for servers):

`FORCEDUPLEX=2`

`SPEED=100` (or 10 if 10BASE-T)

For more information, see the readme file for NetWare servers.

Setting Full Duplex in Other Operating Systems

See the OTHER.TXT readme file in the \OTHER directory on the Intel adapter disk. Open the file with any text editor.

Join a Virtual LAN

NOTE: This feature is not supported on PRO/100 VE, VM, and 82562EH based Phoneline Desktop Adapters and Network Connections.

A Virtual LAN (VLAN) is a logical grouping of network devices put together as a LAN regardless of their physical grouping or collision domains. VLANs let a user see and access only specified network segments. This increases network performance and improves network security.

VLANs offer the ability to group users and stations together into logical work-groups. This can simplify network administration when connecting clients to servers that are geographically dispersed across the building, campus, or enter-prise network.
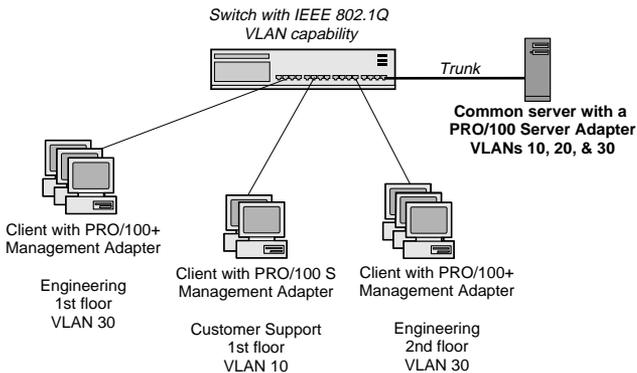
Typically, VLANs consist of co-workers within the same department but in dif-ferent locations, groups of users running the same network protocol, or a cross-functional team working on a joint project. Joining workers with VLANs forms logical working groups.

VLANs are normally only configurable at the switch. The Intel adapter soft-ware, however, permits you to configure a NetWare server with up to 64 VLANs, and 55 VLANs for Windows NT 4.0 and Windows 2000.

To set up VLAN membership, your adapter must be attached to a switch with VLAN capability.

For more information on VLANs in NetWare, see the NWTEAM.TXT file on the Intel adapter CD. For more information on VLANs in Windows NT and Windows 2000, continue to the sections *Adding a VLAN in Windows NT 4.0* and *Adding a VLAN in Windows 2000*.

Adding a VLAN in Windows NT 4.0

1. Create a VLAN on the switch. Use the parameters you assign there to join the VLAN from the server. See your switch documentation for more information.
2. Double-click the Network icon in Control Panel.
3. On the Adapters tab, select the adapter you want to be on a VLAN and click Properties.
4. In PROSet, click Join VLAN. Note that VLANs cannot be assigned to adapters that are already in an Adapter Teaming option.
5. Enter the VLAN ID and VLAN Name. The VLAN ID must match the VLAN ID on the switch. Valid ID range is from 0-4095. The VLAN Name is for informational purposes only and doesn't have to match the name on the switch.
6. Click OK to join the VLAN. Repeat steps 3-5 for each VLAN you want the server to join. The VLANs you add are listed on the Adapters tab.
7. Click Close and restart the computer.

Adding a VLAN in Windows 2000

IMPORTANT: You must use PROSet to add or remove a VLAN in Windows 2000. Do not use the Network and Dial-up Connections dialog box to enable or disable VLANs. Otherwise, the VLAN driver may not be correctly enabled or disabled.

1. Create a VLAN on the switch. Use the parameters you assign there to join the VLAN from the server. See your switch documentation for more information.
2. In PROSet, click the Virtual LAN tab. Note that VLANs cannot be assigned to adapters that are already in an Adapter Team.
3. Under the Virtual LAN tab, click the ADD button.

   If this is the first VLAN you're creating, you may see the following message: "In order for VLANs to function, you must be connected to a switch which supports IEEE VLANs (802.1Q).

   Also, 802.1p/802.1Q Tagging must be enabled on this adapter. Would you like to enable 802.1p/802.1Q Tagging on this adapter?"

   If this message appears, click Yes to continue. PROSet will automatically enable the 802.1p/802.1Q feature on the Advanced tab.
4. Enter the VLAN ID and VLAN Name and click OK.

