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Note

Before using this information and the product it supports, be sure to read the general information under Appendix J, “Notices” on page J-1, “Electronic Emission Notices for STP Media” on page J-4, and “Electronic Emission Notices for UTP Media” on page J-7.

Third Edition (March 1998)

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Pericolo: prima di iniziare l'installazione di questo prodotto, leggere le informazioni relative alla sicurezza riportate nell'opuscolo *Attenzione: Informazioni di sicurezza — Prime informazioni da leggere* in cui sono descritte le procedure per il cablaggio ed il collegamento di apparecchiature elettriche.

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Related Information

Refer to these publications for additional information:

- *IBM Token-Ring Network Problem Determination Guide,* SX27-3710
- *IBM LAN Technical Reference IEEE 802.2 and NETBIOS API,* SC30-3587

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- *IBM Transmission Control Protocol/Internet Protocol Version 2.1 for DOS: Programmer's Reference,* SC31-7046
- *LAN Adapter and Protocol Support Configuration Guide,* S96F-8489
- *MPTS/2 Configuration Guide,* S10H-9693
- *IBM LAN Server Command and Utilities,* S10H-9686
- *Guide to LAN Server Books,* S10H-9688
- *DOS LAN Services and User's Guide,* S10H-9684
- *Microsoft LAN Manager Installation and Configuration Guide*
- *Microsoft Windows NT System Guide*
- *Novell Workstation for DOS and MS Windows*
- Novell NetWare installation and system administration manuals appropriate to the version of Novell NetWare you have installed
- IBM Bulletin Board (919) 543-2307
- FTP Internet Server at lansupport.raleigh.ibm.com
- IBM Networking home page on the World Wide Web:

  `http://www.networking.ibm.com`

As of this writing the bulletin board telephone number and Internet Server address are current. If you should find that either the telephone number or the Internet address is not available, check the README file to see whether a new number or address is available. Also, see "IBM PC Company BBS" on page 5-22.

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Chapter 1. Introduction

This manual contains the information you need to install and use the IBM PCI Token-Ring Adapter and IBM PCI Wake on LAN Token-Ring Adapter. Unless specified, all references in this book to the IBM PCI Token-Ring Adapter also apply to the IBM PCI Wake on LAN Token-Ring Adapter. This chapter describes the adapter, the contents of the adapter kit, and the other materials you will need to install the adapter.

The enclosed CD-ROM contains the installation aids, device drivers, and documentation for the IBM PCI Token-Ring Adapter and IBM PCI Wake on LAN Token-Ring Adapter.

It is important that you are familiar with the computer in which the adapter will be installed and the computer's operating system and network software.

The IBM PCI Token-Ring Adapter

The IBM PCI Token-Ring Adapter is a 32-bit, bus-master, Token-Ring adapter for the PCI bus architecture. Its unique, high-quality filter design supports connection to a token-ring network that is wired with shielded twisted-pair (STP) or unshielded twisted-pair (UTP) cabling. The adapter can be used in a PCI-compatible slot that operates at speeds between 16 MHz and 33 MHz.

Features of the IBM PCI Token-Ring Adapter include:

- IBM LAN Client Software.

  New for the PCI Token-Ring user is IBM LAN Client, which allows a client workstation to communicate with an IBM LAN Server or Novell NetWare server. It also allows the use of TCP/IP applications and provides for NetBIOS and IEEE 802.2 applications. IBM LAN Client has the ability to operate in 32-bit protect mode and requires as little as 2 KB of conventional memory.

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- Adapter management capability using SNMP and Desktop Management Interface (DMI) is available by using the LAN Adapter Management Agent. For an end-to-end management solution, the agent can be used in conjunction with the Nways Workgroup Manager Version 1.1 or higher and Nways Manager for AIX Version 1.2 or higher.

  For more information about the agent or to download the agent, go to http://www.networking.ibm.com/trl/trllma.html. If you have the CD-ROM version of this product, view x:\mgtagent\trllma.htm from your web browser, where x is your CD-ROM drive.
- Automatic ring-speed detection.
- Support for a wide variety of network operating systems and network applications.
- Support for full-duplex (FDX), token-ring LAN operation.
- Support for microcode update.
- Automatic configuration of I/O, memory, ROM space, and interrupt level by PCI BIOS on power-up.
- Can be plugged into either a half-size or full-size, 5-V or 3.3-V signaling, 32-bit or 64-bit PCI-bus slot.
- Uses less than 2 watts.
- Supports UTP and STP cabling with both an RJ-45 connector and a 9-pin, D-shell connector.

The IBM PCI Wake on LAN Token-Ring Adapter

The IBM PCI Wake on LAN Token-Ring Adapter is designed using the same technology as the IBM PCI Token-Ring Adapter. It provides the necessary functions required for a complete system solution for desktop PCs that incorporate Wake on LAN. It uses the same device drivers and configuration tools as the IBM PCI Token-Ring Adapter. You will not see a difference in the device driver name or the identifiers displayed during installation or status reporting.

Note: When installing the device driver for the IBM PCI Wake on LAN Token-Ring Adapter, select the IBM PCI Token-Ring Adapter device driver.

Prerequisite Operating System PCI Updates

Please check with your operating system supplier for the latest information concerning required updates to support PCI adapters. Some currently available operating systems are not PCI-aware, so the device drivers for the IBM PCI Token-Ring Adapter are written to the PCI architected BIOS or register-level interfaces. Chapter 4, “Installation Instructions for Your Environment” deals with updates to specific operating system environments.

Number of Adapters Supported

The maximum number of adapters supported is:

Table 1-1. Maximum Number of Adapters Supported

Device Driver	Number of Adapters
Novell ODI Server	16
Novell ODI OS/2 Client	2
Novell ODI DOS Client	1
NDIS 3.x for NT/W95/WFW	Unlimited
Banyan	Unlimited
NDIS 2.0 OS/2	12
NDIS 2.0 DOS	2
LAN Client	1

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Kit Contents

Along with this manual, you have one of the following three kits:

The IBM PCI Token-Ring Wake on LAN Adapter kit, which contains the following components and software:

- One IBM PCI Token-Ring Wake on LAN Adapter
- The IBM PCI Token-Ring Adapter Drivers and Instructions CD-ROM, which contains:
  - A softcopy version of this manual
  - InstallPro
  - LANAID
  - LAN Client
  - Device drivers
  - Diagnostic code
  - A three-connector Wake on LAN auxiliary power cable, part number 76H254.
    A two-connector Wake on LAN cable, part number 42H2397

The IBM PCI Token-Ring Adapter CD-ROM kit, which contains the following components and software:

- One IBM PCI Token-Ring Adapter
- The IBM PCI Token-Ring Adapter Drivers and Instructions CD-ROM Which contains:
  - A softcopy version of this manual
  - InstallPro
  - LANAID
  - LAN Client
  - Device drivers
  - Diagnostic code

The IBM PCI Token-Ring Adapter Diskette kit, which contains the following components and software:

- A hardcopy version of this manual
- One IBM PCI Token-Ring Adapter
- Diskettes containing
  - LANAID
  - LAN Client
  - Device drivers
  - Diagnostic code

If any item is missing or damaged, contact your place of purchase.

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Adapter Installation Checklist

To install this adapter, complete the following steps in order. You might want to mark this page for easy retrieval or make a copy to be used for reference.

__ 1. Preparation

In addition to the publications shipped with the adapter, you will need:

The manual provided with your computer

The manual provided with your network operating system or network application

Your operating system and network application software

Check the shipping package contents list on “Kit Contents” on page 1-4.

__ 2. If you have the CD-ROM version of this product and are installing the adapter under Windows 95, run the InstallPro program before installing the hardware. Insert the CD-ROM in drive *X&* where *X* is your CD-ROM drive. Then, type d:\startcd and follow the instructions presented.

__ 3. In any other case, install the hardware before installing the software. See Chapter 2, “Installing the Adapter Hardware.”

__ 4. If you have not already done so, install the adapter software. See Chapter 3, “Software Installation.”

Note: The PCI Token-Ring Adapter comes configured from the factory with the following defaults: AutoSense ON, RPL enabled, and expansion ROM enabled.

__ 5. Installation is now complete.

Note: Some systems require manual PCI adapter configuration. Please refer to “Systems Requiring Manual PCI Adapter Configuration” on page 5-5 for information about these systems.

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Chapter 2. Installing the Adapter Hardware

If your adapter has the Wake on LAN feature, install it using the procedure in “Installing the Wake On LAN Adapter.”

If you have the CD-ROM version of this product and are installing the adapter under Windows 95, run the InstallPro program before installing the hardware. Insert the CD-ROM in drive **X** where **X** is your CD-ROM drive. Then, type **X:\startcd** and follow the instructions presented. In any other case, install the hardware before installing the software.

To install the adapter in your PC:

1. Install the adapter according to the instructions for adapter installation in the manual that came with your PC.

2. After installing the adapter and before switching ON your PC, connect the adapter cable to the connector on the adapter and to the network.

   Note: Only one data cable can be connected to the PCI Token-Ring Adapter at a time.

   For information on adapter cables, see “Adapter Cable” on page 2-5.

Installing the Wake On LAN Adapter

1. Switch OFF the PC and all attached devices.

   Note: In the U.K., by law, telephone line cables must be disconnected from the PC before the power cord.

2. Remove the power cord from the outlet.

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Attention

Ensure that your PC is unplugged from the electrical outlet. Power is always supplied to the power connector that attaches to the Wake on LAN adapter, even when the system power switch is OFF.

3 Remove all cables from your PC to any connected devices. Label each cable for easier reconnection at the end of this procedure.

4 Follow the instructions provided in your PC manual for removing the cover or otherwise accessing the adapter slots and inserting the adapter.

5 Two Wake on LAN cables are included with your new adapter. Determine which to connect to your adapter in the following manner.

- If your PC has a power supply cable marked **P9** or **P12**, then you must use Wake on LAN cable part number 42H2397. This cable has two connectors; one for the Wake on LAN Adapter and one for the system board.
- If the cable from the power supply is not present, then you must use part number 76H7254. This cable has three connectors; two for the Wake on LAN Adapter and one for the system board.

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6 Connect the cables to your new Wake on LAN Adapter as follows:

- Connect one end of the Wake on LAN cable to the system board. If you are using the two-connector cable, part number 42H2397, this connector has two pins as shown in Figure 2-1 on page 2-4. If you are using the three-connector cable, part number 76H7254, this connector has three pins.
- Connect one end of the Wake on LAN cable to your new Wake on LAN Token-Ring PCI Adapter at P5 as shown at number **2** in Figure 2-2 on page 2-5.
- If you are using the three-connector cable, part number 76H7254, connect the third end to the Wake on LAN adapter card at P4 as shown at number **3** in Figure 2-2 on page 2-5.

  Otherwise, connect the power supply cable marked P9 or P12 to the adapter card at P4. See number **3** in Figure 2-2 on page 2-5.

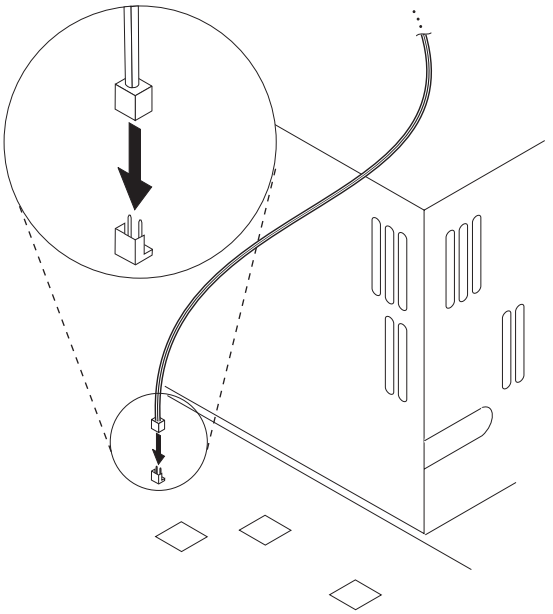

Figure 2-1. Wake on LAN Signal Connector on the System Board

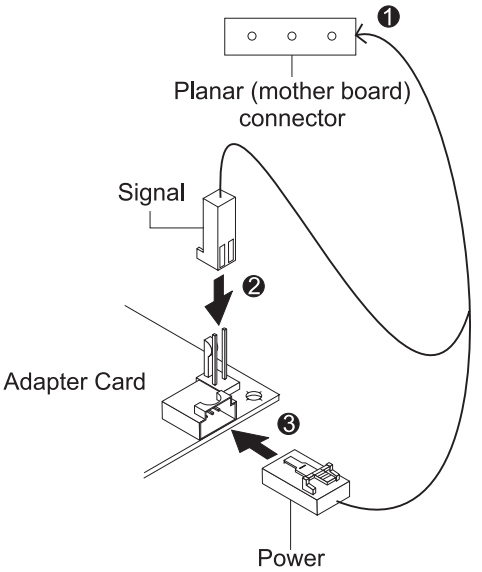

Figure 2-2. Connecting Cables to the Wake on LAN Adapter

7 Re-install all removed covers and reconnect disconnected cables as described in your PC manual. Follow all safety instructions.

Note: In the U.K., by law, the power cord must be connected before the telephone line cable.

Adapter Cable

To connect the IBM PCI Token-Ring Adapter to a token-ring network, you will need one of the cables illustrated in Figure 2-3 on page 2-6. Cables are not included in the adapter package. The network end of the cable must be compatible with the network faceplate or other device to which the adapter will be connected.

Note: No more than one data cable may be connected to the PCI Token-Ring Adapter at a time.

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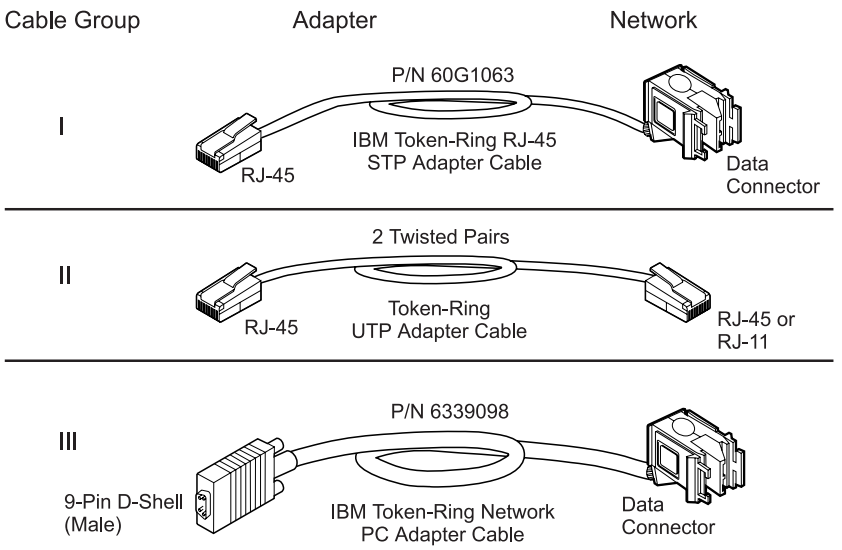

Figure 2-3. STP and UTP Adapter Cables

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Chapter 3. Software Installation

Installing Software from a CD-ROM

If you are installing the software from the CD-ROM version of this product, insert the CD-ROM into drive **X**, where **X** is your CD-ROM drive, and type **X:\startcd** from a DOS prompt. If you want to bypass the startcd process, and run LANAID to install LAN Client, type **X:\rlanaid**. You can also use the CD-ROM for your environment as indicated in Chapter 4, “Installation Instructions for Your Environment.”

Installing Software from Diskettes

If you are installing the software from diskettes, and you are installing the adapter to run under Novell NetWare Server, OS/2 Novell NetWare Requester, the 16-bit DOS Novell NetWare Requester, Microsoft DOS LANManager, Windows NT, Windows 95 NDIS or Novell IntranetWare Client for Windows 95, or Windows for Workgroups NDIS3, refer to the appropriate section in Chapter 4, “Installation Instructions for Your Environment.”

If you are installing the software from diskettes and are installing the adapter to run under DOS, Microsoft Windows 3.1x, or Microsoft Windows for Workgroups 3.1x, use LANAID to install the software as described below.

1. If the PCI Token-Ring Adapter version of LANAID is already installed on your computer, skip to step 2. If it is not, install LANAID on your hard disk.

   Insert Diskette 1, LANAID and Diagnostics, in drive A and enter (from a DOS full screen) **a:install**. Skip to step 3.

   Note: Once installed, LANAID will begin to run automatically.

2. Run LANAID.

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At a DOS full screen, select the drive and directory where you stored LANAID. Enter **lanaid**.

3 On the panel titled `LANAID Version 2.x...`, the MAC address is shown. Use the pull-down menu to show the MAC addresses of other PCI Token-Ring Adapters, if any are installed. Select the address of the adapter you want to work with now. See "MAC Address" on page 3-2.

4 If you want to change RPL or expansion ROM parameters, select **Adapter Configuration**. If not, continue with step 5.

5 Install the software.

Select **Software Installation** and then select your operating system. Finally, select protocol drivers and installation options.

LANAID will prompt you through installation completion.

MAC Address

The *universally administered address label* contains the adapter's universally administered address. This is the unique MAC address that was encoded in the adapter memory at the factory. See "Understanding the Adapter LEDs and Labels" on page 5-13. If you want the adapter to be known on the network by a locally administered address, you must configure the adapter's device driver or protocol driver to use a locally administered address.

You need to know the MAC address if you have installed more than one IBM PCI Token-Ring Adapter, because the LANAID program identifies each installed adapter by this address. All installed adapters are shown in the list on the Main Menu by their addresses.

Command Line Invocation of LANAID

Note to LAN Administrators: If you want to do automated installations of LAN Client, use the LANAIDC tool. Enter **lanaidc /h** for information. Diskette 1, LANAID and Diagnostics, will boot directly into LANAIDC.

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Chapter 4. Installation Instructions for Your Environment

This chapter gives detailed directions for manually installing the adapter drivers.

The following table tells you where to find installation instructions for your environment.

Where to Find the Installation Instructions for Your Environment

Table 4-1 (Page 1 of 2). Installation Instructions

Operating System and Environment	Page
DOS with Windows Version 3.1x	
IBM LAN Client	3-1 (Must use LANAID)
NetWare Requester	4-25
DOS LAN Services	4-23
IBM TCP/IP for DOS (Version 2.1)	4-23
Microsoft LANManager (Version 3.0)	4-27
DOS (without Windows)	
IBM LAN Client	3-1 (Must use LANAID)
NetWare Client	4-25
DOS LAN Services	4-23
IBM TCP/IP for DOS (Version 2.1)	4-23
Microsoft LANManager (Version 3.0)	4-27
Windows for Workgroups Version 3.11	
NDIS3	4-42
NetWare Requester	4-25
NDIS2	4-23
IBM LAN Client	3-1 (Must use LANAID)
OS/2	
OS/2 (MPTS)	4-13
NetWare Requester	4-20
OS/2 (LAPS)	4-15
OS/2 Warp Connect or Server	4-18
NetWare Server	
NetWare Server Version 3.12	4-3
NetWare Server Version 4.1x	4-9
Windows NT	
NDIS 3.1 Driver	4-29
NDIS 4.0 Driver	4-31

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Table 4-1 (Page 2 of 2). Installation Instructions

Operating System and Environment	Page
Remote Unattended Installation	4-33
Windows 95	
NDIS 3.1 Driver	4-34
Novell IntranetWare Client	4-38
Remote Unattended Installation	4-41

Novell NetWare 3.12 Server

Before you start this installation, get the latest level of patches from Novell and install them before beginning this procedure.