   The VLAN ID must match the VLAN ID on the switch. Valid ID range is from 1-4094. The VLAN Name is for informational purposes only and doesn't have to match the name on the switch.
5. Repeat steps 3 and 5 for each VLAN you want the server to join. 802.1p/802.1q is enabled for all VLANs after it is enabled for the first VLAN. The VLANs you add are listed on the Adapters tab.

6   At the Virtual LAN tab, click OK and restart the computer.

General Configuration Notes

- Windows NT versions prior to 4.0 don't support VLANs.
- VLANs require Windows 2000 or Windows NT 4.0 with Service Pack 5.0 (or later).
- In Windows NT and Windows 2000, VLANs cannot be implemented on adapters that have been configured for teaming options.
- 802.1p/802.1q is required for VLANs to function. You can enable this feature through the Advanced tab in PROSet.
- PRO/100 adapters only support VLANs configured in compliance with the IEEE 802.1q specification. Only the PRO/100 Intelligent adapter supports Cisco ISL (Inter-Switch Link) VLANs.

Intel® Priority Packet Overview

NOTE: This feature is not supported on PRO/100 VE, VM, and 82562EH based Phoneline Desktop Adapters and Network Connections.

Intel Priority Packet is a traffic-prioritization utility that enables you to set up priority filters to process high priority traffic before normal traffic. Using Priority Packet, you can give priority to critical applications or users.

Priority Packet is available on the Intel adapter CD in the \PRTPKT directory.

Prioritizing Network Traffic

Priority Packet lets you set up priority filters to send information from critical nodes or applications with an indicated priority. By prioritizing traffic at the host or entry point of the network, network devices can base forwarding decisions on priority information defined in the packet.

Priority Packet prioritizes traffic based on priority filters — parameters you assign to be applied to outgoing (transmit) packets. Using the Priority Filter Wizard, you can set up pre-defined or custom priority filters based on a node (MAC) address, Ethernet type, or by various properties of the protocol and port. Priority Packet provides two different methods for prioritizing traffic: IEEE 802.1p tagging and Intel High Priority Queue.

IEEE 802.1p Tagging

IEEE 802.1p is a new IEEE standard for tagging, or adding additional bytes of information to, packets with different priority levels. Packets are tagged with four additional bytes, which increase the packet size and indicate a priority level. When these packets are sent out on the network, the higher-priority packets are transferred first. Priority packet tagging (also known as Traffic Class Expedit-

ing) allows the adapter to work with other elements of the network (switches, routers) to deliver priority packets first. 802.1p tagging enables you to assign specific priority levels from 0 (low) to 7 (high).

Using the IEEE 802.1p standard for packet tagging, you can assign values to packets based on their priority. This method requires a network infrastructure that supports packet tagging. The routing devices receiving and transferring these packets on your network must support 802.1p for tagging to be effective.

After you set up the priority filter in Priority Packet, you must launch Intel PROSet and select 802.1p/802.1Q Tagging on the Advanced tab.

> **CAUTION**: IEEE 802.1p tagging increases the size of the packets it tags. Some hubs and switches won't recognize the larger packets and will drop them. Check your hub or switch documentation to see if it supports 802.1p. (You can configure the switch to strip the tags from the packets and send it on to the next destination as normal traffic.) If these devices don't support 802.1p or you're not sure, use High Priority Queue (HPQ) to prioritize network traffic.

The requirements for effectively using IEEE 802.1p tagging are:

- The other devices receiving and routing 802.1p tagged packets must support 802.1p.
- The adapters on these devices must support 802.1p (adapters using the Intel 82558 or later Ethernet controller). All PRO/100+ and PRO/100 S Management Adapters support 802.1p. PRO/100B Client Adapters (using the 82557 Ethernet controller) do not.
- The adapter(s) cannot be assigned to an adapter team.
- If you're setting up VLANs and packet tagging on the same adapter, you must select the 802.1p/802.1Q Tagging and the Enable option on the Intel PROSet Advanced tab.

Intel High Priority Queue

If your network infrastructure devices don't support IEEE 802.1p or you're not sure, you can still define priority filters and send packets as high priority. While High Priority Queue (HPQ) doesn't provide the precise priority levels of 802.1p tagging, it does assign traffic as either high or low priority, and sends high priority packets first. Therefore, if there are multiple applications on a system sending packets, the packets from the application with a priority filter are sent out first. HPQ doesn't change network routing, or add any information to the packets.

To assign HPQ, you can specify it using Priority Packet when you create or assign a priority filter.

To effectively use HPQ tagging, the adapter(s) cannot be assigned to an adapter team.