If the Novell NetWare server is not installed on your machine, follow these instructions. If it is installed, skip to the instructions in "Server Driver Installation in Existing NetWare 3.12 Server" on page 4-6.

Changes from the usual NetWare installation are necessary because this driver is written to a new specification level that requires new NetWare loadable modules (NLMs). The installation program is not aware of this, though, and these NLMs must be loaded during installation of the server device driver and after the server installation.

Also, see "Operating and Networking System Limitations" on page C-8 for information about system restrictions and limitations.

1 Refer to Novell's *Installation and Upgrade* manual for installation instructions. Follow the procedure for the installation of Novell NetWare 3.12 until the section titled "Load LAN Drivers" is next.

2 Insert Diskette 3, "ODI Drivers and LAN Client (A)" in drive A **or** insert the CD-ROM. Enter the following commands at the server prompt:

For CD-ROM, replace A: with X:, where X is your CD-ROM drive.

```
LOAD A:\NOVELL\NETWARE\NBI31X.NLM
LOAD A:\NOVELL\NETWARE\MSM31X.NLM
LOAD A:\NOVELL\NETWARE\TOKENTSM.NLM
```

Note: A message referring to *protected-mode BIOS access*, might appear before installation of Novell patches.

3 Load the server device driver. Enter the following command at the server prompt:

```
LOAD A:\NOVELL\NETWARE\IBMTRPO.LAN DATARATE=M16
```

It is recommended for servers that the DataRate be set to 16-MB or 4-MB, and clients be set to Auto. The default is Auto.

Note: See Appendix G, "Novell NetWare Server and LAN Client Driver Parameters" for a complete list of parameters that can be specified on the LOAD IBMTRPO command in the AUTOEXEC.NCF file.

4 Follow the instructions in the Novell manual, beginning with "Bind the Protocol to the LAN Driver" and continue until you are in the File Server STARTUP.NCF File panel.

5 In addition to the instructions in the Novell manual, add the following line to STARTUP.NCF:

```
Set Minimum Packet Receive Buffers = 48
```

Note: Increase the minimum packet receive buffers by 48 for each additional PCI Token-Ring Adapter that is installed.

6 Perform the instructions in "Create an AUTOEXEC.NCF file." In addition to the instructions in the Novell manual, add the following lines to the AUTOEXEC.NCF file immediately after the `IPX INTERNAL NET` statement (replace `C:\SERVER.312\` with the location of the NetWare server program):

```
LOAD C:\SERVER.312\NBI31X.NLM
LOAD C:\SERVER.312\MSM31X.NLM
LOAD C:\SERVER.312\TOKENTSM.NLM
LOAD C:\SERVER.312\IBMTRPO.LAN NAME=IBMLS1 DATARATE=M16
BIND IPX TO IBMLS1 NET=<unique net number>
```

Make sure that the line containing IBMTRPO.LAN has the complete path name.

Notes:

a. See Appendix G, "Novell NetWare Server and LAN Client Driver Parameters" for a complete list of parameters that can be specified on the LOAD IBMTRPO command in the AUTOEXEC.NCF file.

b. If you experience any problems after loading the Novell

NLM files, contact Novell to ensure that you have the current version of these files.

Press **Esc** and answer **Yes** to save the new file to disk. Press **Esc** again to return to the server console.

7 Shut down your server by entering **down** and then entering **exit** from the server prompt.

8 Insert Diskette 3, "ODI Drivers and LAN Client (A)" in drive A **or** insert the CD-ROM. Enter the following commands at the server prompt:

For CD-ROM, replace A: with X:, where X is your CD-ROM drive. For both diskette and CD-ROM, replace `C:\SERVER.312\` with the location of the NetWare server program.

```
COPY A:\NOVELL\NETWARE\NBI31X.NLM C:\SERVER.312
COPY A:\NOVELL\NETWARE\MSM31X.NLM C:\SERVER.312
COPY A:\NOVELL\NETWARE\TOKENTSM.NLM C:\SERVER.312
COPY A:\NOVELL\NETWARE\IBMTRPO.LAN C:\SERVER.312
COPY A:\NOVELL\NETWARE\IBMTRPO.LDI C:\SERVER.312
```

9 Go to the Novell server directory and enter **server** at the DOS prompt to restart the server.

10 Install any Novell patches now.

11 Installation is now complete.

Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files are loading successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF. See “Understanding the Adapter LEDs and Labels” on page 5-13.

If you experience problems go to Chapter 5, “Problem Solving.”

For information concerning NetWare server error messages, see Appendix H, “Novell NetWare Server and LAN Client Driver Messages.”

Server Driver Installation in Existing NetWare 3.12 Server
If Novell NetWare is already installed in your computer, perform the following steps to install the PCI Token-Ring Adapter server device driver.

1. After installing your adapter, switch ON your computer.
2. Install any Novell patches now.
3. Insert Diskette 3, "ODI Drivers and LAN Client (A)" in drive A **or** insert the CD-ROM. Enter the following commands at the server prompt:

   For CD-ROM, replace A: with X:, where X is your CD-ROM drive.

   ```
   COPY A:\NOVELL\NETWARE\NBI31X.NLM C:\SERVER.312
   COPY A:\NOVELL\NETWARE\MSM31X.NLM C:\SERVER.312
   COPY A:\NOVELL\NETWARE\TOKENTSM.NLM C:\SERVER.312
   COPY A:\NOVELL\NETWARE\IBMTRPO.LAN C:\SERVER.312
   COPY A:\NOVELL\NETWARE\IBMTRPO.LDI C:\SERVER.312
   ```

   Note: If you experience any problems after loading the Novell NLM files, contact Novell to ensure that you have the current version of these files.
4. In the directory where Novell is installed on your hard disk, enter **server** at the DOS prompt to start the server.
5. At the server console prompt, enter **load install**.
6. From the Installation Options menu, select **System Options** and press **Enter**.
7. Select **Edit STARTUP.NCF File** and press **Enter**. Add the following line to the STARTUP.NCF file:

   ```
   Set Minimum Packet Receive Buffers = 48
   ```

Note: Increase the minimum packet receive buffers by 48 for each additional PCI Token-Ring Adapter that is installed.

8 Press **Esc** and then answer **Yes** to save changes to the STARTUP.NCF file.

9 Select **Edit AUTOEXEC.NCF File** and press **Enter**. Edit this file and, after the `IPX internal net` statement, include the following statements. (Replace `C:\SERVER.312\` with the location of the NetWare server program.)

```
LOAD C:\SERVER.312\NBI31X
LOAD C:\SERVER.312\MSM31X
LOAD C:\SERVER.312\TOKENTSM
LOAD C:\SERVER.312\IBMTRPO NAME=IBMLS1 DATARATE=M16
BIND IPX TO IBMLS1 NET=<unique net number>
```

See Appendix G, “Novell NetWare Server and LAN Client Driver Parameters” for a complete list of parameters that can be specified on the `LOAD IBMTRPO` command in the AUTOEXEC.NCF file.

Press **Esc** and then answer **Yes** to save the new file to disk. Press **Esc** again to return to the server console.

10 Shut down your server by entering **down** and then entering **exit** from the server prompt.

11 Enter **server** to restart the server.

12 Installation is now complete. Shut down and restart your computer for all changes to take effect.

Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files are loading successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF. See “Understanding the Adapter LEDs and Labels” on page 5-13.

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If you experience problems go to Chapter 5, “Problem Solving.”

For information concerning NetWare server error messages, see Appendix H, “Novell NetWare Server and LAN Client Driver Messages.”

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Novell NetWare 4.1x Server

Before you start this installation, get the latest level of patches from Novell and install them before beginning this procedure.

If the Novell NetWare server is not installed on your machine, follow these instructions. If it is installed, follow the instructions in “Server Driver Installation in Existing NetWare 4.1x Server” on page 4-11.

Changes from the usual NetWare installation are necessary because this driver is written to a new specification level that requires new NetWare loadable modules (NLMs). The installation program is not aware of this, though, and these NLMs must be loaded during installation of the server device driver and after the server installation.

Note: A message referring to protected-mode BIOS access might appear before installation of Novell patches.

Also, refer to “Operating and Networking System Limitations” on page C-8 for information about system restrictions and limitations.

1. Install the adapter in the server machine before installing NetWare 4.1x.
2. When you see the network driver selection panel, press the Insert (**INS**) key to install the unlisted driver.
3. Press **F3** on the next panel to specify a different directory path
4. In the dialog box entitled Specify a directory path, enter

   A:\NOVELL\NETWARE

   For CD-ROM, replace A: with X:, where X is your CD-ROM drive.
5. Follow the instructions on the following panels to complete the installation of the driver. If it is necessary to make any custom configuration changes to the driver, you can do them at this time.

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6 Log into the server as an administrative user (typically admin).

7 Insert the IBM PCI Token-Ring Adapter Diskette 3, "ODI Drivers and LAN Client (A)" in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in your CD-ROM drive.

8 Change directories into the SYS:\SYSTEM directory on the client.

9 Issue the following commands on the client: For CD-ROM, replace A: with X:, where X is your CD-ROM drive.

```
COPY IBMTRPO.LAN TRPOLAN.OLD
COPY IBMTRPO.LDI TRPOLDI.OLD
COPY A:\NOVELL\NETWARE\IBMTRPO.LAN
COPY A:\NOVELL\NETWARE\IBMTRPO.LDI
```

See Appendix G, “Novell NetWare Server and LAN Client Driver Parameters” for a complete list of parameters that can be specified on the `LOAD IBMTRPO` command in the AUTOEXEC.NCF file.

10 Installation is now complete. Shut down and restart your computer for all changes to take effect.

Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files are loading successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF. See “Understanding the Adapter LEDs and Labels” on page 5-13.

If you experience problems go to Chapter 5, “Problem Solving.”

For information concerning NetWare server error messages see Appendix H, “Novell NetWare Server and LAN Client Driver Messages.”

Server Driver Installation in Existing NetWare 4.1x Server
If Novell NetWare is already installed in your computer, perform the following steps to install the PCI Token-Ring Adapter server device driver.

Note: If you are altering the configuration of a previously loaded adapter, unload that adapter before proceeding with these instructions.

1 After installing your adapter, switch ON your computer.

2 Install any Novell patches now.

3 Insert the IBM PCI Token-Ring Adapter Diskette 3, "ODI Drivers and LAN Client (A)" in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in your CD-ROM drive.

4 Issue the command LOAD INSTALL on the server

5 Select **Driver Options**.

6 Select **Configure Network Drivers**.

7 Select **Select drivers**.

8 On the next panel, press the Insert (**INS**) key to install the unlisted driver.

9 Press **F3** on the next panel to specify a different directory path

10 In the dialog box entitled Specify a directory path, enter

A:\NOVELL\NETWARE

For CD-ROM, replace A: with X:, where X is your CD-ROM drive.

11 Follow the instructions on the following panels to complete the installation of the driver. If it is necessary to make any custom configuration changes to the driver, you can do them at this

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time. Installation is now complete. Shut down and restart your computer for all changes to take effect.

Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files are loading successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF. See “Understanding the Adapter LEDs and Labels” on page 5-13.

If you experience problems go to Chapter 5, “Problem Solving.”

For information concerning NetWare server error messages, see Appendix H, “Novell NetWare Server and LAN Client Driver Messages.”

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OS/2 NDIS 2 Device Driver Using MPTS

MPTS is the Multiple Protocol Transport Services.

1. Start MPTS by performing either of the following actions:
   - From the OS/2 desktop, double-click the MPTS icon.
   - From an OS/2 window, go into the IBMCOM subdirectory and enter **mpts** at the OS/2 prompt.
2. Select **OK** on the MPTS logo panel.
3. Select **Install**. You will be prompted for the source of the .NIF file. Enter **A:** when using diskette; if you are using CD-ROM, enter **X:** where **X** is your CD-ROM drive. Select **OK** once the Installation Complete for PCI Token-Ring Adapter message appears. You will return to the main menu.
4. Select **Configure** in the MPTS dialog box.
5. On the Configure panel, make sure that **LAN adapters and protocols** is preselected and then select **Configure** at the bottom of the panel.
6. In the Configuration panel, in the Network Adapters group box, select **IBM PCI Token-Ring Adapter (IBMTRP.OS2)** and select **ADD**.

   Note: You can edit parameter settings for this adapter. Highlight **IBM PCI Token-Ring Adapter** in the Current Configuration list box and select **Edit**.
7. In the Protocols list box, select the protocols used by your network application. Highlight each protocol and select **ADD**. If you are not sure which ones to use, select **IBM IEEE 802.2** and **IBM OS/2 NetBIOS** protocol drivers or ask your network administrator.

   The protocol drivers you have selected will appear under the adapter driver name in the Current Configuration list box.

Note: You can edit parameter settings for the protocols. Highlight a protocol and select **Edit**.

8 Select **OK** when you have finished selecting and editing protocols in the MPTS Configuration panel.

9 Select **Close** on the Configure panel.

10 Select **Exit** in the MPTS dialog box.

11 Select **Exit** on the Update CONFIG.SYS panel to update the CONFIG.SYS file.

12 Select **OK** when you get the message that the CONFIG.SYS has been successfully updated.

13 Select **Exit** on the Exiting MPTS panel.

14 Shut down OS/2 and restart your computer to let the changes take effect. Installation is now complete.

15 At system startup, check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files loaded successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF.

  If you experience problems go to Chapter 5, “Problem Solving.”

For information concerning NDIS driver error messages, see Appendix F, “NDIS 2 Device Driver Messages.”

OS/2 NDIS 2 Device Driver Using LAPS

Installing the IBM OS/2 Fix for PCI Support

You must have OS/2 Version 2.11 or higher.

If your system uses OS/2 Version 3 (Warp) or higher, skip to installation step 1. Otherwise, you will need the software fix that supports shared interrupts on PCI system buses. In some computers, if this fix is not installed when the PCI Token-Ring Adapter driver is initialized, the driver might fail to bind to the network.

For OS/2.11, you must obtain an updated OS/2 loader, which is available in the latest OS/2 fix pack. If you have installed an OS/2 fix pack that is level XR_A058 or higher, you already have the fix.

You can obtain OS/2 fix packs and service packs from one of the following sources:

- Phone the IBM Personal Software Products service center (1-800-992-4777 in the United States and 1-800-IBM-SERV, 1-800-423-7678, in Canada). For the OS/2 2.11 fix pack, request APAR PJ14230. For the OS/2 service pack, request service pack XR06200.
- The IBM Software Service FTP site

  `ftp://service.boulder.ibm.com/ps/products/os2/fixes/v2.1x/`

After you obtain and install the fix, continue with the following steps to install the adapter driver.

Installation

1. Insert Diskette 2, "NDIS Drivers" in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in your CD-ROM drive.
2. Enter **laps** at the OS/2 prompt. LAPS is usually located in the \IBMCOM subdirectory on the boot drive.

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3 Select **Install**. You will be prompted for the source of the .NIF file. Enter **A:** when using diskette; when using CD-ROM, substitute the drive letter of your CD-ROM for A. Select **OK** once the Installation Complete for PCI Token-Ring Adapter message appears. You will return to the main menu.

4 Select **Configure** and then, on the Select a Configuration option menu, make sure that **Configure LAN Transport** is highlighted. Select **Continue**. You will now be in the Configuration Workstation panel.

5 From the Network Adapters group box, select **IBM PCI Token-Ring Adapter (IBMTRP.OS2)**. Then, select **Add**.

Note: You can edit parameter settings for this adapter. Select **PCI Token-Ring Adapter** in the Current Configuration box and select **Edit**. See Appendix E, “NDIS 2 Device Driver Parameters.”

6 In the Protocols list box, select the protocols used by your network application. Highlight each protocol and select **ADD**. If you are not sure which ones to use, select **IBM IEEE 802.2** and **IBM OS/2 NetBIOS** protocol drivers or ask your network administrator.

The protocol drivers you have selected will appear under the adapter driver name in the Current Configuration list box.

Note: You can edit parameter settings for the protocols. Highlight a protocol and select **Edit**.

7 Select **OK** when you have completed your selections for the adapter. You will now return to the main menu. Select **Exit** for the changes to take effect.

8 Select **Exit** on the IBM logo panel.

9 You will see messages regarding updates to the CONFIG.SYS file. Make sure that the correct drive and directory for the CONFIG.SYS file are specified, and click **Continue**.

10 Exit the program. Select **OK** when asked if you want CONFIG.SYS, STARTUP.CMD, and PROTOCOL.INI updated.

11 Select **Exit** on the Exiting LAPS window.

12 Installation is now complete. Shut down and restart your computer for all changes to take effect.

13 Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files are loading successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF.

  If you experience problems, go to Chapter 5, “Problem Solving.”

For information concerning NDIS driver error messages, see Appendix F, “NDIS 2 Device Driver Messages.”

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OS/2 NDIS 2 Device Driver Using Other Installation Programs

Installing the IBM OS/2 Fix for PCI Support

You must have OS/2 Version 2.11 or higher.

If you are using IBM OS/2 Version 3 (Warp) or Version 4 (Warp), skip directly to step 1. Otherwise, you will need the software fix that supports shared interrupts on PCI system buses. In some computers, if this fix is not installed when the PCI Token-Ring Adapter driver is initialized, the driver might fail to bind to the network.

If you use OS/2 Version 2.11, you must obtain an updated OS/2 loader, which is available in the latest OS/2 fix pack. If you have installed an OS/2 fix pack that is level XR_A058 or higher, you already have the fix.

You can obtain OS/2 fix packs and service packs from one of the following sources:

- Phone the IBM Personal Software Products service center (1-800-992-4777 in the United States and 1-800-IBM-SERV, 1-800-423-7678, in Canada). For the OS/2 2.11 fix pack, request APAR PJ14230. For the OS/2 service pack, request service pack XR06200.
- The IBM Software Service FTP site

  `ftp://service.boulder.ibm.com/ps/products/os2/fixes/v2.1x/`

Note: After you obtain and install the fix, continue with the following steps to install the adapter driver.

Installation

1. Insert Diskette 2, "NDIS Drivers", in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in the CD-ROM drive.

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2 Use your product documentation to install the driver (IBMTRP.OS2), which is located in the root directory on both the diskette and CD-ROM.

3 Modify the parameters if needed. See Appendix E, “NDIS 2 Device Driver Parameters.”

IBM TCP/IP for OS/2 and Warp Connect are examples of products that provide driver installation programs.

4 Installation is now complete. Shut down and restart your computer for all changes to take effect.

5 Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files load successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF.

If you experience problems go to Chapter 5, “Problem Solving.”

For information concerning NDIS driver error messages, see Appendix F, “NDIS 2 Device Driver Messages.”

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OS/2 Novell NetWare Requester

Installing the IBM OS/2 Fix for PCI Support

You must have OS/2 Version 2.11 or higher.

If you are using IBM OS/2 Version 3 (Warp) or Version 4 (Warp), skip directly to step 1 on page 4-21. Otherwise, you will need the software fix that supports shared interrupts on PCI system buses. In some computers, if this fix is not installed when the PCI Token-Ring Adapter driver is initialized, the driver might fail to bind to the network.

If you use OS/2 Version 2.11, you must obtain an updated OS/2 loader, which is available in the latest OS/2 fix pack. If you have installed an OS/2 fix pack that is level XR_A058 or higher, you already have the fix.