Intel® Network Encryption Co-Processor

The Intel PRO/100 S family of Network Adapters includes an Intel 82594ED IPSec encryption co-processor. If Windows 2000 is enabled for IPSec encryption, it automatically offloads the intensive encryption and authentication functions onto the adapter, increasing throughput and decreasing CPU utilization.

NOTE: This feature is *only* available on PRO/100 S Management Adapters.

Intel® PROSet Overview

When you install the Intel adapter Windows drivers, an advanced configuration utility called PROSet is also installed. Users running Windows NT, Windows 2000, Windows 98 or Windows 95 can easily test hardware and set standard and advanced adapter features with PROSet (depending on your adapter model). PROSet runs when you select an adapter and click the Properties button in the Network Control Panel, or double-click the Intel PROSet system tray icon.

Intel® Boot Agent

The Intel Boot Agent is a software product that allows a personal computer to boot using a boot image that resides on a remote server. The product is complaint with the Wired for Management Baseline 2.0 (WfM 2.0) specification and incorporates the PXE client functionality described in the Pre-boot eXecution Environment Version 2.0 (PXE 2.0 and 2.1) specification.

For more information, refer to the Intel Boot Agent User's Guide on the Intel CD. Depending on the version you have (version number displays when starting up), see the \BOOTAGNT2.6\ or \BOOTAGNT3.0\ directory.

PCI Installation Tips

NOTE: These instructions do not apply to the PRO/100 VE, VM, and 82562EH based Phoneline Desktop Adapters and Network Connections.

PCI computers are designed to automatically configure add-in cards each time the computer starts. Your PCI computer sets the I/O address and IRQ level for your network adapter when the computer starts. These values cannot be changed by Intel adapter software. If you experience a problem when the computer starts, you may need to follow additional configuration steps.

On some computers, manual configuration is possible through the computer's PCI BIOS setup utility. Refer to your computer's documentation. You may need to verify or change some BIOS settings.

Some common PCI solutions are listed here:

- Bus master-enabled slots. On some computers, not all slots are bus master enabled by default. Check your BIOS PCI bus setting. It will be set to either Busmaster or Non-busmastered. Choose Busmaster.
- Reserve interrupts (IRQs) and/or memory addresses for ISA adapters. This prevents PCI cards from trying to use the same settings ISA cards are using. Check your PCI BIOS setup program. There may be IRQ options such as Enable for ISA, Reserve for ISA, or Disable for PCI. This option is sometimes in the Plug and Play area of the BIOS setup.
- Enable the PCI slot. In some PCI computers, you must use the PCI BIOS setup program to enable the PCI slot. This is especially common in PCI computers with the PhoenixBIOS*.
- Update your PCI BIOS. An updated PCI system BIOS can correct some PCI configuration problems. Call your computer manufacturer to see if an updated BIOS version is available for your computer.
- Configure the slot for level-triggered interrupts. The slot the adapter is using must be configured for level-triggered interrupts rather than edge-triggered interrupts. Check your PCI BIOS Setup program.

Here are some examples of PCI BIOS setup program parameters:

```
PCI slot #:        Slot where the adapter is installed
Master:            ENABLED
Slave:             ENABLED
Latency timer:     40
Interrupt:         Choose an IRQ from the list
Edge-level:        Level
```

The exact wording of these parameters varies with different computers.

Removing an Existing Adapter in Windows 95 and Windows 98

If you are replacing an existing adapter with an Intel network adapter, follow these steps *before* physically removing the adapter card:

1   Double-click My Computer.
2   Double-click Control Panel.
3   Double-click System.
4   Click the Device Manager tab.
5   Double-click Network Adapters.
6   Select the adapter driver listed below the Network Adapters group and click Remove.
7   Click OK.
8   Follow the instructions in the section *Put the Adapter in the Computer* at the start of this manual.

Removing an Existing Adapter in Windows 2000

NOTE: For adapters that are built-in to the motherboard, uninstalling the software as described here will disable the adapter.

If you are replacing an existing adapter with an Intel network adapter, follow these steps *before* physically removing the adapter card:

1   From the Control Panel, double-click the System icon, select the Hardware tab, and click the Device Manager button.
2   Expand the "Network Adapters" listing by clicking the plus sign in front of it. Highlight the adapter listing you want to remove and press the Del key.
3   Follow the instructions in the section *Put the Adapter in the Computer* at the start of this manual.

Removing an Existing Adapter in Windows NT

NOTE: For adapters that are built-in to the motherboard, uninstalling the software as described here will disable the adapter.