You can obtain OS/2 fix packs and service packs from one of the following sources:

- Phone the IBM Personal Software Products service center (1-800-992-4777 in the United States and 1-800-IBM-SERV, 1-800-423-7678, in Canada). For the OS/2 2.11 fix pack, request APAR PJ14230. For the OS/2 service pack, request service pack XR06200.
- The IBM Software Service FTP site

  `ftp://service.boulder.ibm.com/ps/products/os2/fixes/v2.1x/`

Note: After you obtain and install the fix, continue with the following steps to install the adapter driver.

Installation

Note: Before installation, copy IBMTRPO.SYS from your IBM PCI Token-Ring Adapter CD-ROM or Diskette 3, "ODI Drivers and LAN Client (A)" to the root directory of your Novell NetWare Requester source files.

To install the driver on an OS/2 workstation, perform the following steps:

1. Refer to the workstation basics and installation manuals from Novell to begin. When a dialog box titled Requester Installation appears during the installation process, continue with the following steps.

2. If you are installing the NetWare OS/2 Requester on a workstation, select **Edit CONFIG.SYS and Copy All Files...**. If the NetWare OS/2 Requester is already installed on the workstation and only a driver update is needed, then select **Only Edit CONFIG.SYS...**.

3. On the next panel, specify the name of the IBM PCI Token-Ring Adapter driver—IBMTRPO.SYS.

4. When you get to the panel labeled "Copy ODI LAN Driver files," select **Copy only the default driver**.

5. Continue with the installation, following the instructions on the panels.

6. When Installation Complete appears in the Novell NetWare OS/2 Requester window, go to the Configuration menu and select **This workstation...**.

7. Click **Edit** to accept the default location for the NET.CFG file.

8. In the edit box titled Current NET.CFG File Contents, type the following lines:

```
link driver IBMTRPO
  SLOT 10001
link support
  BUFFERS 8 4096
```

Notes:

a. See Appendix I, "Novell NetWare DOS and OS/2 ODI Driver Parameters" for a complete list of parameters that you can specify in the NET.CFG file.

b. To enable source routing, changes will have to be made to the CONFIG.SYS file. Refer to Novell's *Workstation for*

OS/2 manual for instructions on how to enable source routing.

c. The lines in the NetWare Requester section of the CONFIG.SYS file must be in a certain order. Do not reorder the lines in this section of CONFIG.SYS. Refer to the Novell manuals for more information.

9 Click **Save** to complete the Novell NetWare OS/2 Requester installation.

10 Reboot the computer in order to make the changes take effect.

Note: To make changes in the NetWare OS/2 Requester configuration, double-click the Novell icon on the desktop. Double-click the Install icon in the Novell window. Go to the Configuration and select **This workstation...**. Make sure that the correct NET.CFG is shown in the next dialog box and click **Edit**. Edit the NET.CFG file in the edit box titled Current NET.CFG File Contents. When the changes are complete, click on **Save**. It is necessary to reboot the computer in order to make the changes take effect.

11 Installation is now complete. Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files loaded successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF.

If you experience problems, go to Chapter 5, “Problem Solving.”

For information concerning Novell NetWare server messages, see Appendix H, “Novell NetWare Server and LAN Client Driver Messages.”

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DOS NDIS 2 Device Driver Using Other Installation Programs

See “Operating and Networking System Limitations” on page C-8 for information about system restrictions and limitations.

1. Insert Diskette 2, "NDIS Drivers", in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in the CD-ROM drive.

2. Use your product documentation to install the driver (IBMTRP.DOS). This driver is located in the \dos subdirectory on both diskette and the CD-ROM.

3. Modify the parameters, if needed. See Appendix E, “NDIS 2 Device Driver Parameters.”

   Note: If you use Microsoft Windows for Workgroups and want to configure the NetAddress parameter for the NDIS device driver, remember to enclose the address in double quotes (" "). The NetAddress parameter is used to set a locally administered address for the adapter.

4. Reboot the computer to load the drivers.

5. Installation is now complete. Shut down and restart your computer for all changes to take effect.

6. Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

   - The device driver files load successfully. There are no error messages. If error messages are displayed or if you do not see messages that indicate that the drivers have been installed, go to “Start of Troubleshooting Process” on page 5-2.
   - The adapter LEDs indicate normal operation: Green ON, Amber OFF.

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If you experience problems go to Chapter 5, “Problem Solving.”

For information concerning NDIS driver error messages, see Appendix F, “NDIS 2 Device Driver Messages.”

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DOS Novell NetWare Requester (16-bit)

It is recommended that you use LAN Client (Client32) whenever possible as a more effective tool, instead of DOS, 16-bit Novell NetWare Requester.

The DOS, 16-bit NetWare Requester environment supports access to servers running Novell NetWare 3.11 or higher.

To install the IBMTRPO.EXE ODI driver on a DOS computer, perform the following steps:

Note: Consult your Novell NetWare documentation to create these diskettes from a Novell NetWare server.

1. Insert the NetWare Client for DOS and MS Windows Disk 1 in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in the CD-ROM drive.

2. At the command prompt, type **a:** and then press **Enter**. Next, type **install** and then press **Enter**.

   For CD-ROM replace a: with X: where X is the drive of your CD-ROM.

3. Follow the instructions as they appear. In step 5, select the driver for your network board. Scroll down through Network Boards, highlight **Other Drivers**; then press **Enter**.

4. Insert Diskette 3, "ODI Drivers and LAN Client (A)" in drive A. Specify the location of the NetWare DOS Requester driver for the PCI Token-Ring Adapter and press **Enter**. These files are usually at A:\NOVELL\DOS. (Or they are at X:NOVELL\DOS for the CD-ROM version.)

5. Highlight **IBM PCI Token-Ring Adapter** and press **Enter**.

6. At this time you can change the default parameters. When you finish making any desired changes, press **F10**. Appendix I, “Novell NetWare DOS and OS/2 ODI Driver Parameters” contains the parameters that can be configured in the NET.CFG file.

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7 Follow the instructions presented to finish the installation.

Note: If source routing is required, edit the STARTNET.BAT file that is in the client directory (usually C:\NWCLIENT) and add the following line after the IPXODI statement: C:\NWCLIENT\ROUTE

8 Shut down and restart your computer for all changes to take effect.

9 Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files load successfully. There are no error messages. If error messages are displayed or if you do not see messages that indicate that the drivers have been installed, go to “Start of Troubleshooting Process” on page 5-2.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF.

If you experience problems go to Chapter 5, “Problem Solving.”

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DOS LANManager with NDIS 2

1 If Microsoft LANManager Version 3.0 or higher is not already installed, install the program now.

Refer to the *Microsoft LANManager Installation and Configuration Guide* for instructions on how to install the program.

2 Start the Microsoft LANManager Setup program.

Refer to the *Microsoft LANManager Installation and Configuration Guide* for instructions on how to start the Setup program.

3 If the Workstation Configuration window appears, select the **Add New Config** option on that window. Otherwise, continue with step 4.

4 Select **Other Driver** in the Network Adapter Drivers window.

5 When prompted, insert Diskette 2, "NDIS Drivers" in the diskette drive and press **Enter**. Do not enter a path name on the prompt window. If you are using the CD-ROM version of this product, insert the CD-ROM in your CD-ROM drive and press **Enter**. Do not enter a path name on the prompt window.

A message will be displayed to indicate when the NDIS device driver (IBMTRP.DOS) has been copied. Press **Enter** to continue.

6 Select a protocol in the Network Protocols window. Microsoft LANManager requires the NetBEUI driver for NetBIOS support.

7 Follow the instructions on the panels to complete the configuration. See Appendix E, “NDIS 2 Device Driver Parameters” for descriptions of the parameters.

8 Reboot the computer to load the IBM PCI Token-Ring Adapter driver and the protocol driver. Look for messages that indicate that the drivers have been installed.

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9 Installation is now complete. Shut down and restart your computer for all changes to take effect.

Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files loaded successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF.

  If you experience problems, go to Chapter 5, “Problem Solving.”

For information concerning NDIS driver error messages, see Appendix F, “NDIS 2 Device Driver Messages.”

Windows NT Version 3.51 with NDIS 3.1

Note: Refer to the *Microsoft Windows NT System Guide* for the general procedure regarding installation of network drivers for Windows NT. The following instructions should apply in most circumstances.

1. Be sure that the network card is physically installed and that Windows NT 3.51 is running.
2. Log on to Windows NT as an administrator.
3. From the **Main** program group within the Program Manager, find and double-click the **Control Panel** icon.

   Note: If the Control Panel icon is not displayed, select **MS-DOS Command Prompt** to display the command-line prompt, and enter **Control** on the command line.
4. In the Control Panel window, double-click the **Network** icon.
5. In the Network control panel, double-click **Add Adapter**.
6. In the Add Network Adapter dialog box, click the drop-down list for Network Adapter Card. Scroll down the list and select **<Other> Requires disk from manufacturer**. Then, select **Continue**.
7. If you are using Diskette 2, insert Diskette 2, "NDIS Drivers" in drive A and enter the path, **A:**. If you are using the CD-ROM version of this product, insert the CD-ROM in your CD-ROM drive and enter the path, **X**:, where **X** is your CD-ROM drive.
8. Select **OK** to accept the drive and path information.
9. In the Select OEM Option dialog box, select **IBM PCI Token-Ring Adapter**.

   Several work-in-progress panels are displayed, indicating that the driver and its supporting files are being copied to your computer's hard disk.

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10 The Network Control panel is displayed again. There should be an entry for the IBM PCI Token-Ring Adapter in the Installed Adapter Cards list box.

Note: To change default values for an adapter, select that adapter on the Installed Adapters list box, and then select **Configure**. Make the necessary changes and select **OK**.

11 Select **OK** at the top right to complete the installation.

Note: If TCP/IP is installed on the computer and the IP Address and Subnet Mask Address information was not entered during installation, you will now see the TCP/IP configuration panel. Enter all necessary information and select **OK**.

12 The message **Your network settings have changed. You will need to exit and restart Windows NT so that the new settings can take effect** will be displayed. Select **Restart now** in order to have Windows NT automatically restart your computer.

13 Installation is now complete.

14 Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files loaded successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF.

If you experience problems, go to Chapter 5, “Problem Solving.”

Windows NT Version 4.0 with NDIS 4.0

Refer to the *Microsoft Windows NT System Guide* for the general procedure regarding installation of network drivers for Windows NT. The following instructions should apply in most circumstances.

1. Ensure that the network card is physically installed and that Windows NT 4.0 is running.
2. Log on to Windows NT as an administrator.
3. Select **Start ► Settings ► Control Panel**.
4. From the Control Panel window, double-click the **Network** icon.
5. Select the **Adapters** tab.
6. Select **Add**.
7. Windows NT will display a dialog box that includes a list of network adapters. Click on **Have Disk**.
8. If you are using Diskette 2, "NDIS Drivers", insert the diskette in drive A and select **OK**. If you are using the CD-ROM, insert the CD-ROM in the CD-ROM drive, and type **X**:, where **X** is your CD-ROM drive, and select **OK**).
9. In the Select OEM Option dialog box, select **IBM PCI Token-Ring Adapter**.

   Several work-in-progress panels are displayed, indicating that the driver and its supporting files are being copied to your computer's hard disk.
10. The Network Control panel is displayed again. There should be an entry for the IBM PCI Token-Ring Adapter in the Installed Adapter Cards list box.

    Note: To change default values for an adapter, select that adapter on the Installed Adapters list box, and then select **Properties**. Make the necessary changes and select **OK**.

11 Select **Close** to complete the installation.

Note: If TCP/IP is installed on the computer and the IP Address and Subnet Mask Address information was not entered during installation, you will now see the TCP/IP configuration panel. Enter all necessary information and select **OK**.

12 The message **Your network settings have changed. You will need to exit and restart Windows NT so that the new settings can take effect** will be displayed. Select **Restart now** in order to have Windows NT automatically restart your computer.

13 Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully:

- The device driver files loaded successfully. There are no error messages.
- The adapter LEDs indicate normal operation: Green ON, Amber OFF.

If you experience problems go to Chapter 5, “Problem Solving.”

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Remote Unattended Installation of Windows NT

Instructions for this environment are on the Internet. These instructions are maintained by the IBM Network Environment Support Team and can be found at the following URL:

`http://www.networking.ibm.com/nes/nesrui.htm`

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Windows 95 with NDIS 3.1

Note: The procedure in this section is for installation on Windows 95 GA and OEM Service Releases up to OSR2. Italisized portions indicate differences in procedure for OSR2.x.

If Windows 95 is already installed

1. Physically install the IBM PCI Token-Ring Adapter in the computer, and turn on the machine.

2. Windows 95 will detect the new hardware and bring up a dialog box to allow a choice of drivers. Select **Driver Diskette from Hardware Manufacturer** and then select **OK**.

   Certain versions of Windows 95 will bring up an Update Device Driver Wizard dialog box which states that "This wizard will complete the installation of: PCI Token Ring Controller."

3. Insert Diskette 2, "NDIS Drivers" or the setup CD-ROM into the appropriate drive.

4. Windows 95 will prompt for the location of the driver installation media. If you are installing from a disk, type: A:\ and then select **OK**. If you are installing from CD-ROM, type **X**:\ where **X** is the letter of your CD-ROM drive.

5. Select **Next >** to search for the drivers. Windows 95 will then search the disk to find an appropriate driver for the adapter. A dialog will be displayed that states `Windows has found the following updated driver for this device`. Select **Finish** to continue.

   Note: If the search fails, select **Other Locations...**. If you are installing from a diskette, type **A:**, then press **ENTER**. If you are installing from CD-ROM, type **X**:\ where **X** is the letter of your CD-ROM drive. Select **OK**, and then select **Finish**.

6. At this point, Windows may prompt you for network names. Type in your computer's name and workgroup. Consult a system administrator if you do not know this information. Select **OK** to continue.

7 The driver files will be copied at this point. Windows may prompt you for the Windows 95 Installation CD-ROM in order to install its default network protocols and services. Follow the directions on the windows.

Certain versions of Windows 95 may prompt you again for the location of the driver files. Type in the appropriate location and click **OK** *to continue.*

8 After the files have been copied, a dialog box will display the following message: `In order to finish setting up your new hardware, you must restart your computer.` Remove the driver diskette or CD-ROM from the computer and select **Yes**.

9 The system will be rebooted.

10 When the system restarts, check to make sure that the network connection is active, and that the status LEDs on the back of the adapter show normal operation (Green ON, Amber OFF).

11 Installation is now complete.

First-Time Installation of Windows 95 with the IBM PCI Token-Ring Adapter

If Windows 95 is installed on a machine with the IBM PCI Token-Ring Adapter already physically installed in the machine, the adapter may not be detected properly. The following procedure should correct the problem.

1 Insert Diskette 2, "NDIS Drivers" or the setup CD-ROM into the appropriate drive.

2 Click the **Start** button, and select **Settings ▸ Control Panel**. The Network Control Panel will be displayed.

3 Inside the Control Panel window, double-click the **System** icon.

4 Select the **Device Manager** tab.

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5 Within the device manager, expand the Other Devices section by clicking the + icon that appears to the left of the words **Other Devices**. There should be an entry for PCI Token-Ring Controller. Select the entry for **PCI Token-Ring Controller** and then select **Properties**.

6 Select the **Driver** tab within the PCI Token Ring Controlled properties dialog box.

7 Select the **Change Driver...** button.

Note: In some versions of Windows 95, this may be called the **Update Driver...** button.

8 In the Select Hardware Type dialog box, select **Network Adapter**.

Some versions of Windows 95 will now display the Update Device Driver Wizard. Select **Next** to search for the drivers. Windows 95 will then search the disk to find an appropriate driver for the adapter. A dialog will be displayed that states `Windows has found the following updated driver for this device`. Select **Finish** to continue.

Note: If the search fails, select **Other Locations...**. If you are installing from a diskette, type **A:** and then press **ENTER**. If you are installing from CD-ROM, type **X**:\ where **X** is the letter of your CD-ROM drive. Select **OK**, and then select **Finish** and skip to step 13.

9 In the Select Device dialog box, select **Have Disk...**.

10 Windows 95 will prompt for the location of the driver installation media. If you are installing from a diskette, type in A:\ and then select **OK**. If you are installing from CD-ROM, type **X**:\ where **X** is the letter of your CD-ROM drive.

11 Windows will display a list of compatible devices. Make sure that **IBM PCI Token-Ring Adapter** is selected; then, select **OK**.

12 Windows will return to the PCI Token-Ring Controllers properties dialog box. Select **OK** to continue.

13 At this point, Windows may prompt you for network names. Type in your computer's name and workgroup. Consult a system administrator if you do not know this information. Select **OK** to continue.

14 The driver files will be copied at this point. Windows may prompt you for the Windows 95 Installation CD-ROM in order to install default network protocols and services. Follow the directions provided on the window.

15 Windows 95 may display a dialog at this point that warns you that the IBM PCI Token-Ring Controller has a ROM. Ignore this message and click **Test** to continue. Skip step 16.

16 Click **OK** in the Device Manager.

17 Remove the driver diskette or CD-ROM; reboot Windows 95.

18 When the system restarts, check to make sure that the network connection is active, and that the status LEDs on the back of the adapter show normal operation (Green ON, Amber OFF).

19 Installation is now complete.

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Novell IntranetWare Client for Windows 95

(Formerly known as NetWare Client 32 for Windows 95.)

Note: You will need the Windows 95 diskettes or CD-ROM to complete this installation.

For CD-ROM replace a: with X: where X is the drive of your CD-ROM.

See the figures on the following pages or other Novell documentation for instructions for accessing the IntranetWare Client software and running the setup program.

1. When you reach the Select Drive panel in the setup program, select **Have disk...**.
2. Insert Diskette 3, "ODI Drivers and LAN Client (A)" in drive A and type **a:\novell\netware**. Click **OK**.
3. On the Select Device panel select the appropriate adapter. Click **OK**.
4. You will be prompted to insert Windows 95 diskettes or CD-ROM.
5. When you get back to the IntranetWare Client Installation panel, remove the diskette from drive A and select **Reboot**.
6. Installation is now complete.
7. Check for the following conditions to determine whether the adapter is working correctly and whether installation has been completed successfully.
   - The device driver files loaded successfully. There are no error messages.
   - The adapter LEDs indicate normal operation: Green ON, Amber OFF.

   If you experience problems, go to Chapter 5, “Problem Solving” on page 5-1.

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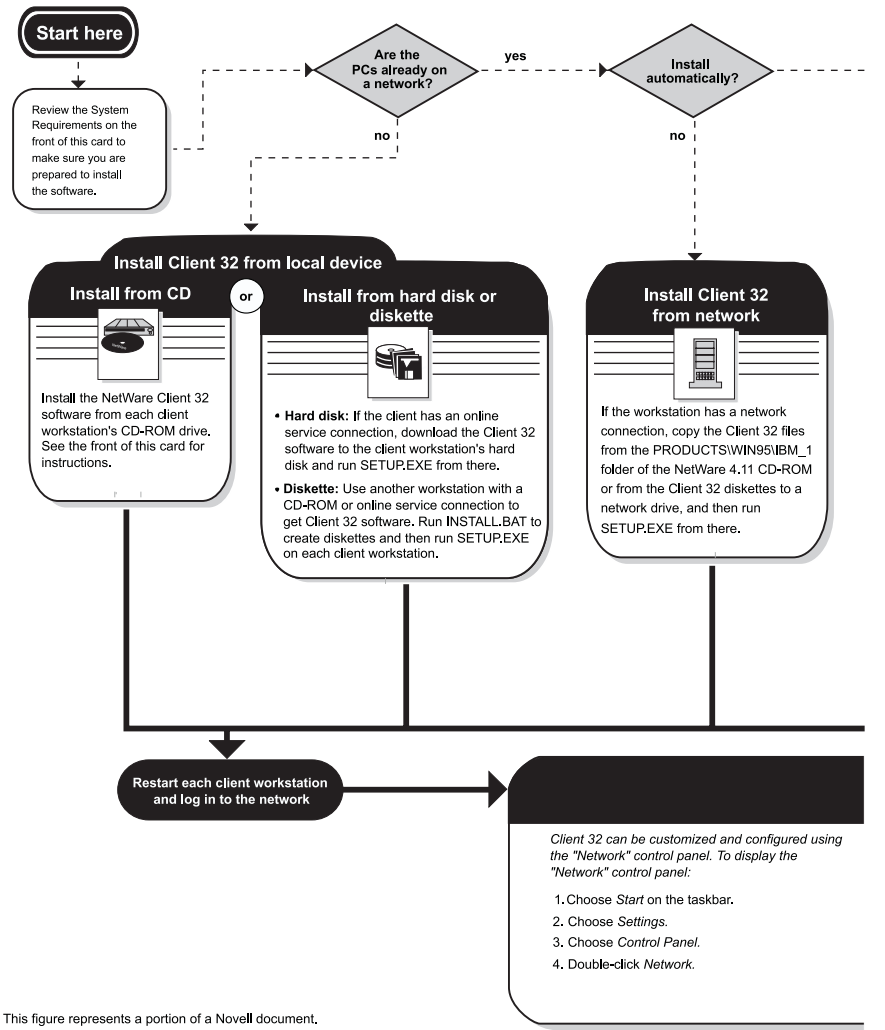
Installation: NetWare Client



This figure represents a portion of a Novell document.
NetWare® Client™ 32™ for Windows* 95*,
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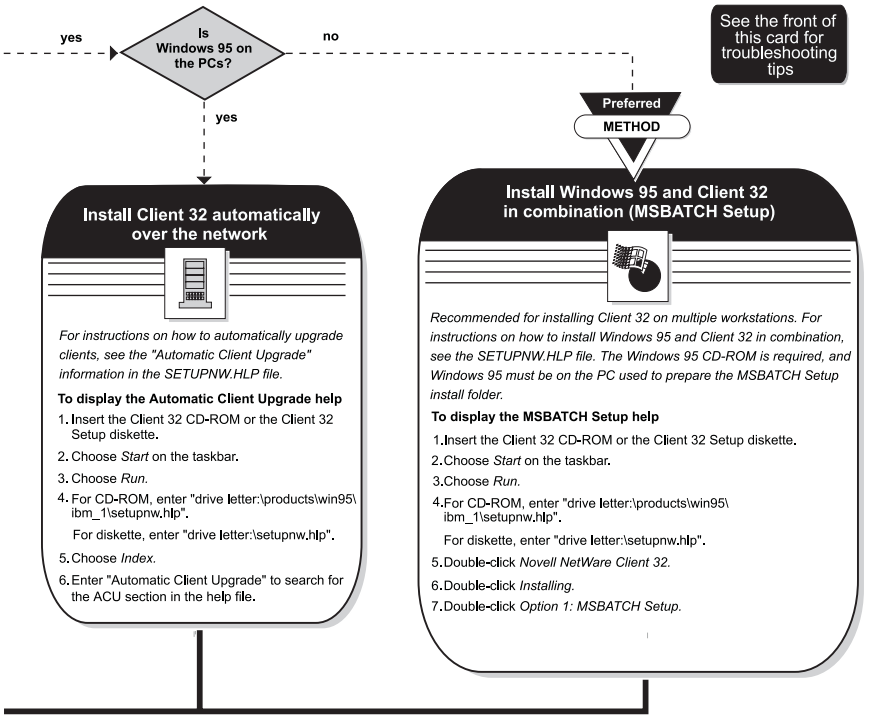
32 for Windows 95



Customize Client 32

Each network component can be configured. For example, to configure the "Novell NetWare Client 32" component:

1. Display the *Network* control panel.
2. Choose *Novell NetWare Client 32.*
3. Choose *Properties.*
4. Enter or change values as appropriate.
5. Choose *OK.*
6. Choose *OK* on the *Network* control panel.

Client 32 also has additional functionality (such as SNMP and NetWare\IP™) that you can add. These are added using the "Network" control panel. For detailed instructions, see the SETUPNW.HLP file.

Client 32 can also be configured using the System Policy Editor. For more information, see the NWCFG95.HLP file.

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Remote Unattended Installation of Windows 95

Instructions for this environment are on the Internet. These instructions are maintained by the IBM Network Environment Support Team and can be found at the following URL:

`http://www.networking.ibm.com/nes/nesrui.htm`

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Windows for Workgroups with NDIS 3

Note: Refer to the *Microsoft Windows For Workgroups System Guide* for the general procedure regarding installation of network drivers for Windows for Workgroups.

1. Insert Diskette 2, "NDIS Drivers" in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in your CD-ROM drive.
2. Double-click the Network group icon from the Program Manager window.
3. Double-click the Network Setup icon.
4. Click **Drivers** and then **Add Adapter...**.
5. Click **Unlisted or updated network adapter** and then **OK**.
6. For diskette, enter **A:\WFW**. For CD-ROM, enter **X:\WFW**, where **X** is your CD-ROM drive.
7. Click **IBM PCI Token-Ring Adapter, NDIS 2/3**. Click **OK**.
8. Click **CLOSE**.
9. Click **OK**.
10. You will be prompted to reinstall specific network-related files. Reinstall them as needed.
11. You will also be prompted to insert the Windows for Workgroups program application diskettes or CD-ROM. Follow the instructions.
12. Select **OK** for any messages regarding updates to the SYSTEM.INI and PROTOCOL.INI files.
13. When prompted to restart your computer, click **RESTART COMPUTER**.

14 Windows for Workgroups will automatically restart your computer and the driver will be loaded.

15 At system startup, check for the following conditions to determine whether you have successfully installed the adapter:

- The device driver files loaded successfully. There are no error messages.
- The adapter LEDs indicate normal operation. See "Understanding the Adapter LEDs and Labels" on page 5-13.
- You are able to log on and communicate with the network.

If you experience problems, go to Chapter 5, "Problem Solving."

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Chapter 5. Problem Solving

This chapter contains procedures that help you troubleshoot problems and optimize performance with an IBM PCI Token-Ring Adapter.

The following sections are presented:

- "Start of Troubleshooting Process" on page 5-2
- "Solving an Adapter Communication Problem" on page 5-3
- "Starting DLS in DOS Memory-Constrained Environments" on page 5-4
- "System PCI Performance Information" on page 5-4
  - "Latency Timer" on page 5-5
  - "ISA Device Impact on PCI Performance" on page 5-8
- "BIOS Updates" on page 5-19
- "EnableTxEofInt Optimization" on page 5-8
- "Other Performance Enhancements" on page 5-9
- "Expansion ROM and PCISETUP" on page 5-10
- "Solving Problems with Driver Installation" on page 5-11
- "Understanding the Adapter LEDs and Labels" on page 5-13
- "Understanding the Adapter Labels" on page 5-16
- "Adapter Diagnostics" on page 5-17
- "Symptoms of Systems Restricted to One IBM PCI Token-Ring Adapter" on page 5-21
- "Interrupt Assignment and Interrupt Sharing" on page 5-6
- "Questions, Problems?" on page 5-21
  - "IBM Product Support" on page 5-21
  - "IBM PC Company BBS" on page 5-22
  - "World Wide Web" on page 5-22

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Start of Troubleshooting Process

If you were not able to complete the installation procedures successfully or the IBM PCI Token-Ring Adapter is not operating correctly, use the following steps to start the troubleshooting process:

- If yours is the first station on the ring, make sure that AutoSense is disabled.
- Use Table 5-1 on page 5-3 to locate the symptom that best describes the problem.

Table 5-1. Symptoms and Recommended Procedures

Symptom	Solution
Problem with loading the drivers	"Solving Problems with Driver Installation" on page 5-11
Problem indicated by the adapter LEDs	"Understanding the Adapter LEDs and Labels" on page 5-13
Problem with the adapter operation	"Adapter Diagnostics" on page 5-17
Memory bandwidth restrictions	"Symptoms of Systems Restricted to One IBM PCI Token-Ring Adapter" on page 5-21
Unable to communicate with the network	"Solving an Adapter Communication Problem"
Error SYS0054 when attempting to start DOS LAN Services	"Starting DLS in DOS Memory-Constrained Environments" on page 5-4
Performance tuning	"System PCI Performance Information" on page 5-4

Solving an Adapter Communication Problem

Check the following list of possible causes if the adapter is unable to communicate on the network but other stations on the network are able to communicate:

- Verify that the appropriate adapter cable is connected to the adapter and to the network. See "Adapter Cable" on page 2-5 for a description of the compatible adapter cables.
- Verify that the adapter is firmly seated in the expansion slot.
- Verify that the setting for the adapter's Data Rate option matches the data rate of the network, or that the data rate has been set to AutoSense if yours is not the first station on the ring. Run the software configuration again to determine the current setting.
- Replace the adapter cable with one that is known to be good.
- Verify that the Expansion ROM is on so that PCISETUP can run.

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Starting DLS in DOS Memory-Constrained Environments

This section applies to DOS and DOS/Windows environments only.

If you receive the error code of SYS0054 as a result of starting DOS LAN Services with the command:

```
NET START
```

either from the command line or the AUTOEXEC.BAT file, the following commands should be used instead to start DOS LAN Services.

```
NET START NETBIND
NET START NETBEUI
```

And one of the following commands, based on the requester being used.

```
NET START FULL
NET START BASIC
NET START VIRTUAL
```

These commands can be entered from either the DOS command line or from within a .BAT file such as AUTOEXEC.BAT.

System PCI Performance Information

Most PC systems are tuned for CPU and display performance benchmarks. The systems are optimized for CPU accesses to memory and video buffers (both subordinate devices). This leaves PCI master devices like the IBM PCI Token-Ring Adapter susceptible to being locked out of memory.

A program, called PCISETUP, is provided with this adapter to adjust the CPU to PCI access buffering, which corrects this problem. This program is resident in the adapter ROM and is automatically run each time you boot your computer.

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Latency Timer

The latency timer limits the amount of time a PCI device can use to transfer data on the bus. This has a small effect on overall adapter and system performance.

On systems that automatically set the latency timer value, no change should be necessary. On systems that require manual configuration, it is suggested that the latency timer value be set to a minimum value of 64 (decimal), or X'40' (hexadecimal). This is a reasonable setting for all systems *except* on multiple PCI bus systems across a PCI-to-PCI bridge. We suggest a setting of at least 192 (decimal) or X'CO'h (hexadecimal) because the PCI-to-PCI bridge must request the main PCI bus on behalf of several PCI devices.

In no case should a non-network device driver (IDE, SCSI) have a greater latency timer value than a network device.

Refer to your system manual for information about viewing and setting the timer.

Systems Requiring Manual PCI Adapter Configuration

Some systems are electrically and physically PCI compatible, but require manual reconfiguration when adding PCI adapters. The following list names required resources. Some systems may require that only a few of these parameters be set manually.

The IBM PCI Token-Ring Adapter requires these resources:

- Adapter Enable = ON
- Bus Master Enable = ON
- I/O Location—any available 256-byte address range
- Memory Location—any available 256-byte address range
- Interrupt—Any available interrupt except 0 (IRQ0) (See “Interrupt Assignment and Interrupt Sharing” on page 5-6.)
- ROM Location—Any available 2-KB ROM address range (See “ROM Mapping” on page 5-6.)
- Latency timer—Any value above (40 hex) 64 decimal (See “System PCI Performance Information” on page 5-4.)

ROM Mapping

The following message was seen on one Gateway2000 system during the system boot sequence because all of the Shadow ROM had been disabled from the system setup utility.

```
WARNING: Insufficient PCI Memory Block
         Use Setup to increase the PCI Memory Block Size.
```

To correct this problem, follow the instructions in the system's user manual to correctly configure any required ISA adapter ROM space utilization. Leave remaining ROM address ranges enabled for use by the PCI devices.

The IBM PCI Token-Ring Adapter uses 16-KB at initialization, which reduces to 2K bytes of ROM space at run time (located somewhere between X'C0000'h and X'EFFFF'h.)

Interrupt Assignment and Interrupt Sharing

When multiple PCI adapters share an interrupt, a problem with one adapter can appear as a performance or functional problem with a different adapter. When investigating problems in a system with more than one configured PCI adapter, isolate each adapter on its own interrupt, if possible. Refer to the manual shipped with your computer. Use LANAID to view the interrupt values of the PCI Token-Ring Adapter.

Interrupt assignment and interrupt sharing are two areas in which system-adapter incompatibilities can occur. Interrupt assignment is done by the PCI initialization BIOS code, or manually on systems not providing automatic PCI configuration.

The following list describes critical factors regarding PCI interrupts:

1. The IBM PCI Token-Ring Adapter must have a PCI level-sensitive interrupt line assigned. This allows multiple devices to share the interrupt. It is not the same as ISA edge-triggered interrupts, which cannot be shared.
2. The interrupt assigned must not be shared with any ISA device. It is recommended that PCI interrupts not be shared with EISA,

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or Micro Channel adapters, although this will work in some systems.

3. We recommend that each IBM PCI Token-Ring Adapter be assigned its own interrupt, when possible. Sharing interrupts among PCI devices is allowed by the PCI specification, but some early PCI systems have bugs that can be avoided by not sharing interrupts.
4. Interrupt Request Level 0 is reserved for the system timer, and cannot be used for the IBM PCI Token-Ring Adapter.

When multiple PCI adapters share an interrupt, a problem with one adapter can appear as a functional problem with a different adapter. When debugging system problems, try to isolate each adapter on its own interrupt, when possible.

PCI Bus Parity Checking and Error Handling

The PCI specification contains parity checking for all address and data information on the PCI bus. The PCI Specification also allows the system to disable PCI Parity checking.

We suggest that for critical LAN-attached systems, PCI parity checking be enabled.

You may want to verify with your system provider that PCI parity checking, especially for all memory accesses, is provided in the system.

In addition to the PCI architected error checking, the IBM PCI Token-Ring Adapter maintains parity checking throughout the adapter's data path and buffers. This additional error checking is always enabled, even if the system error checking is disabled.

PCISETUP

The PCISETUP program is provided in the ROM on the adapter, and is also an executable program on diskette 1 or the CD-ROM for those systems in which the ROM is not able to execute.

The program looks for specific system chips based on their PCI Vendor ID and Device ID. Based on which chips are found,

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corresponding modifications are made to specific bits within that chip's PCI configuration registers, or within the PCI configuration registers. Refer to “Expansion ROM and PCISETUP” on page 5-10.

If you have a different IBM PCI adapter that requires PCISETUP installed on your machine, and you are adding the IBM PCI Token-Ring Adapter, you may need to replace the PCISETUP file installed in your system with the PCISETUP file on Diskette 1 Diagnostics and LANAID. In any case, you should use the PCISETUP file with the higher version number.

ISA Device Impact on PCI Performance

Data transfer on ISA devices is much less efficient than on PCI, EISA, or Micro Channel devices. A system with a video controller or a disk controller (or both) on the ISA bus will leave less bus bandwidth for PCI devices to use.

It is recommended that PCI video and PCI disk adapters, rather than ISA-based adapters, be used in installations requiring high-performance LAN traffic. In many cases, the effect on overall system performance is negligible. However, in some cases, high-speed graphics screen activity or extensive disk activity can restrict PCI memory transfer rates. In extreme cases, this can cause the IBM PCI Token-Ring Adapter to drop frames being transmitted or received, causing retransmission. For this reason, we recommend that you use PCI video and PCI disk adapters to handle critical LAN traffic, rather than ISA-based adapters. In some cases EISA video adapters have been shown to interfere with the proper operations of the PCI Token-Ring Adapter.

EnableTxEofInt Optimization

Transmit Complete interrupts can be disabled with this parameter.

This is not recommended for NetWare packet-burst mode or other protocols or applications that wait for Transmit Complete interrupts from each transmit request.

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Other Performance Enhancements

The default settings for the PCI Token-Ring Adapter have been chosen to maximize interoperability with various PCI systems and network configurations. In many environments, performance can be optimized by a few percent by increasing frame size for client and server. Token rings allow frame sizes as large as 18200 bytes. The larger the frame size, the more efficiently the LAN can operate. The default frame size is less than 4500 bytes for two reasons:

1. To minimize memory used for buffers.
2. To ensure interoperability with network bridges and switches that cannot handle larger frame sizes.

See Appendix E, “NDIS 2 Device Driver Parameters” or Appendix G, “Novell NetWare Server and LAN Client Driver Parameters” for the applicable device driver keywords.

Note: If these values are changed, then the MAXFRAMESIZE used by the protocol stack should be changed as well.

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Expansion ROM and PCISETUP

The adapter contains an expansion ROM that performs two functions:

1. It runs a program called PCISETUP, which modifies the BIOS setup for the adapter in specific systems.
2. It will boot (RPL) the operating system from a server, if your system is set up to boot from the LAN instead of from disk.

These functions are both enabled by default, and can be set by the diagnostics diskette or the LANAID program. When enabled, the expansion ROM will use 2 KB of system memory space per adapter. The expansion ROM is part of the adapter microcode flash memory, and can be updated by diskette.

If the adapter ROM is disabled, or if your system does not support expansion ROM, you might need to install a PCISETUP file to correct a BIOS setup problem. Use the following instructions.

DOS, Novell, Windows, or Windows 95 (adapter driver not in CONFIG.SYS)

1. Insert Diskette 1, LANAID and Diagnostics,, in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in drive D.
2. Copy A:\DIAGS\PCISETUP.EXE to the root directory of the disk from which the system boots. If you are using the CD-ROM version of this product, copy D:\DIAGS\PCISETUP.EXE.
3. Make the following line the first executable line in the AUTOEXEC.BAT file:

   ```
   PCISETUP
   ```

DOS, Novell, Windows, or Windows 95 (adapter driver in CONFIG.SYS)

1. Insert Diskette 1, LANAID and Diagnostics,, in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in drive D.

2. Copy A:\DIAGS\PCISETUP.DOS to the root directory of the disk from which the system boots. If you are using the CD-ROM version of this product, copy D:\DIAGS\PCISETUP.DOS.
3. Make the following line the first executable line in the CONFIG.SYS file:

   ```
   DEVICE=PCISETUP.DOS
   ```

OS/2

1. Insert Diskette 1, LANAID and Diagnostics,, in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in drive D.
2. Copy A:\DIAGS\PCISETUP.OS2 to the root directory of the disk from which the system boots. If you are using the CD-ROM version of this product, copy D:\DIAGS\PCISETUP.OS2.
3. Make the following line the first executable line in the CONFIG.SYS file:

   ```
   DEVICE=PCISETUP.OS2
   ```

Windows NT

1. Insert Diskette 1, LANAID and Diagnostics,, in drive A. If you are using the CD-ROM version of this product, insert the CD-ROM in drive D.
2. From the File pull-down menu, select **Run**.
3. Type A:\DIAGS\PCISETNT in the path entry field. Then, select **OK**. PCISETNT.BAT will install PCISETUP.SYS as a device driver that will be loaded each time the system is started. If you are using the CD-ROM version of this product, type D:\DIAGS\PCISETNT and select **OK**.