If you are replacing an existing adapter with an Intel network adapter, follow these steps *before* physically removing the adapter card:

1   From the Control Panel, double-click the Network icon.
2   Click the Adapters tab.
3   Under the "Network Adapters" field, highlight the adapter you're removing and click the Remove button.
4   Click OK.
5   Follow the instructions in the section *Put the Adapter in the Computer* at the start of this manual.

Push Installation for Windows 95

If you are a LAN administrator setting up a server-based push installation of Windows 95 as defined in the Microsoft Windows 95 Resource Kit, you'll need to follow additional steps for this adapter. Refer to the W9XPUSH.TXT file in the \PUSH\WIN9X directory on the Intel adapter CD.

Fast Ethernet Wiring

The 100BASE-TX specification supports 100 Mbps transmission over two pairs of Category 5 twisted-pair Ethernet (TPE) wiring. One pair is for transmit operations and the other for receive operations. Segment lengths are limited to 100 meters with 100BASE-TX for signal timing reasons. This complies with the EIA 568 wiring standard.

Troubleshooting and FAQs

If the Adapter Can't Connect to the Network

Make sure the cable is installed properly.

The network cable must be securely attached at both RJ-45 connections (adapter and hub). The maximum allowable distance from adapter to hub is 100 meters. If the cable is attached and the distance is within acceptable limits but the problem persists, try a different cable.

If you're directly connecting two computers without a hub or switch, use a crossover cable.

Check the LED lights on the adapter.

The adapter has two diagnostic LEDs, one on each side of the cable connector. These lights help indicate if there's a problem with the connector, cable, or switch/hub.

LED Function Indicators

LED	Meaning
ACT/LNK On	The adapter and switch are receiving power; the cable connection between the switch and adapter is good.
ACT/LNK Off	The adapter and switch are not receiving power or there is a driver configuration problem. If the LED is off: • Make sure power is connected to the PC. If power is connected and the LED is still off: — Make sure the WOL cable is attached and power is applied to the computer. — Make sure the network cable is attached at both ends. • Make sure you've loaded the network drivers. • Check all connections at the adapter and the switch and make sure both ends are connected. • Try another port on the switch. • Make sure the duplex mode setting on the adapter matches the setting on the switch. • Make sure you have the correct type of cable between the adapter and the hub. 100BASE-TX requires two pairs. Some hubs require a cross-over cable, while others require a straight-through cable. • Make sure you've loaded the correct network drivers.
ACT/LNK Flashing	The adapter is sending or receiving network data. The frequency of the flashes varies with the amount of network traffic. If the ACT/LNK LED does not flash, the cause could be: • The network may be idle. Try accessing a server. • The adapter may not be transmitting or receiving data. Try another adapter. • Make sure you're using two-pair cable for TX wiring.
100 Mbps On	Operating at 100 Mbps.
100 Mbps Off	Operating at 10 Mbps.
1 Mbps on	82562EH based Phoneline Network Adapter or Connection: Operating at 1 Mbps.
1 Mbps off	N/A

Make sure you're using the correct drivers.

Make sure you're using the drivers that come with this adapter. The driver file name always contains the letter B (for example, E100BODI.DOS). Drivers that support previous versions of this adapter don't support this version of the adapter.

Make sure the switch port and the adapter have the same duplex setting.

If you configured the adapter for full duplex, make sure the switch port is also configured for full duplex. Setting the wrong duplex mode can degrade performance, cause data loss, or result in lost connections.

Testing the Adapter (Diagnostics)

Test the adapter by running diagnostics. For DOS or Windows 3.1, run Setup on the Intel adapter disk. For Windows NT*, Windows 95 and Windows 98, run PROSet by double-clicking the PROSet icon in the Windows Control Panel. To run diagnostics, select the adapter and click the Diagnostics tab, then click Run Tests. For additional information, click Help in the PROSet window.

Frequently Asked Questions (FAQs)

The computer hangs when the drivers are loaded.
- Change the PCI BIOS interrupt settings. See *PCI Installation Tips* for more information.
- If you are using EMM386, it must be version 4.49 or newer (this version ships with MS-DOS 6.22 or newer).

Diagnostics pass, but the connection fails or errors occur.
- At 100 Mbps, use Category 5 wiring and make sure the network cable is securely attached.
- At 100 Mbps, connect to a 100BASE-TX hub/switch (not 100BASE-T4).
- For NetWare, make sure you specify the correct frame type in your NET.CFG file.
- Make sure the duplex mode setting on the adapter matches the setting on the switch.