Solving Problems with Driver Installation

Use this procedure if you are having problems loading the IBM PCI Token-Ring Adapter drivers.

1 Ensure that you performed the installation procedures correctly.

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2 In Table 5-2, locate the row that describes the network operating system or network application on the computer and perform the recommended actions.

Table 5-2. Investigating Driver Installation Messages

Environment	Message Type and Action
Novell NetWare Server	• Message prefix IBMTRPO: See Appendix H, "Novell NetWare Server and LAN Client Driver Messages." This appendix contains explanations and recommended actions for each message. • Novell NetWare messages: Refer to your Novell NetWare documentation to determine the appropriate action
OS/2 with LAPS or MPTS	Check LAPSHIST.LOG, usually found in the subdirectory OS2\Install, and LANTRAN.LOG, usually found in the subdirectory \IBMCOM, for messages. LAN Server users can use the NET ERROR function to view the error log. • Message prefix LA1 or reference to IBMTRP: Go to Appendix F, "NDIS 2 Device Driver Messages." • LAPS messages: Refer to the documentation provided with the LAPS program for explanations and appropriate actions.
Other OS/2 stations	Refer to the documentation provided with the network operating system or network application that you used to install the adapter and protocol driver.
LAN Client	See Appendix H, "Novell NetWare Server and LAN Client Driver Messages."
DOS NDIS 2	See Appendix F, "NDIS 2 Device Driver Messages."

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Understanding the Adapter LEDs and Labels

Figure 5-1 and Table 5-3 on page 5-14 describe the LEDs and labels located on the bracket of the IBM PCI Token-Ring Adapter.

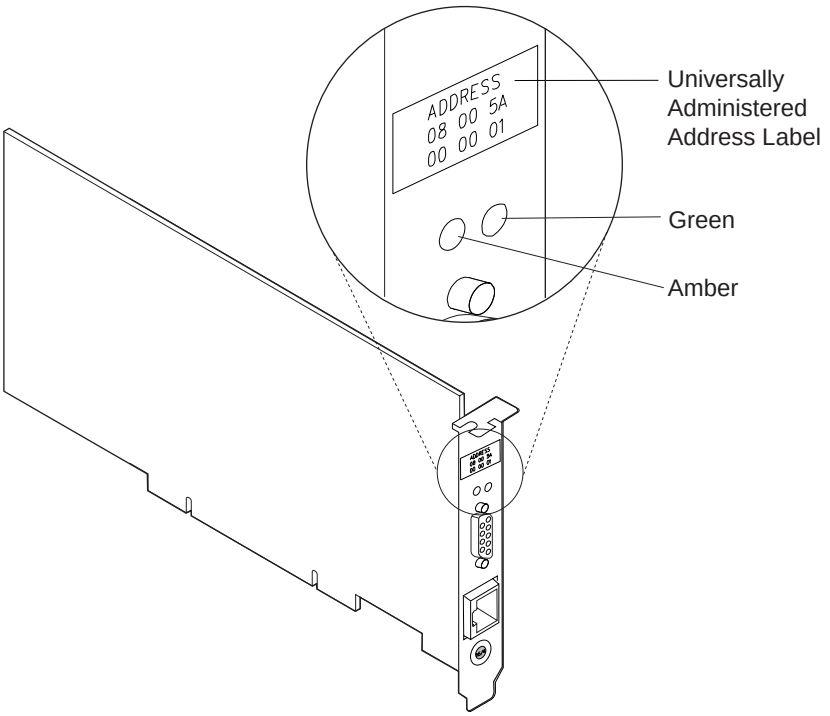

Figure 5-1. The Adapter LEDs and Labels

The LEDs provide information useful for monitoring the status of the adapter and for problem solving. If the green LED is on and the amber LED is off, the adapter is operating correctly. If the amber LED is blinking and the green LED is on, a problem with the adapter has been detected. Table 5-3 on page 5-14 indicates the sequence that will be displayed when the computer is started and the adapter reaches the open state successfully. Some of those states might be too brief to observe. Table 5-4 on page 5-15 lists LED states that indicate problems.

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Table 5-3. Startup Sequence of LED States

Amber	Green	Explanation
Blinking	Blinking	Slow blink The adapter is waiting for initialization. Fast blink (Wake on LAN only) The adapter has detected a wake-up frame and is attempting to wake up the system. If this state persists, it indicates one of the following problems: • The attached PC does not have Wake on LAN enabled. To correct this problem, power on the PC and enable the Wake on LAN feature from the power management system configuration menu. • The Wake on LAN cable is not attached correctly. To correct this problem, ensure that the Wake on LAN cable is properly attached.
Off	Off	The adapter initialization is in progress, or the computer is powered off.
Off	Blinking	The adapter did not detect any problems during its self-diagnostic tests and is waiting to open. If this LED state occurs after the adapter has been opened, this state indicates that the adapter has been closed under software control.
Off	On	The adapter is open and operating correctly.

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Table 5-4. Problems Shown by Adapter LED States

Amber	Green	Explanation and Action
On	Off	The adapter self-diagnostic tests failed or there is a problem with the adapter. **Action:** Go to "Adapter Diagnostics" on page 5-17 to test the adapter.
Blinking	Off	The adapter is closed due to an undetected error. One of the following conditions exists: • The adapter open failed. • The adapter detected a wire fault. • The adapter failed the auto-removal test. **Action:** Perform the following procedures, as appropriate: 1. Perform "Solving an Adapter Communication Problem" on page 5-3. 2. Verify that the adapter is configured correctly. 3. If other stations on the network are having problems communicating, contact your network administrator.
Blinking	On	The adapter has detected beaconing or a hard error. **Action:** Go to "Solving an Adapter Communication Problem" on page 5-3.
On	On	The adapter has failed before running the self-diagnostic tests. **Action:** Go to "Adapter Diagnostics" on page 5-17 to test the adapter.

The following definitions are of terms referred to in the table:

Auto-removal The state in which a token-ring adapter port removes itself from the network to perform self-tests to verify that it is not the cause of a hard error. If the tests are successful, the port will reattach itself to the network.

Beaconing The state that a token-ring adapter port enters after it has detected a hard error. The error condition is reported to the other devices on the network. Beaconing can result in the port removing itself from the network (auto-removal) to determine whether it is the cause of the hard error.

Hard error An error condition on a network that requires removing the source of the error or reconfiguring the network before the network can resume reliable operation.

Initialization The first step taken to prepare an adapter port for use after the computer has been booted. During initialization, the adapter port runs a series of internal self-diagnostic tests.

Open The state in which the adapter port has established connection with other devices on the ring.

Wire fault An error condition caused by a break or a short circuit in the cable segment that connects the adapter port to its access unit, such as an IBM 8230 Token-Ring Network Controlled Access Unit.

Understanding the Adapter Labels

The *green dot label* indicates that the adapter can communicate at 4 Mbps or 16 Mbps over a token ring. (Similar labels appear on token-ring network adapter cables manufactured by IBM.)

The *universally administered address label* contains the adapter's universally administered address. This is the MAC address that was encoded in the adapter memory at the factory. This 12-digit, hexadecimal address is recorded on the label in 2-digit increments from left to right, starting on the first row. In the illustration, the

universally administered address is X'08 00 5A 00 00 01' in non-canonical format, with the most significant bit (MSB) first. The universally administered address is unique and is used by network software to distinguish the adapter from others on the network. If you would prefer the adapter to be known on the network by a locally administered address, you must configure the device driver or protocol driver to use a locally administered address.

Adapter Diagnostics

Important

To avoid potentially erroneous results, you should always perform a power-on reboot of your computer before running the IBM PCI Token-Ring Adapter diagnostics.

Use the following procedure to test the IBM PCI Token-Ring Adapter:

1 Insert Diskette 1, LANAID and Diagnostics, in drive A and reboot your computer.

If you are using the CD-ROM version of this product, you must create a diagnostic diskette. Using the utility on the CD-ROM, make a copy of Diskette 1, LANAID and Diagnostics,.

If the system will not boot with the PCI Token-Ring Adapter installed, but will boot with the adapter removed, skip to step 4 on page 5-18.

2 At the DOS 7.0 Boot Menu select option 2, **IBM PCI Token-Ring Extended Diagnostics**.

Note: If there is more than one IBM PCI Token-Ring Adapter installed in your computer, select the specific adapter to be tested. A selection menu is listed identifying each adapter by its universally administered address. Use the cursor keys or the mouse to select the adapter for test.

3 Connect the adapter to the network and press the **Test** (Enter) key. There are two test options: wrap test and on-ring test.

The wrap test tests the adapter and cable through the hub or concentrator, or through a wrap plug attached to the cable.

The on-ring test requires that the adapter is connected to a network with other adapters, so the ring speed of the network can be automatically sensed. If the adapter is the only one in the network, the on-ring test will fail.

4 If the test indicates there is no adapter in the system, or that diagnostics cannot be run:

- Check that the adapter is correctly seated in the slot.
- Make sure that the LEDs blink alternately amber and green after you power up your computer.
- See Table 5-3 on page 5-14 for LED states.
- Use "Adapter Diagnostics" on page 5-17 to run the adapter diagnostics. If the tests are completed successfully, and your computer still is not communicating, refer to "BIOS Updates" on page 5-19 or contact your network administrator.

5 If the wrap test and on-ring test run without errors, the adapter is ready for use. Exit the diagnostic program, and follow the directions for reactivating the computer.

If an error occurs, record any messages that appear, record the LED sequences, and contact your network administrator.

Note: This procedure does not verify that the data rate of the device driver setting matches the data rate of the LAN segment.

Note: If more than one PCI Token-Ring Adapter is in your machine, and you have not run this diagnostic disk already, the diagnostic will reboot your computer, after updating the disk for the correct number of PCI Token-Ring Adapters.

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BIOS Updates

System BIOS code provides the interface to allow your software to utilize the system's hardware features. A BIOS update is done through software, and generally does not require any hardware changes. Some PCI systems may require a BIOS code update to work correctly with high-bandwidth PCI devices like the IBM PCI Token-Ring Adapter.

If you suspect that your system needs an update, contact your system provider to confirm that an update is required, and to get the update for your system.

The system's BIOS is used by the device driver to find and access the adapter. The IBM PCI Token-Ring Adapter requires system BIOS to support PCI BIOS Specification 2.0 or later. Symptoms that might indicate your system needs a BIOS update are:

1. The IBM PCI Token-Ring Adapter Diagnostics report that no adapter is installed in the system and the adapter LEDs indicate that the adapter is awaiting initialization (alternate blinking of amber and green).
2. The system halts when the IBM PCI Token-Ring Adapter Diagnostics start to access the adapter.

These systems may require an update based on when they were manufactured:

- IBM PC 300 and 700 (Pentium models 6575, 6585, 6875, 6885)

  Require BIOS level 46 or above

- IBM PC 300 (80486 models 6573, 6583)

  Require BIOS level 58 or above

- IBM ValuePoint Performance Series (models 6484, 6494 or Models 6482, 6492 with PCI feature installed)

  Requires BIOS level 58 or above

- IBM Aptiva (Models 2144-Mxx AND 2168-Mxx)

  These models of Aptiva may need the latest BIOS, which you can obtain from the the following resources:

PC Company Bulletin Board at

919-517-0001

World Wide Web—http://www.us.pc.ibm.com/files.html

access the search form and then enter MFLASH. Download and then execute the MFLASH.EXE self-extracting zip file and follow the instructions in the README.TXT file.

Anonymous FTP site—ftp.pc.ibm.com

MFLASH.EXE can be found in the pub/ps1aptiva/update_files/bios directory.

- Compaq Deskpro XL (Pentium and 486 versions)
  Requires BIOS dated 8/5/94 or later

- Gateway2000 P5-90 (P54C processor)
  Requires BIOS level 10 or above

Note to IBM ValuePoint Performance Series (Model 6384-189) users:
Requires riser board FRU #71G2782 installed, or the IBM PCI Token-Ring Adapter must be installed in the bottom PCI slot only.

Note to IBM ValuePoint High Performance Models 6484 and 6494 users:
Some of the earlier models of the 64x4 will not function correctly with the IBM PCI Token-Ring Token Ring Adapter.

If the system halts after you install the IBM PCI Token-Ring Adapter, the system may need an updated version of the PCI riser card. Customers in the United States should contact the IBM PC Company HelpCenter at 800-772-2227 for assistance. In Canada, customers should call IBM's HelpPC at 800-565-3344.

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Note to DELL 466 Models users:
Some Dell 466 models (486DX2 - 66MHz) with a NetWare device driver are unable to find the adapter, but the diagnostic can. If you have such a Dell 466 model, you must follow the instructions in "Expansion ROM and PCISETUP" on page 5-10 that discuss the manual installation of PCISETUP for all environments.

Symptoms of Systems Restricted to One IBM PCI Token-Ring Adapter

Some systems can support only a single IBM PCI Token-Ring Adapter due to limited PCI-to-memory bandwidth.

Symptoms that might indicate a memory bandwidth restriction are:

- A single adapter can attach to the network but fails if additional adapters are active in the system.
- Adapters connect successfully to the network, but then lose connection when LAN traffic on multiple adapters increases or when other system I/O activity (for example, disk or video) increases.
- A network monitor indicates that one or more adapters are reporting excessive receive congestion or internal errors. These errors usually indicate that the adapter is attempting to move more data on the network than the system can currently handle.

Questions, Problems?

See the README.1ST file on Diskette 1, LANAID and Diagnostics. It contains an index of the readme files containing the latest information about this product.

IBM Product Support

1-800-426-7299 Options by IBM HelpCenter
1-800-237-5511 IBM Support Services
1-800-772-2227 IBM HelpCenter
1-800-565-3344 HelpPC (Canada)

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IBM PC Company BBS
For new or updated version of the installation code or the drivers:

United States	(919) 517-0001 (directory 32)
Vancouver	(604) 664-6464
Toronto	(416) 956-7877
Montreal	(514) 938-3022
Markham	(905) 316-4255

You can download the code from the BBS or the Internet. If you are outside the United States or Canada, contact your IBM marketing representative.

World Wide Web
Anonymous ftp to lansupport.raleigh.ibm.com

On a web browser:

http://www.networking.ibm.com/nes/nestoken.htm
http://www.us.pc.ibm.com/files.html

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Appendix A. About IBM LAN Client

IBM LAN Client provides program interfaces to support network application programs using selected IBM Token-Ring and Ethernet adapters. It allows a client workstation to communicate with an IBM LAN Server at Version 3.0, 4.0, and Warp Server, or with a Novell NetWare Server at Version 2.15c or higher, or to use TCP/IP applications. (The IBM and Novell client code is included with this package but, with the exception of PING, TCP/IP applications are not.) In addition, support is provided for programs written to the NetBIOS or IEEE 802.2 application programming interfaces.

IBM LAN Client Features

- As little as 4 KB conventional memory required. (See below for more details.)
- One common environment for concurrent multiple protocols.
- One or more of NetBIOS, IPX, TCP/IP, and IEEE 802.2.
- Shim modules, such as ODINSUP and LANSUP, are not needed.
- Includes client software for attachment to Novell NetWare Servers and IBM LAN Servers.
- Supports DOS LAN Services 5.x.
- New Novell IntranetWare Client for DOS and Windows.
- Provides full access to essential NetWare services such as NetWare Directory Services (NDS).
- Provides improved connection reliability, including the ability to auto-reconnect open files.
- Provides enhanced large internet packet (LIP) and packet burst support.
- Includes an installation tool with a graphical user interface (GUI) for easy installation of client software.
- Includes a command-line version of the installation tool for use by network administrators installing on a large number of workstations.

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- Allows the same adapter device driver to be used for client workstations and for Novell NetWare servers, reducing support complexity.

DOS Conventional Memory Usage — Reduction

LAN Client minimizes the use of DOS conventional memory for network communications. With IBM LAN Client, IBM LAN adapter drivers and protocol stacks no longer require large amounts of DOS memory below 1 MB. The tables in this section show how little memory is required for IBM LAN Client, compared to existing implementations. There is one table for ISA and Micro-channel adapters, and one for the PCI adapter. These tables show how much DOS conventional memory is used by IBM LAN Client for three popular communication protocols, compared with current usage.

Table A-1. IBM PCI Token-Ring Adapter Memory Reduction Table

Protocol	Before IBM LAN Client	With IBM LAN Client
IPX	59 KB	5 KB
IEEE 802.2	95 KB	4 KB
NetBIOS	95 KB	4 KB

Supported IBM LAN Adapters

IBM LAN Client provides support for the following adapters:

- IBM Auto LANStreamer PCI Adapter
- IBM PCI Ethernet Adapter
- IBM Auto 16/4 Token-Ring ISA Adapter
- IBM Token-Ring 16/4 ISA-16 Adapter
- IBM Token-Ring Auto 16/4 Credit Card Adapter
- IBM EtherJet ISA Adapter
- IBM EtherJet 10BASE-T ISA Adapter
- IBM Auto 16/4 Token-Ring MC Adapter
- IBM Token-Ring 16/4 Adapter/A

- IBM Auto Wake Token-Ring ISA Adapter
- IBM PCI Token-Ring Adapter
- IBM Turbo 16/4 Token-Ring ISA Adapter
- IBM Turbo 16/4 Token-Ring Credit Card Adapter
- IBM EtherJet PC Card Adapter

The adapter device driver needed for the adapter to operate with the IBM LAN Client software is provided on the IBM LAN Client installation diskettes. The following drivers are provided:

- TOKEN.LAN — for ISA, Micro-channel, and PCMCIA Token-Ring adapters
- IBMMPCO.LAN — for the Auto LANStreamer PCI Token-Ring adapter
- IBMEANWS.LAN — for the PCI Ethernet adapter
- IBMEINWS.LAN — for the ISA Ethernet adapters
- IBMTRPO.LAN — for the PCI Token-Ring adapter
- IBMEXNWS.LAN — for the EtherJet PC card

The installation program will copy the driver onto your workstation hard disk when you tell it which adapter you will be using. It will also provide the correct load statements in STARTNET.BAT.

Supported Software

IBM LAN Client provides support for the following protocols and client applications:

For DOS 5.0 or higher:

- IEEE 802.2
- NetBIOS
- DOS LAN Services 5.x (with IBM Warp Server)
- Novell IntranetWare Client for DOS and Windows (IPX/SPX) (with Novell NetWare 2.15c and higher)
- PC3270 Version 4.x

- DCAF (Version 1.3 + CSDs)
- Artisoft LANtastic Version 6.0 (not supported with the IBM EtherJet ISA adapters or IBM EtherJet PC Card adapter)
- Attachmate 3270 Emulation
- LANDP (If you are using Version 2, make sure that the service level of LAN.EXE is MS004 or higher.)

For Windows 3.1, Windows 3.11, and Windows for Workgroups 3.11:

- IEEE 802.2
- NetBIOS
- DOS LAN Services 5.x (with IBM Warp Server)
- Novell IntranetWare Client for DOS and Windows (IPX/SPX) (with Novell NetWare 4.0)
- AS/400 for Windows (Version 4.0, V3R1M0, and V3R1M1)
- (802.2 only, AnyNet TCP/IP not supported)
- TCP/IP using Winsock 1.1 or 1.2
- PC3270/Windows Version 4.x
- Artisoft LANtastic Version 6.0 (not supported with the IBM EtherJet ISA adapters.)
- APPC/Windows

Note: IBM LAN Station Manager cannot be run in the same workstation as IBM LAN Client.

Supported Operating Systems

IBM LAN Client supports the following desktop operating systems:

- MS-DOS 5.x and 6.x
- PC-DOS 5.x, 6.x, and 7.0
- Windows 3.1 and 3.11, in enhanced mode
- Windows for Workgroups 3.11

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Related Documentation

In addition to this document, you might need to consult the following publications:

- The appropriate LAN adapter documentation (provided with the adapter)
- *IBM LAN Technical Reference IEEE 802.2 and NetBIOS Application Programming Interfaces*, SC30-3587
- *IBM LAN Server Command and Utilities*, S10H-9686
- *IBM Guide to LAN Server Books*, S10H-9688
- *IBM DOS LAN Services and Windows User's Guide*, S10H-9684
- Manuals for Novell IntranetWare Client and Novell NetWare Server 4.0
- Manuals for Novell TCP/IP interface

Note: IBM documentation can be obtained from your IBM marketing representative, or by calling IBM support at the following numbers:

- In the USA, 1-800-426-7299
- In Canada, 1-800-565-3344

Note: Novell documentation can be obtained by contacting Novell, either by calling 1-800-NETWARE or over the World Wide Web at http://www.novell.com.

Restrictions for This Release

The following restrictions apply for this release of IBM LAN Client:

- IBM LAN Client will operate with only one adapter.
- You cannot use RPL to download IBM LAN Client from either a Novell NetWare server or an IBM LAN Server.

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Appendix B. How to Configure Route Switch Client Support

Route Switch Client support has become a standard part of the device drivers for the IBM PCI Token-Ring Adapter and the IBM IBM PCI Wake on LAN Token-Ring Adapter, making installation of the support as easy as upgrading the device driver.

Once a Route Switch Client-enabled driver has been installed, configuration consists of setting just two parameters. The first parameter, Route Switch Client Enable, is used to enable and disable Route Switch Client support. By default this parameter is set to NO in order to disable it. Setting this parameter to YES will enable Route Switch Client Support.

The second parameter, Route Switch Client Table Entries, specifies the maximum number of logical connections that can be switched at any one time. Valid values for this parameter are: 16, 32, 64, 128, 512, and 1024. Workstations or client machines should set this value to one of the smaller values, and servers should set this value to one of the larger values.

Why Route Switch Client?

The performance improvement realized from MSS Route Switching Client support is greatest in network environments where end-to-end delays are due primarily to router bottlenecks. In networks where routers are not the primary source of delay between two endpoints, MSS Route Switching Client can be used to prevent the overloading of routers from ever occurring.

Due to the client/server based design of Route Switching, the client function is not required in both machines communicating with each other through routers in order to achieve benefits. Route Switching allows for an asymmetric configuration where only one of the machines has been enabled with Route Switching to direct traffic through the switching network while the other machine's traffic is still being routed. This means significant benefits can be obtained by placing the MSS Route Switching Client function on just the LAN-based servers where vast amounts of data are being sent

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versus being received. As time permits, the device drivers for the workstation adapters can be upgraded with Route Switch enabled drivers, further increasing performance improvements.

Novell NetWare Server

Note: At this time, the maximum value for Route Switch Client Table Entries for the Novell server driver is limited to the range 16 to 200. This means that setting the value to 200 will allow as many as 200 simultaneous connections to be switched instead of being routed.

Follow these instructions to enable the Route Switch Client function of the IBMTRPO.LAN, which is the device driver provided in this package.

1. From the NetWare server console type **load install**.
2. Select **Driver options**.
3. Select **Configure network drivers**.
4. Choose **Select a driver**.
5. Select **IBMTRPO.LAN** from the available drivers list and press **Enter**.
6. Choose **Select/Modify driver parameters and protocols** and press **Enter**.
7. Using the arrow keys, move to the Parameters section and select the **RTWEnable** keyword value and press **Enter**.
8. Select **YES** for the keyword value and press **Enter**.
9. Select the **RTSWTableSize** keyword value and press **Enter**.
10. Select the desired Route Switch table size from the list and press **Enter**.

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11 Select **Save parameters and load driver**. This step will save the previously chosen configuration settings in the AUTOEXEC.NCF file.

IBM OS/2 2.11 and Higher

The following instructions enable the Route Switch Client function in the OS/2 NDIS 2.01 driver. These instructions assume that the IBM PCI Token-Ring Adapter is already installed and configured.

To set the Route Switch Client parameters in OS/2 follow these instructions:

1 Double-click the **MTPS** icon on the desktop.

2 Click **OK**.

3 Make sure that LAN Adapters and Protocols is selected and click **Configure**.

4 Select the name of the adapter in the current configuration section of the window and click **Edit**.

5 Scroll down through the adapter's configuration parameters until `Enable Route Switch client support` is displayed.

6 Make sure that the cursor is in the data entry portion of this parameter by either scrolling up or down or by clicking the data entry area.

7 Type "YES" in this field.

8 Click **OK**.

9 Click **OK** on the right-hand side of the window.

10 Follow the remaining instructions to exit MPTS.

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Windows 95

The following instructions describe how to enable the Route Switch Client function in the Windows 95 driver. These instructions assume that the IBM Token-Ring Adapter is already installed and configured.

To set the Route Switch Client parameters in Windows 95 follow these instructions:

1. Click **Start**.
2. Click **Settings/Control Panel**.
3. Double-click **Network**.
4. Make sure that the Configuration tab is selected.
5. If more than one adapter is configured, select the IBM adapter to be configured by clicking the name in the top window.
6. Click the **Advanced** tab to show configuration parameters.
7. Click **Enable Route Switch Client**.
8. Click the down arrow for the value of this feature and select **Yes**.
9. Click **Route Switch Table Size**.
10. Enter a value for the number of Route Switch table entries.
11. Select **OK** to save the changed values.

Windows NT 4.0 and Higher

The following instructions enable the Route Switch Client function in t he Windows NT 4.0 driver. These instructions assume that the IBM Token-Ring Adapter is already installed and configured. If not, refer to the installation and configuration manual for the adapter being used.

To set the Route Switch Client parameters in Windows NT 4.0 follow these instructions:

1. Click **Start**.
2. Click **Settings/Control Panel**.
3. Double-click **Network**.
4. Click the **Adapters** tab.
5. If more than one adapter is configured, select the IBM adapter to be configured by clicking the name in the top window.
6. Open the **Properties** window for this adapter by either double-clicking the adapter's name as in step 5 or by clicking the Properties button.
7. Click the **Route Switch Client** tab.
8. Enable Route Switch Client by clicking the check box titled **Enable Route Switch Client Feature**.
9. Select the table size by dragging the slider to the appropriate value.
10. Select **OK** to save the changed values.

Windows NT 3.51

The following instructions enables the Route Switch Client function in the Windows NT 3.51 driver. These instructions assume that the IBM Token-Ring Adapter is already installed and configured.

To set the Route Switch Client parameters in Windows NT 3.51 do the following:

1. In the Program Manager, double-click the **Control Panel** icon in the Main program group.
2. In the Control Panel window, double-click the **Network** icon.

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3 If there is more than one adapter configured, select the IBM adapter to be configured by clicking the name in the Installed adapters panel.

4 Open the **Properties** window for this adapter by either double-clicking the adapter's name as in step 3 or by clicking the configure button.

5 Click the **Route Switch Client** tab.

6 Enable Route Switch Client by clicking the check box titled **Enable Route Switch Client Feature**.

7 Select the table size by dragging the slider to the appropriate value.

8 Select **OK** to save the changed values.

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Appendix C. System Limitations and Restrictions

Device Driver Limitations

Windows for Workgroups 3.11 with DOS NDIS 2.0

The following restrictions and work arounds apply to the DOS NDIS 2.0 device driver when used with Microsoft Windows for Workgroups 3.11. Please check the documented electronic distribution locations or contact IBM support for updates.

No response from Windows

On some networking support configurations, the machine will not respond when network activity is started and Windows for Workgroups 3.11 is running; for example, when starting File Manager and remote drives are defined, or when Windows-supplied networking support is configured for both Microsoft NetBEUI protocol and IPX/SPX Compatible Transport with NetBIOS on an IBM 6598-CXX.

In configurations using Windows for Workgroups 3.11 on an IBM 6598-CXX machine, it is recommended that the NDIS 3.0 driver for the IBM PCI Token-Ring Adapter or the IBM LAN Client product be used to provide networking support. If the NDIS 2.0 driver must be used, then one of the following actions must be taken until this problem is resolved.

1. Configure just one of the protocol drivers, either Microsoft NetBEUI or IPX/SPX Compatible Transport with NetBIOS.
2. If using just one of the above protocols is not possible, then use a NetBIOS protocol stack other than the one supplied with Windows for Workgroups 3.11. For example, use IBM LAN Support Program or IBM DOS LAN Services.
3. If the Windows for Workgroups 3.11 networking support must be used, then disable, or make unavailable, Interrupt Request (IRQ) level 9 of the machine if possible.

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4. If disabling IRQ 9 is not possible, then the string /UseIRQ9. should be placed on the Netcard statement of the network drivers section of SYSTEM.INI. The line should look as follows:

   ```
   Netcard= ibmtrp.dos/UseIRQ9
   ```

   Note: If after making these changes the Network folder is opened and Network Setup is run, be sure to select **Cancel**. If Close is selected the change will be lost and SYSTEM.INI should be modified again.

Driver unable to load

If the driver is unable to load when using Windows for Workgroups 3.11 and the supplied networking support, and the UMB parameter is placed on the DOS= statement in CONFIG.SYS, the following information may be helpful:

In certain configurations it has been observed that NET.EXE, which loads the DOS NDIS 2.0 driver after DOS initialization, is not supplying an adequate amount of memory for the driver to load.

When your environment requires the DOS real mode driver (NDIS2) and the CONFIG.SYS line DOS=HIGH,UMB contact IBM for support or change the DOS= line in CONFIG.SYS to read DOS=HIGH.

Unable to configure for two adapters

When using only the NDIS 2.0 driver with the networking support of Windows for Workgroups 3.11, only one adapter can be configured. The Network Setup function of Windows For Workgroups 3.11 does not permit two adapters to be configured when using an NDIS 2.0 driver that loads once and drives multiple adapters. However, simple manual changes to configuration files may allow this configuration to work.

When using the networking support of Windows for Workgroups and the NDIS 2.0 device driver to drive two IBM PCI Token-Ring Adapters, follow these steps:

1 From the Network Folder, double-click the **Network Setup** icon.

2 Select the **Drivers** button to add a new Network Driver.

3. On the Network Drivers panel, click **Add Adapter...**.

4. Select **Unlisted or Updated Network Adapter** and then click **OK**.

5. Insert Diskette 2, "NDIS Drivers" for the IBM PCI Token-Ring Adapter.

6. On the Install Driver panel, update the drive letter with the location of the diskette that contains Diskette 2, "NDIS Drivers", and click **OK**.

7. Select the top choice on the Unlisted or Updated Network Adapter panel, **IBMPCI Token-Ring Adapter, NDIS2 only** and click **OK**.

8. Repeat steps 1–7 for the second adapter.

9. Check that you have selected the correct protocols for each adapter.

10. Click **CLOSE** to return to the Network Setup panel

11. Click **OK** to continue with the installation process.

    Windows will now ask whether you want to replace Enhanced Mode Protocol Manager files. Do this only if necessary. Windows will copy IBMPCI Token-Ring Adapter files from the diskette.

12. Windows will update the PROTOCOL.INI, CONFIG.SYS, and SYSTEM.INI. Click **OK** for this information panel.

13. Click **Continue**. Do NOT click **Restart Computer**.

14. Choose the editor of your choice to do the following steps:

    - In the Windows directory (usually \WINDOWS), update the SYSTEM.INI by going to the network drivers section and locating the line for

      ```
      netcard=
      ```

Notice there is no driver name stated. This happens only when configuring for two adapters. Change the line to read

```
netcard=IBMTRP.DOS
```

Save the file.

- Update the PROTOCOL.INI by going to the IBM$TRPN22 section and locating the line

  ```
  DriverName=IBMTRP2$
  ```

  Notice there is a 2 just before the dollar sign. Remove the 2 just from that line to read

  ```
  DriverName=IBMTRP$
  ```

  Save the file.

- Shut down and reboot the system.

  Note: If after making these changes the Network folder is opened and Network Setup is run, be sure to select **Cancel**. Do not select Close as your changes will be lost and you will need to repeat this procedure.

No response from Windows when using high-volume traffic applications

A recoverable hang condition has been observed in a couple of configurations where a DOS-based LAN application that creates a large volume of LAN traffic has run within a windowed DOS session in Windows for Workgroups 3.11. Until the final solution is found for this situation, run any DOS-based LAN applications creating a high volume of traffic in a DOS full-screen session. IBM Networking Hardware development is working with Microsoft to resolve this problem within Windows for Workgroups 3.11. If this problem occurs, contact IBM for support.

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Windows for Workgroups 3.11 with NDIS 3.0

The following restrictions and work arounds apply to the NDIS 3.0 device driver. Please check the documented electronic distribution locations or contact IBM support for updates.

A recoverable hang condition has been observed when DOS-based LAN applications that create a large volume of LAN traffic are run in two or more DOS sessions using the NDIS 3.0 device driver within Windows for Workgroups 3.11. Until this problem is resolved, run high-volume DOS-based LAN applications in only one DOS session at a time. IBM Networking Hardware development is working with Microsoft to resolve this problem within Windows For Workgroups.

Windows 3.x with NDIS 2.0

The following restrictions and work arounds apply to the DOS NDIS 2.0 device driver when used with Microsoft Windows 3.x. Please check the documented electronic distribution locations or contact IBM support for updates.

No response from Windows when using high-volume traffic applications

A recoverable hang condition has been observed in a couple of configurations where a DOS-based LAN application that creates a large volume of LAN traffic has run within a windowed DOS session in Windows 3.x. Until the final solution is found, run DOS-based LAN applications that create a high volume of traffic in a DOS full-screen session. IBM Networking Hardware development is working with Microsoft to resolve this problem within Windows 3.x. If this problem occurs, contact IBM for support.

Certain software environments prevent the IBM PCI Token-Ring Adapter from correctly resetting when the Control-Alt-Delete key sequence is entered. This may cause the system to hang during the reboot process. If the machine hangs while rebooting, the machine must be turned off and then back on. Many system vendors have a BIOS update that will correct this problem. If you experience this problem, please contact your system vendor for possible updates to the BIOS to disable the busmaster enable bit during system reset, as recommended by the PCI Special Interest Group (SIG).

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Machine-Specific Limitations

Servers and Clients

During initialization on some machines, the RPL Panel is displayed although you do not intend to RPL the machine. You may correct this by either using the BIOS configuration utility of your machine to change the startup sequence to boot from the hard file first, or disabling the RPL option on the adapter by using LANAID or the Diagnostic.

IBM PC Server 300 Models 8640-xPx: These models of the IBM PC Server 300 support only one IBM PCI Token-Ring Adapter, working only in half-duplex mode. Call IBM service for the latest information. (See “IBM Product Support” on page 5-21 for the product support telephone numbers.)

A failure has been observed on an 8460-OPT system. When loading an NLM from the DOS partition (C:\) of the hard disk that also contains the NetWare partition (SYS:), the system may hang with the hard-drive activity light on. This problem occurs only when the hard drive and LAN adapter share the same interrupt, and the LAN is active.

To avoid this problem, install all NLMs and other related files onto the NetWare partition. Or, load all required NLMs before starting the LAN connection (before **BIND IPX to...**).

If you continue to experience problems with the IBM PC300 Model 8640-OPT using Novell's NetWare, please call IBM at the numbers listed in “IBM Product Support” on page 5-21 for further information.

Compaq Presario 9546 The IBM PCI Token-Ring Adapter does not work reliably in the Compaq Presario 9546. We do not recommend you use the PCI Token-Ring Adapter in this machine.

Micron Millennia Plus P133: A system cache data problem might exist when using the Micron Millennia Plus P133 (M54Hi system motherboard) with the IBM PCI Token-Ring Adapter. Please contact Micron or IBM Technical Support for the latest compatibility

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information. (See “IBM Product Support” on page 5-21 for current support numbers.)

IBM 8272 Token-Ring Switch: The microcode in the IBM 8272 Token-Ring Switch must be at fix level 2.06a or higher. 8272 upgrades are available from the following Web site:

http://www.networking.ibm.com/nes/nesswitc.htm

IBM PC Server 704 when running WINDOWS NT: The IBM PC Server 704 may fail or produce unpredictable results when the IBM PCI Token-Ring Adapter is installed. Correct the problem by changing the Multi-Processor Specification (MPS) setting in the BIOS to 1.4 (vs. the default setting of 1.1). Select **BIOS UPDATE**; choose **ADVANCED MENU**; choose **CHIP SE CONFIGURATION**; click **MPS** and select **1.4**.

IBM PC Server 720, Model 8642: The IBM PC Server 720 Model 8642 does not currently support the IBM PCI Token-Ring Adapter. IBM is preparing an update to the PC Server 720 DPB Bridge Card to correct a problem that can cause unreliable operation of some PCI bus master devices, including the IBM PCI Token-Ring Adapter. When ready, the new DPB Bridge Card will be available as an update for existing systems, and will begin shipping in all newly manufactured systems. A preliminary assembly part number of 76H7133 has been assigned to the updated DPB Bridge Card. Contact IBM support for the latest information. (See “IBM Product Support” on page 5-21 for current support information.)

IBM PC 100 Model 6260: When the IBM PCI Token-Ring Adapter is installed in the IBM PC 100 Model 6260 with BIOS level 10, the machine will attempt to IPL from the network (RPL) when powered on or rebooted. The following actions will prevent this from happening:

1. Use the system BIOS utility to set the hard disk as the primary boot device, or
2. Run LANAID or the diagnostic and disable RPL on the adapter.

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Operating and Networking System Limitations

In Novell NetWare server, or IBM LAN Client, or Novell IntranetWare Client if you want to use a second frame type, use the "frame=" parameter in the driver load statement to specify the second frame type.

Novell IntranetWare Client with Multiple IBM PCI Token-Ring Adapters

If you are using more than one IBM PCI Token-Ring Adapter with Novell IntranetWare Client, please refer to Novell's documentation for information on how to correctly load additional drivers.

EMM386 Earlier Than Release 4.49

The IBM PCI Token-Ring Adapter's device drivers for DOS will occasionally hang or reboot the system if an early level of EMM386 is active.

EMM386 must be at Release level 4.49 or higher (included in versions of Microsoft DOS 6.3 or higher or IBM DOS 7.0) when utilizing 32-bit accesses to PCI BIOS, or ISA plug-and-play BIOS.

If you use the IBM PCI Token-Ring Adapter with an older level of EMM386, your system may hang immediately when the adapter device driver is loaded, or at some time later during operation of the adapter.

Contact your operating system supplier, or Microsoft for information on obtaining an updated EMM386 driver. The latest EMM386 is available on Microsoft's bulletin board system.