The adapter stopped working without apparent cause.
- Run the diagnostics.
- Try re-seating the adapter in its slot, or try a different slot if necessary.
- The network driver files may be corrupt or missing. Remove the drivers and then reinstall them.

The Wake on LAN feature is not working.
- Make sure the WOL cable is attached and that power is being applied to the computer. (PCI 2.2 compliant systems do not require this.)
- Check the BIOS for its WOL setting. Some computers may need to be configured for WOL.

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- Make sure the network cable is fully attached to the adapter.

SETUP.EXE (for DOS-only installation) reports the adapter is "Not enabled by BIOS."

The PCI BIOS isn't configuring the adapter correctly. See the section *PCI Installation Tips*.

How does the home phoneline network differ from 10BaseT Ethernet networks?

- The home phoneline network (supported on 82562EH based Phoneline Desktop Adapters and Network Connections) uses regular telephone wiring instead of Category 5 unshielded twisted-pair (UTP) cabling.
- It uses RJ-11 rather than RJ-45 connectors, and so cannot be intermixed.
- It requires no hubs, routers or switches typically associated with an ethernet network.
- The wiring can span up to 500 feet.

Can a home phoneline network co-exist with telephone equipment and modems?

- Yes. The same wiring can be used for all telephone communications equipment and the home phoneline network.
- It uses the second pair of wires, which are normally not used. If the wire pair is used, it does not interfere with other telephone devices.

Adapter Specifications

Feature	PRO/100 S, PRO/100+ Management Adapters	PRO/100 VE, VM, and 82562EH based Phoneline Desktop Adapters and Network Connections
Compatibility	PCI v2.2 systems	Network Connections: PCI v2.2 Desktop Adapters: CNR 1.0 specification. CNR Interfaces used: SMBus, LAN Connect Interface, LAN EEPROM.
Media (cable) Connectors and Wiring	RJ45 Use Category 5 cabling at 100 Mbps Supports 100BASE TX Fast Ethernet	RJ45, Use Category 5 cabling at 100 Mbps Supports 100BASE TX Fast Ethernet 82562EH based Phoneline Desktop Adapters and Network Connections use RJ11 connector, standard household telephone wiring.
Data Rate Mode	10 or 100 Mbps	10 or 100 Mbps 1 Mbps (82562EH based Phoneline Desktop Adapters and Network Connections only)
Interrupt Levels	PCI: INTA	PCI: INTA
SRAM Transmit/ Receive Buffer	6 Kbytes	N/A (built-in to ICH2 chipset)
Power Requirements	1.73 Watts @ 5.0VDC (for the PRO/100 S and PRO/100+ Management Adapter) 1.06 Watts @ 5.0VCS (for the PRO/100+ Client Adapter)	0.3 Watts @ 3.3 VDC
Isolation Voltage	200V RMS	200V RMS
Operating Temperature	0 - 55 degrees C	0 - 55 degrees C
Humidity	10% - 90% non-condensing	10% - 90% non-condensing
Diagnostic LEDs	Activity/Link, 100 Mbps	Activity/Link, 100 Mbps Activity/Link, 1 Mbps (82562EH based Phoneline Desktop Adapters and Network Connections only)
Diagnostic Software	On-board PROSet, Setup Responder	On-board PROSet, Setup Responder
Compliance & Certification	• Safety — UL • FCC Class B • CE & Immunity • C-tick (Australian)	• Safety — UL • FCC Class B • CE & Immunity • C-tick (Australian)

Adapter Attributes

Attribute	Benefit	Intel PRO/100 S Management Adapter	Intel PRO/100+ Manage- ment Adapter	Intel PRO/100 VE, VM, and 82562EH based Phoneline Desktop Adapters and Network Connections
Adapter Identifier	Enables identification of adapt- ers (number printed on sticker on adapter)	3DES: 748566-xxx DES: 748564-xxx	721383-xxx	VE: A19716- xxx VM: A19725- xxx 82562EH: Axxxxxx-xxx
10/100 auto- negotiation	Provides flexible support for Ethernet, Fast Ethernet and mixed bandwidth networks. Relocate PCs as needed and upgrade network speed with- out swapping out or reconfigur- ing adapters	●	●	●
Intel® 82559 Fast Ethernet Controller	Increased performance and improved adapter reliability	●	●	Uses Intel® 82562-based Ethernet Controller.
Intel® Sin- gle Driver™ technology with full driver suite	One driver suite across Intel® 10/100 adapters for simplified setup and maintenance on Windows* 95, 98, 2000, UNIX*, LINUX*, NetWare*, and Windows NT* systems	●[1]	●	●
Full-duplex support	Enables easy transition from shared-media networking to full-duplex switched environ- ments	●	●	**
Wake on LAN*	Easy, off-hours maintenance and diagnostics	●	●	***
DMI 2.0 support	Enables easy asset manage- ment	●	●	●
Pre- installed Intel® Boot Agent	Deploy and upgrade PCs remotely	●	●	●
Intel® 82594ED network encryption co-proces- sor	Offloads security encryption from PC to the adapter, reduc- ing processor utilization and maximizing network perfor- mance	●		