OS/2 LAN Server

A potential data corruption problem exists with LAN Server versions 3.0, 4.0, and 5.0. The problem can occur with the IBM PCI Token-Ring Adapter and other LAN adapters when they are operating under heavy network traffic conditions. To fix the problem you must install the following fixes:

- LAN Server 5.0 - Warp Server

Fix Pack IP08260

Fix Pack WR08210 for MPTS

- LAN Server 4.0

  Service Pack IP08222

  Fix Pack IP08227

  One of the following fix packs:

  Fix Pack WR08210 for
  LAPS V2.60.5 (Warp Connect)
  LAPS V2.60.6 (Comm Mgr 2.0)
  LAPS V2.60.7
  or
  Fix Pack WR08163 for
  OS/2 2.x
  LAPS prior to 2.60.5

  Note: The above fixes are available only from IBM's Personal Software Solution Center. For assistance call

  1-800-992-4777

- LAN Server 3.0

  If the data corruption problem is encountered with LAN Server 3.0, it can only be corrected by upgrading to LAN Server 4.0 or higher.

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Appendix D. Remote Program Load

The Remote Program Load (RPL) function enables a network adapter to boot a computer using files the computer receives from a LAN server. The computer that requests these files is referred to as the *client computer*, and the computer that responds with these files is referred to as the *LAN server*. In order for RPL to take place, two things must occur. First, the RPL feature of the adapter in the client machine initiates the RPL request. Second, a LAN server responds to the RPL request with the files to bring up, or boot the client computer.

The PCI Token-Ring Adapter supports RPL from the following servers:

IBM OS/2 LAN Server Version 3.0 (CSD level IP07060 or higher)

IBM OS/2 LAN Server Version 4.0 (CSD level IP08152 or higher)

IBM OS/2 Warp Server

Novell NetWare 3.11 or higher

Please read the \RPL\README.RPL file on Diskette 2, "NDIS Drivers" or on the CD-ROM for any updated information on RPL procedures available after this manual was published, or view our Web site at http://www.networking.ibm.com/nes/nestoken.htm.

The following sections describe:

- "Setting Up Your Client Computer for RPL" on page D-2
- "Setting Up Your OS/2 LAN Server to Support RPL from the IBM PCI Token-Ring Adapter" on page D-3
- "Setting Up Your Novell NetWare Server to Support RPL from the IBM PCI Token-Ring Adapter" on page D-5
- "RPL Messages" on page D-9
- "Troubleshooting RPL Problems" on page D-11

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Setting Up Your Client Computer for RPL

In order for the RPL process to begin, the RPL feature must be enabled on the adapter installed in the client computer, and the client computer must recognize the RPL feature of the adapter as the first or only bootable device present.

Enabling the RPL Feature on the PCI Token-Ring Adapter

The PCI Token-Ring Adapter is shipped with the RPL feature enabled. You can ensure that it is enabled by running the adapter diagnostics and, at the diagnostics test panel for the adapter, pressing F5 to view or change the RPL setting. You can also check the RPL setting with LANAID or LANAIDC.

Making the RPL Feature the First Bootable Device

All IBM PCs support RPL, and many IBM-compatible PCs do also. If your computer is not an IBM PC, refer to your computer's user's manual or contact the manufacturer if you are not sure whether it supports RPL.

On most IBM PCs you can make this adapter the first bootable, or startup, device by choosing **network** as the first startup device in the startup sequence in the configuration utility (usually you enter the configuration utility by pressing F1 when the IBM logo and Configuration Utility program symbol appear during the power-on process). If drive A is the first bootable device, consider making the adapter the second bootable device. Refer to the user's manual for your IBM PC if you need further instructions for altering the startup sequence or entering the configuration utility.

Many non-IBM machines and some older IBM machines do not have a configuration utility, or do not allow a choice of a network-bootable device in the configuration utility. On these machines you can either remove the hard disk or use the RPLENABL.EXE utility program provided with this adapter on Diskette 2, "NDIS Drivers" or on the CD-ROM, in the \RPL subdirectory to disable the hard disk as a bootable device. Once the hard disk is disabled as a bootable

device, computers that support RPL adapters will attempt to boot from the network as long as no diskette is in the diskette drive.

Once you have successfully selected RPL as the first startup, or boot device, you will see an RPL panel when your client machine is booting. The following figure is an example of this RPL panel:

```
                    IBM PCI Token-Ring Adapter RPL
ET-02:15:36
ID-268 0030
BU-0000
AA-0004AC570001
AL-000001 PX10AH
BL-CR1.0243
RM-C800
OP-0000 16

RQ-000F
SF-
SN-
RS-2010
PC-0606
AC-8C00 00002000 8820
AE-000 OP-0011
```

This sample shows all the possible error and status message prefixes. You will normally not see the error status condition prefixes, such as PC-, unless an error condition occurs. These error and status messages are described later in the RPL Messages section.

Setting Up Your OS/2 LAN Server to Support RPL from the IBM PCI Token-Ring Adapter

This manual assumes that you have already set up your OS/2 LAN Server for RPL and installed the DOS or OS/2 RPL image. If you have not, refer to the OS/2 LAN Server documentation and install RPL support before installing RPL support for the PCI Token-Ring Adapter on the OS/2 LAN Server. In summary, at this point you should have already performed the following steps:

1. Installed OS/2 LAN Server DOS or OS/2 RPL support.
2. Run RIPLINST.EXE if you installed OS/2 RPL support, to install an OS/2 RPL image. The RIPLINST.EXE utility is

normally on diskette 7 of the OS/2 installation diskettes. You must use the OS/2 unpack command to unpack the RIPLINST file before you can run it.

3 Installed any service fix packs required

LAN Server 3.0: IP07060 or higher

LAN Server 4.0: IP08152 or higher

Use the OS/2 SYSLEVEL command on your OS/2 LAN Server to check the CSD level.

4 Run any post-service updates for RPL described in the fix pack IPxxxxx.INF file (xxxxx is the fix pack level being applied).

5 Run GETRPL.EXE to update the RPL access profiles (requires the RPL service to be stopped, and you to be logged on with administrator authority).

6 Run NET START RPL to start the RPL service.

Once these steps are complete, run the following steps on the OS/2 LAN Server to add RPL support for the PCI Token-Ring Adapter:

1 Run A:\RPL\CFGRPL.CMD from Diskette 2, "NDIS Drivers", or the CD-ROM in an OS/2 window.

2 Run NET STOP RPL to stop the RPL service.

3 Run GETRPL.EXE to update the RPL access profiles (requires the RPL service to be stopped, and you to be logged on with administrator authority).

4 Run NET START RPL to start the RPL service.

5 Create an RPL workstation image for each client computer with a PCI Token-Ring Adapter installed. This procedure is described in the LAN Server documentation. For the Server Record Identifier use:

Client Operating Environment	Record Identifier
OS/2 2.11	R_221_DTKTRP
OS/2 3.0	R_230_DTKTRP
DOS	R_DTKTRP_NDIS

Setting Up Your Novell NetWare Server to Support RPL from the IBM PCI Token-Ring Adapter

To RPL clients with the PCI Token-Ring Adapter from a NetWare Server you must:

1. Power on a NetWare Client machine and log on to the NetWare Server with supervisor authority.

2. Copy the RPL.NLM file to the NetWare server \SYSTEM directory from the \RPL directory on Diskette 2, "NDIS Drivers" or the CD-ROM.

3. Copy the _0249.RPL file to the NetWare server \LOGIN directory from the \RPL directory on Diskette 2, "NDIS Drivers" or the CD-ROM.

4. Generate a bootable client diskette for this adapter, and run the DOSGEN program located in the \SYSTEM directory on the Novell NetWare Server. For information on running DOSGEN or for more detailed information on setting up unique RPL images for specific adapters, refer to the Novell NetWare documentation.

5. Add the following two lines to the AUTOEXEC.NCF file located in the \SYSTEM directory on the NetWare Server:

   ```
   load rpl
   bind rpl to <driver>
   ```

   where <driver> is the token-ring driver loaded on your NetWare Server.

The following steps make up a sample procedure for creating a NetWare Client boot image:

1 Prepare a bootable DOS diskette. Perform either step 1a or for a VLM image or step 1b on page D-6 for a NETX image:

a VLM image

Place the following files on the bootable DOS diskette:

```
COMMAND.COM  AUTOEXEC.BAT  CONFIG.SYS    NET.CFG
LSL.COM      IBMTRPO.EXE   ROUTE.COM     IPXODI.COM
VLM.EXE      CONN.VLM      SECURITY.VLM  NWP.VLM
REDIR.VLM    IPXNCP.VLM    NDS.VLM       FIO.VLM
PRINT.VLM    TRAN.VLM      BIND.VLM      GENERAL.VLM
NETX.VLM
```

Your CONFIG.SYS file should have the following statements:

```
REM Use these three if you want to use high memory and
REM XMS memory.
REM DOS=HIGH
REM DEVICE=A:\HIMEM.SYS
REM DEVICE=A:EMM386.EXE NOEMS
FILES=40
BUFFERS=20
LASTDRIVE=Z
```

Your AUTOEXEC.BAT file should have the following statements:

```
PATH A:\
PROMPT $P$G
SET NWLANGUAGE=ENGLISH
LSL
IBMTRPO
ROUTE
IPXODI
REM If you issue commands that reload COMMAND.COM,
REM you must also copy COMMAND.COM
REM to the NetWare Server \system directory and
REM uncomment the COMSPEC command statement below.
REM SET COMSPEC=F:\SYSTEM\COMMAND.COM
VLM
LOGIN yourID
```

b NETX image

Place the following files on the bootable DOS diskette:

```
COMMAND.COM  AUTOEXEC.BAT  LSL.COM       NETX.EXE
IBMTRPO.EXE  ROUTE.COM     IPXODI.COM    NET.CFG
```

Your AUTOEXEC.BAT should have the following statements:

```
PATH A:\
PROMPT $P$G
LSL
IBMTRPO
ROUTE
IPXODI
REM If you issue commands that reload COMMAND.COM,
REM you must also copy COMMAND.COM
REM to the NetWare Server \system directory and
REM uncomment the COMSPEC command statement below.
REM SET COMSPEC=F:\SYSTEM\COMMAND.COM
NETX
F:
LOGIN yourID
```

2 Update the diskette with IBMTRPO.EXE from Diskette 3, "ODI Drivers and LAN Client (A)" or the CD-ROM.

This driver is not shipped with your IBM PCI Token-Ring Adapter. You must get it from the World Wide Web at http://www.networking.ibm.com/nes/nestoken.htm.

3 Generate the image using DOSGEN (see the Novell documentation for information on creating images and running DOSGEN).

Following is a sample of the NET.CFG file for VLM or NETX clients:

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

```
Link Driver IBMTRPO
        FRAME TOKEN-RING MSB
        DATARATE AUTO
        PCISLOT 17
        RXBUFFERS 2
        TXBUFFERS 2

NetWare DOS Requester
        FIRST NETWORK DRIVE = F
        NETWARE PROTOCOL = NDS BIND
```

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

RPL Messages

ET-00:00:45

Explanation: Elapsed Time. A continuously updated field indicating the elapsed time since the RPL feature gained control.

ID-268 BBDF

Explanation: Identification. An indication of which adapter is using the RPL function. 268 indicates a PCI Token-Ring Adapter. BBDF indicates the PCI bus, device, and function number for the PCI slot in which the adapter is inserted.

BU-0000

Explanation: Bring-Up. This field is displayed as X'0000' if the adapter has been successfully initialized and opened. If not, a code other than X'0000' is displayed and the field is highlighted. See “Troubleshooting RPL Problems” on page D-11.

AA-08005A2B0000

Explanation: Adapter address. The permanently encoded address of the token-ring adapter in your computer. This address is always 12 hexadecimal characters (6 bytes) long.

AL-000001 PX10AH

Explanation: Adapter Level. The Engineering Change (EC) level of the code on the token-ring network adapter.

BL-CR1.0243

Explanation: BIOS Level (module level). The EC level of the code in the RPL feature.

RM-CC00

Explanation: Memory (Read-Only Memory). Segment address in memory where BIOS has placed the RPL ROM.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

OP-0000 04

Explanation: Open Return Code. The first 4 digits are X'0000' and the last 2 digits identify the adapter data rate, if the adapter has been successfully opened and attached to the network. If not, a code other than X'0000' is displayed and the field is flashing. See “Troubleshooting RPL Problems” on page D-11.

RQ-0001

Explanation: Request Count (FIND Frame Count). The number in hexadecimal of FIND frames that have been transmitted. An excessive request count indicates that the LAN server is not present, is congested, or is not correctly configured to RPL this adapter.

SF-0001

Explanation: SEND.FILE.REQUEST Frame Count. The number of SEND.FILE.REQUEST frames that have been transmitted. An excessive SEND.FILE.REQUEST frame count indicates that the LAN server is not responding after having been found.

SN-0023

Explanation: File Response Sequence Number. This value is displayed when the LAN server has responded to the SEND.FILE.REQUEST. It indicates how many times valid FILE.DATA.RESPONSE frames have been received.

RS-0040

Explanation: Ring Status. This field displays a code indicating the status of the network. The field will be highlighted if the operation cannot continue; it will not be highlighted if processing can continue. See “Troubleshooting RPL Problems” on page D-11.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

PC-4020

Explanation: Computer Error. This field displays an error code indicating that the adapter has difficulty in functioning with the computer. In most cases, the panel will be frozen and this field will be highlighted because the adapter cannot continue. See "Troubleshooting RPL Problems" on page D-11.

AC-0040 0000 0000 0000

Explanation: Adapter Check. The adapter has detected an internal error and cannot continue. Reboot your computer. If this problem persists, record the adapter check code, and contact your network administrator.

AE-nnn XX-0011

Explanation: Adapter Error. The adapter in your computer could not establish communication with the LAN server. The *nnn* indicates the instance number. The reason for this error is indicated by the XX message to the right of AE-nnn. XX can be either BU or OP. The BU and OP messages are described previously in this section.

Troubleshooting RPL Problems

The following chart is helpful if, when using an RPL feature on a client computer, you do not get the expected results.

If other computers on the network need problem determination, you might need one or more of the following documents:

- The operator's guide for your computer
- The problem determination guide for network-related problems

Table D-1 (Page 1 of 2). Failure Indication Messages

Failure Indication	Action
The computer's BASIC panel appears, or the computer boots to the hard disk or diskette drive.	Perform the steps in "Setting Up Your Client Computer for RPL" on page D-2.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

Table D-1 (Page 2 of 2). Failure Indication Messages

Failure Indication	Action
A Bring-Up Error. The BU field on the client computer display panel is highlighted.	See list item 1.
An Open Error. The OP field on the client computer display panel is highlighted.	See list item 2.
A Ring Status Error. The RS field on the Client computer display panel has a value other than zero (0) and is highlighted.	See list item 3.
A PC Error. The PC field on the Client computer display panel is highlighted or is shown with counters not being updated.	See list item 4.
The Client computer display panel shows any response that has not been identified.	Contact your network administrator.

1 Bring-Up Error

The Client computer display panel shows that the elapsed time (ET) field has stopped with only a few seconds of time accumulated, and the bring-up (BU) error field is highlighted. The RPL feature tried three times and was unable to initialize the adapter for use. The BU error codes and the action to take are listed here:

Hex Value	Cause	Action
0020-002F, 0030-003F	A module on the adapter is not responding correctly.	The adapter appears defective. Run the adapter diagnostics.
0048	Initialize time-out.	The adapter appears defective. Run the adapter diagnostics.
	All others.	Adapter failure. The adapter appears defective. Run the adapter diagnostics. Contact your network administrator if problems persist.

2 Open Error

The open error field (OP) contains an error code. This code might be displayed normally or flashing.

If the error code is flashing, the RPL feature is trying to open the adapter after an unsuccessful attempt.

If the problem persists, record the 4 digits of the flashing OP field. Using Open Error and the Reason Code as the symptom, refer to the *IBM Token-Ring Network Problem Determination Guide* to resolve the problem.

Hex Value	Cause	Action
0011, 0010	No media attached.	Connect the UTP or STP cable to the adapter.
002D	A Client computer is trying to be the first active computer on a token-ring network.	Start your LAN server. If the error persists, reboot the Client computer.
All Others	Adapter open failure.	Refer to the *IBM Token-Ring Network Problem Determination Guide*.

3 Ring Status Error

A ring error was detected when the RPL feature or bootstrap program was executing. The ring status error field (RS) contains the error code. Locate the error code in the following table to determine the correct action to take. Some values might be displayed that are a combination of the values listed in the table. The x's used in the Hex Value column can be any hexadecimal number between 0 and F.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

Hex Value	Cause	Action
Cxxx to Dxxx	No receive signal was detected. The network is beaconing. The adapter is transmitting beacon frames.	Refer to the *IBM Token-Ring Network Problem Determination Guide*.
2000	This adapter has detected a soft-error condition.	No action required.
08xx	Wire Fault. The adapter has detected a problem in itself or in its lobe.	Refer to the *IBM Token-Ring Network Problem Determination Guide*.
04xx	This adapter detected an internal hardware error.	Contact your network administrator.
x1xx	Remove received. This adapter removed from the network.	Contact your network administrator for assistance.
0080	Counter overflow. One of the error log counters has incremented past 256.	Restart the computer.
0040 or 0060	Single Station. The adapter has opened and is the only station on the network. This bit resets when another station inserts.	No action is required unless other stations are known to be operating on this network. If other stations are on the network, refer to the *IBM Token-Ring Network Problem Determination Guide*.
0020	Ring recovery. The adapter is transmitting or receiving claim token frames.	No action is required.
0004	Full-Duplex. The adapter is operating in full-duplex mode.	No action is required.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

Hex Value	Cause	Action
All others.	Reserved.	Contact your network administrator for assistance.

4 PC Error

The RPL feature has detected a problem with either the software or hardware in the client computer. Retry the operation by restarting the computer at least once. If the problem persists, locate the error code in the following table to determine the correct action to take.

Hex Value	Cause	Action
05xx	An invalid Command Control Block (CCB) code was issued to the Adapter Support Subset. xx = the CCB code.	Check the bootstrap program if it is user-written. If not, contact your network administrator for assistance. Provide the CCB code.
06xx (not highlighted)	PROGRAM.ALERT frames being transmitted. The xx portion of the value represents the alert code. 00 = Unexpected error response frame received. 02 = File not found. 04 = Out of memory space. 06 = Memory overrun. 08 = Unexpected DLC status received.	Restart the computer. If this error persists, contact your network administrator for assistance.
07xx	The adapter failed a wrap test. xx = System Status Block (SSB) return code.	The adapter appears defective. Run the adapter diagnostics. Contact your network administrator if problems persist.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

Hex Value	Cause	Action
All others.	A computer hardware or software error has occurred.	Perform the computer diagnostic test procedure or contact your network administrator for assistance.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

Appendix E. NDIS 2 Device Driver Parameters

Table E-1 (Page 1 of 6). DOS and OS/2 NDIS Device Driver Parameters in PROTOCOL.INI

Parameter	Explanation
NetAddress	Use this parameter to specify a locally administered address for the adapter. The address must be enclosed in double quotes (“ ”) and be unique among all the addresses on the network. The adapter can be known on the network by its universally administered address (the address encoded in the adapter’s memory at the factory) or a locally administered address (a unique, user-assigned address). The universally administered address is the default value. That address appears on the IBM PCI Token-Ring Adapter bracket. See Figure 5-1 on page 5-13 for an illustration. **Valid values:** "400000000000" to "7FFFFFFFFFFF" in hex
DataRate	Used for configuring the ring speed of the PCI Token-Ring Adapter. It is recommended for servers that the DataRate be set to M16 or M4, and clients be set to Auto. **Valid values:** AUTO AutoSense – automatic ring-speed detection. **Note:** The adapter will not function with AutoSense if the adapter is the first one on the ring. M16 16-Mbps ring speed operation. M4 4-Mbps ring speed operation. The default value is AUTO.