Standards-based IPSec support	Helps protect sensitive data traveling on the LAN	●		
Optimized for Windows* 2000	Specifically designed for Windows* 2000 in collaboration with Microsoft to run encryption on your network without compromising performance	●		
DES and 3DES encryption algorithms	Provides the highest level of encryption widely available for maximum data protection	●		

1 On PCI-based adapters, Wake on LAN technology requires a motherboard equipped with a 3-pin connector for the auxiliary cable. Wake on LAN is a result of the Intel-IBM Advanced Manageability Alliance and a trademark of IBM.

** Half-duplex only on 82562EH based Phoneline Network Connections and Desktop Adapters.

*** PRO/100 VM only; supports Alerting.

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Intel may replace or repair the adapter product with either new or reconditioned parts, and any adapter product, or part thereof replaced by Intel becomes Intel's property. Repaired or replaced adapter products will be returned to you at the same revision level as received or higher, at Intel's option. Intel reserves the right to replace discontinued adapter products with an equivalent current generation adapter product.

Returning a Defective Product

From North America:

Before returning any adapter product, contact Intel Customer Support and obtain a Return Material Authorization (RMA) number by calling +1 916-377-7000.

If the Customer Support Group verifies that the adapter product is defective, they will have the RMA department issue you an RMA number to place on the outer package of the adapter product. Intel cannot accept any product without an RMA number on the package.

All Other Locations:

Return the adapter product to the place of purchase for a refund or replacement.

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Intel wants you to be completely satisfied with the Intel adapter product that you have purchased. Any time within ninety (90) days of purchase, you may return your Intel adapter to the original place of purchase for a full refund of the purchase price from your dealer. Resellers and distributors, respectively, accepting returns and refunding money back to their customers may return Intel adapters to their original place of purchase. Intel guarantees that it will accept returns under this policy and refund the original purchase price to customers purchasing directly from Intel.

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Software: Software provided with the adapter product is not covered under the hardware warranty described above. See the applicable software license agreement which shipped with the adapter product for details on any software warranty.

FCC Compliance Statement

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 instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

NOTE: 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.

CAUTION: If the device is changed or modified without permission from Intel, the user may void his or her authority to operate the equipment.

Canadian Compliance (Industry Canada)

When tested in at least one intended host:

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled "Digital Apparatus", ICES-003 of the Canadian Department of Communications.

Cet s numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Class B prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le Ministre Canadien des Communications.

Manufacturer Declaration

This certifies that the Intel network adapter shipped with this manual complies with the EU Directive 89/336/EEC, using the EMC standards EN55022 (Class B) and either EN50082-1 or EN55024. This product also meets or exceeds EN 60950 requirements. This product has been tested and verified to meet CISPR 22 Class B requirements.

Intel Corporation, Mailstop JF3-446
Hillsboro, Oregon 97124-6497 USA

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You can reach Intel's automated support services 24 hours a day, every day at no charge. The services contain the most up-to-date information about Intel products. You can access installation instructions, troubleshooting information, and general product information.

Readme Files on Your Product Disk

Use the file editor of your choice to view the readme files located under the \INFO directory of the Intel adapter disk. Or, you can view these files from the DOS prompt. To do so, insert the Intel adapter disk in a disk drive, switch to that drive, and type:

`SETUP /README` and then press Enter.

Web and Internet Sites

Support: http://support.intel.com

Network Products: http://www.intel.com/network

Corporate: http://www.intel.com

FTP Host: ftp://download.intel.com

FTP Directory: /support/network/adapter/

Customer Support Technicians

US and Canada: 1-916-377-7000 (7:00 - 17:00 M-F Pacific Time)

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http://support.intel.com/support/9089.htm.