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Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

Table E-1 (Page 2 of 6). DOS and OS/2 NDIS Device Driver Parameters in PROTOCOL.INI

Parameter	Explanation
EnableTxEofInt	This parameter specifies whether the Transmit End of Frame Interrupt is enabled. **Valid values:** Yes Indicates that the interrupt will be recognized by the interrupt handler. No Indicates that the interrupt will not be recognized by the interrupt handler. This value is preferable in some environments (such as a server environment) to reduce the number of times the interrupt handler is invoked. This can result in reduced CPU utilization and increased performance. The default is Yes.
MaxTransmits	This parameter specifies the maximum number of transmit queue entries. The value should be set high enough to accommodate the sum of all MaxTransmits for all protocol drivers using the IBM PCI Token-Ring Adapter concurrently. **Valid values:** 1 to 128 The default value is 4 (DOS), 31 (OS/2).

Table E-1 (Page 3 of 6). DOS and OS/2 NDIS Device Driver Parameters in PROTOCOL.INI

Parameter	Explanation
MaxTxFrameSize	This parameter specifies the maximum frame size that can be transmitted on the LAN. The parameter value serves as an upper limit. The actual maximum frame size might be smaller. The maximum frame size supported by the NDIS device driver is the lesser of the following values: • The value of this MaxTxFrameSize parameter • Total Receive Buffer Area (see the MinRcvBuffs parameter) • The physical frame size capacity of the network (4500 bytes for 4-Mbps token rings and 18 200 bytes for 16-Mbps token rings) Do not count the 4 bytes of FCS defined for a frame when setting this parameter value. In some environments, performance can be increased by operating server and client at larger frame sizes. Protocol frame size should be adjusted if this parameter is changed. **Note:** Some token-ring switches support a frame size of 4500 only. **Valid values:** 14 to 18 000 The default value is 4216 (DOS), 4500 (OS/2).

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Table E-1 (Page 4 of 6). DOS and OS/2 NDIS Device Driver Parameters in PROTOCOL.INI

Parameter	Explanation
MinRcvBuffs	This parameter specifies the minimum number of receive buffers that are allocated. The Total Receive Buffer Area for the adapter is calculated using the following formula: Total Receive Buffer Area = MinRcvBuffs × RcvBuffSize **Note:** To receive the maximum length frame that is supported by the attached network, the Total Receive Buffer Area must be larger than the maximum frame size that is allowed for the network, which is 4500 bytes for 4-Mbps token rings and 18000 bytes for 16-Mbps token rings). A smaller Total Receive Buffer Area will use less system memory but will correspondingly reduce the size of the largest frame that can be received by the NDIS device driver. The maximum frame size supported by the driver can be further limited by the MaxTxFrameSize parameter. **Valid values:** 1 to 512 The default value is 8 (DOS), 20 (OS/2).
RcvBuffSize	This parameter specifies the size of each receive buffer. **Valid values:** 256 to 18000 The default value is 1120 (DOS), 2252 (OS/2).
FullDuplex	This parameter permits the device driver to activate token-ring full-duplex operation if supported by the network. The MaxTxFrameSize parameter may need to be adjusted separately, depending on network requirements. **Valid values:** Yes Permits full-duplex operation. No Prohibits full-duplex operation. The default is Yes.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

Table E-1 (Page 5 of 6). DOS and OS/2 NDIS Device Driver Parameters in PROTOCOL.INI

Parameter	Explanation
LoopBack	Determines whether or not the adapter will copy a frame that it is transmitting if the destination address is recognized by the adapter. **Valid values:** Yes Indicates that transmit frames whose destination is this adapter will be transmitted and then received by the adapter. No Indicates that transmit frames whose destination is this adapter must be looped back by the protocol stack. The default is No.
TxPriMax	This parameter specifies the value of the maximum token access priority that will be allowed for frames sent on the high-priority transmit channel. High-priority transmit frames whose Frame Control priority value exceeds the value of this parameter will have their token access priority reduced to the value specified by this parameter. Frame Control is a field in the IEEE 802.2 Logical Link Control (LLC) header. **Valid values:** 0 to 6 The default value is 5.
TxPriThresh	This parameter specifies the frame priority value that will be used to transmit on the adapter's high-priority transmit queue. IEEE 802.2 LLC frames that contain a frame priority setting (in the Frame Control field) that is equal to or greater than the value of this parameter are treated as high-priority frames. **Valid values:** 1 to 6 The default value is 3.

Table E-1 (Page 6 of 6). DOS and OS/2 NDIS Device Driver Parameters in PROTOCOL.INI

Parameter	Explanation
LLCOnly	This parameter indicates whether only LLC frames should be copied by the adapter when it is running in promiscuous copy mode. If this parameter is set to Yes, no MAC frames will be copied while in promiscuous copy mode. **Valid values:** Yes Copy only LLC frames. No Copy all frames on the ring. The default value is No.
RTSWEnable (OS/2 only)	This parameter indicates whether the driver should enable code that attempts to send routable traffic directly to a destination rather than through the router. This can improve the performance of these connections and reduce workload at the router. If the value is No, all routable frames will be sent through the router. **Valid values:** Yes Enable the code. No Do not enable the code. The default value is No.
RTSWTableSize (OS/2 only)	This parameter specifies the number of entries in the route table for Route Switch client support. This should be set equal to or greater than the number of remote stations that this station will send data to using routable frames (for example, TCP/IP). If it is set too low, some of the traffic that could be sent directly will instead be sent through the router. *Valid values*: 16, 32, 64, 128, 256, 512, 1024 The default is 16.

```
;Protocol Manager Section
[PROT_MAN]
   Drivername = PROTMAN$

;Section A:  Protocol Driver (IBM TCP/IP V1.2 for DOS)
[TCPIP_nif]
   Drivername = TCPIP$
   Bindings = IBMTRP_NIF

;Section B: NDIS Device Driver
[IBMTRP_NIF]
   Drivername = IBMTRP$
   NetAddress = "400000000000"
   DataRate = "M16"
   EnableTxEofInt = "Yes"
   MaxTransmits = 4
   MaxTxFrameSize = 4216
   MinRcvBuffs = 8
   RcvBuffSize = 1120
   FullDuplex = "Yes"
   TxPriMax = 5
   TxPriThresh = 3
```

Figure E-1. Sample PROTOCOL.INI File for a DOS Station Configured for TCP/IP

```
;Protocol Manager Section
[PROT_MAN]
   Drivername = PROTMAN$

;Section A:  Protocol Driver (IBM TCP/IP V1.2 for OS/2)
[TCPIP_nif]
   Drivername = TCPIP$
   Bindings = IBMTRP_NIF

;Section B: NDIS Device Driver
[IBMTRP_NIF]
   Drivername = IBMTRP$
   NetAddress = "400000000000"
   DataRate = "M16"
   EnableTxEofInt = "Yes"
   MaxTransmits = 31
   MaxTxFrameSize = 4500
   MinRcvBuffs = 20
   RcvBuffSize = 2252
   FullDuplex = "Yes"
   TxRetries = 3
   TxPriMax = 5
   TxPriThresh = 3
```

Figure E-2. Sample PROTOCOL.INI File for an OS/2 Station Configured for TCP/IP

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

Appendix F. NDIS 2 Device Driver Messages

This appendix contains messages that can be received from the NDIS device driver. These messages can come from DOS and NDIS 2 files. The messages are either displayed or logged to a file.

The term *Port nnnnnnnn* appears in several messages. It is used to identify the adapter's instance and bears *no* relationship to the physical slots in the computer. If this is the only PCI Token-Ring Adapter, the number will be 00000000.

LA10001 **IBM PCI Token-Ring Adapter, Version** *xx*

Explanation: Information only.

User Action: None.

LA10002 **The IBM PCI Token-Ring Adapter UAA (BIA) is** *xx***.**

Explanation: Information only.

User Action: None.

LA10003 **The IBM PCI Token-Ring Adapter is using an LAA of** *xx***.**

Explanation: Information only.

User Action: None.

LA10004 **Revision level** *xx* **of the PCI Token-Ring Adapter is incompatible with this driver version.**

Explanation: The Revision ID of the PCI Token-Ring Adapter is not one that is supported by this version of the device driver. This correlation is enforced to ensure an appropriate match between the adapter hardware and the device driver software.

User Action: Contact your support personnel for assistance. You might need to upgrade your PCI Token-Ring Adapter, use a different version of the device driver, or do both.

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LA10005 A device driver initialization error occurred (failure code *xx*).

Explanation: An unexpected error occurred during initialization of the device driver.

User Action: Shut down the computer correctly and switch OFF the power to the machine. Restart the computer by switching it ON again. If the error persists, contact your support personnel.

LA10006 The configuration parameter *xx* was specified incorrectly. Its default value will be used.

Explanation: The value of a configuration parameter was incorrectly specified.

User Action: Edit the configuration file (or rerun the configuration program) to specify a value that is of the correct type and within the allowed range. Check the adapter installation instructions for additional information.

LA10007 The configuration parameter values have forced the internal data blocks to exceed the allowed limit.

Explanation: The combination of configuration parameters being used requires more than the 64-KB memory area that is available for this adapter instance to hold its internal control information.

User Action: Lower the value of the MaxTransmits or MinRcvBuffs parameters from their current setting to reduce the amount of control block storage required by the device driver. Shut down and restart the computer to activate this configuration change.

LA10008 Unable to register interrupt level *xx* for this adapter.

Explanation: The hardware interrupt level assigned to this adapter was not able to be registered (*hooked*) by the device driver.

User Action: Check the configuration of your computer, looking for other devices that are assigned the same interrupt level as this adapter. Try removing the conflicting device from the machine and restart the computer to see if the problem goes away. If so, determine whether the conflicting device can be left out of the machine, or whether the machine can be reconfigured to resolve the conflict. Note that in most PCI machines, the PCI BIOS assigns certain system resources to the devices found in the computer, including the interrupt level.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

LA10010 A hardware failure occurred while attempting to open the adapter.

Explanation: An adapter hardware error was detected when opening the adapter for network operation.

User Action: Run the adapter diagnostics program to isolate the problem, and contact your support personnel. If no problem was identified by the diagnostics, check that the cable is attached securely to both the adapter and the network interface (wall plate). Switch the computer OFF and then ON again to restart the machine. If the problem persists, contact your support personnel.

LA10011 A possible lobe wire failure was detected while attempting to insert into the network.

Explanation: The adapter is not correctly connected to the token-ring network.

User Action: Check that the cable is securely attached to both the adapter and to the token-ring network. You may need to contact your local network administrator to ensure that the cabling in the building is intact and that the network concentrator to which you are attached is operational. If the error persists, try using a different cable.

LA10012 A signal loss condition was detected while attempting to insert into the network.

Explanation: The token-ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

LA10013 The lobe wire connected to the adapter is not attached to the network.

Explanation: The adapter is not correctly connected to the token-ring network.

User Action: Check that the cable is securely attached to both the adapter and to the token-ring network. You might need to contact your local administrator to ensure that the cabling in the building is intact and that the network concentrator to which you are attached is operational. If the error persists, try using a different cable.

Title: AUF3CNTL CreationDate: 02/17/98 15:18:00

LA10014 **The configured data rate for the adapter does not match that of the network.**

Explanation: The operational speed of the token-ring network does not match the configured speed of the adapter.

User Action: Change the setting of the DataRate configuration parameter to match the speed of the network to which the adapter is attached. Your local network administrator should be able to tell you which speed to use.

Setting the DataRate parameter value to Auto will allow the adapter to automatically determine the correct speed setting to use when connecting to the network, provided that this is not the only adapter active on the token ring.

Consult the adapter installation instructions for additional information on setting the DataRate parameter.

LA10015 **An adapter timeout occurred while attempting to insert into the network.**

Explanation: The token-ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

LA10016 **A ring failure condition was detected while attempting to insert into the network.**

Explanation: The token-ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

LA10017 **A ring beaconing condition was detected while attempting to insert into the network.**

Explanation: The token-ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

LA10018 **A duplicate network address was detected while attempting to insert into the network.**

Explanation: The address specified for the NetAddress configuration parameter is being used by another adapter (or ring station) on the network.

User Action: Modify the configuration file to change the NetAddress parameter value being used for this adapter, or remove the NetAddress parameter to allow the adapter's universally administered address to be used.

Contact your local network administrator for assistance with choosing a new NetAddress parameter value, or to possibly have the conflicting adapter removed from the same token-ring network as this adapter.

LA10019 **A ring parameter failure occurred while attempting to insert into the network.**

Explanation: The token-ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

LA10020 **The adapter was forced to remove itself while attempting to insert into the network.**

Explanation: The token-ring network rejected the attempt by this adapter to connect to it.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

LA10021 **A hardware failure occurred while attempting to open the adapter.**

Explanation: An adapter hardware error was detected when opening the adapter for network operation.

User Action: Run the adapter diagnostics program to isolate the problem, and contact your support personnel. If no problem was identified by the diagnostics, check that the cable is attached securely to both the adapter and the network interface (wall plate). Switch the computer OFF and then ON again to restart the machine. If the problem persists, contact your support personnel.

LA10022 **A hardware failure occurred while attempting to open the adapter.**

Explanation: An adapter hardware error was detected when opening the adapter for network operation.

User Action: Run the adapter diagnostics program to isolate the problem and contact your support personnel. If no problem was identified by the diagnostics, check that the cable is attached securely to both the adapter and the network interface (wall plate). Switch the computer OFF and then ON again to restart the machine. If the problem persists, contact your support personnel.

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LA10023 **The adapter cannot be opened in AutoSense mode if it is the only active station on the network.**

Explanation: The adapter DataRate configuration parameter is set to Auto (which is also the default value if the parameter is not specified), but the adapter is the first station to open on the token-ring network.

User Action: This adapter is designed to not open onto the attached token-ring network if it is configured to use AutoSense detection and if it would have been the first active ring station.

The possible remedies are to try to connecting again at a later time when at least one other ring station is active on the network (such as a network server), or to change the configuration value so that the DataRate parameter is set to a specific ring-speed value of M16 or M4 and restart the computer.

Note that setting a specific value of M16 or M4 for the DataRate parameter will cause this adapter to establish the operational speed of the token-ring network if it is still the first active ring station, so consult your local network administrator if necessary.

Check the adapter installation instructions for additional information on setting the DataRate parameter.

LA10024 **The adapter attempted to perform a Remote Program Load but failed monitor contention.**

Explanation: The adapter was opened as a Remote Program Load (RPL) client, but was unable to locate an RPL server on the network.

User Action: Make sure that there is an active Remote Program Load server on the network and that it is configured to recognize this adapter's address.

LA10025 **A network protocol error occurred while attempting to operate the adapter in full duplex mode.**

Explanation: The adapter was unable to successfully communicate with a token-ring switch when attempting to open for full-duplex operation.

User Action: Check that your full-duplex switch is functioning correctly and that the adapter is correctly connected to it. If this problem persists, contact your support personnel.

LA10027 **The PCI Token-Ring Adapter opened for token ring, *xx* Mbps., half duplex.**

Explanation: Information only.

User Action: None.

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LA10028 **The PCI Token-Ring Adapter opened for token ring, *xx* Mbps., full duplex.**

Explanation: Information only.

User Action: None.

LA10033 **Adapter analysis code is *xx*.**

Explanation: Information only.

User Action: None.

LA10034 **Adapter full-duplex operation has now been activated.**

Explanation: Information only.

User Action: None.

LA10042 **A device driver initialization error occurred (failure code *xx*).**

Explanation: An unexpected error occurred during initialization of the device driver.

User Action: Shut down the computer correctly and switch OFF the power to the machine. Restart the computer by switching it ON again. If the error persists, contact your support personnel.

LA10043 **No adapter instances recognized by this device driver were found in PROTOCOL.INI.**

Explanation: THe PROTOCOL.INI file does not have a section defined by the correct DriverName = line anywhere within it.

User Action: If you intend to run this device driver, make sure to define a valid network configuration in the PROTOCOL.INI file. If you do not intend to run this device driver, remove its DEVICE= statement from the CONFIG.SYS file.

LA10044 **The NDIS 2.0 Protocol Manager could not be opened.**

Explanation: An unexpected error occurred when the program attempted to open the Protocol Manager.

User Action: Check the drive and directory to ensure that the Protocol Manager is located in the path specified in the CONFIG.SYS file. If this error persists, consider reinstalling the NDIS 2.0 network support software.

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LA10045 Could not find the PROTOCOL.INI file image.

Explanation: An unexpected error occurred when the program attempted to read the PROTOCOL.INI file image through interaction with the Protocol Manager.

User Action: Check the drive and directory to ensure that the Protocol Manager is located in the path specified in the CONFIG.SYS file. Verify that a valid PROTOCOL.INI file exists in the proper location. If this error persists, consider reinstalling the NDIS 2.0 network support software.

LA10046 The required DRIVERNAME parameter was not found in PROTOCOL.INI.

Explanation: The parameter specifying the driver name (DRIVERNAME) was not found in the PROTOCOL.INI file. This parameter is required.

User Action: Change PROTOCOL.INI to specify the proper information.

LA10047 The NetAddress value in PROTOCOL.INI is invalid and will be ignored.

Explanation: The value specified for the network address parameter in PROTOCOL.INI is not valid for one of the following reasons:

- Invalid local station address
- Too long
- Too short
- Contains non-hexadecimal characters
- Not enclosed in double quotation marks

User Action: Remove or correct the NetAddress configuration parameter value. A valid value for this parameter is 12 characters long and must be enclosed in double quotation marks. For token-ring adapters, the locally administered address must be within the hex range 400000000000 to 7FFFFFFFFFFF.

Make sure not to set the corresponding group address bit, which is the high-order bit in token-ring addressing notation.

LA10048 An unrecognized parameter *xx* was found in PROTOCOL.INI.

Explanation: An unrecognized parameter was found while processing a section of the PROTOCOL.INI file defined for this device driver.

User Action: Correct the parameter name or remove it from PROTOCOL.INI. Refer to the installation manual that came with your adapter for more information on the configuration parameters.

LA10049 **The configuration parameter *xx* was specified incorrectly. Its default value will be used.**

Explanation: An invalid value was specified for an adapter configuration parameter in the PROTOCOL.INI file. A default value has been substituted.

User Action: Change the PROTOCOL.INI file to specify a valid value for the configuration parameter that is in error. Refer to the installation manual that came with the adapter for more information on the allowable settings for this particular parameter.

The device driver has proceeded with its initialization using a predetermined default value for this parameter.

LA10050 **The NDIS 2.0 device driver was not able to register with the Protocol Manager.**

Explanation: An unexpected error occurred when the program attempted to register an adapter with the Protocol Manager.

User Action: Check the drive and directory to ensure that the Protocol Manager is located in the path specified in the CONFIG.SYS file. If this error persists, consider reinstalling the NDIS 2.0 network support software.

LA10051 **The configuration parameter values have forced the internal data blocks to exceed the allowed limit.**

Explanation: The combination of configuration parameters being used requires more than the 64-KB memory area that is available for this adapter instance to hold its internal control information.

User Action: Lower the value of the MaxTransmits or MinRcvBuffs parameters in the PROTOCOL.INI file to reduce the amount of control block storage required by the device driver. Shut down and restart the computer to activate this configuration change.

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Appendix G. Novell NetWare Server and LAN Client Driver Parameters

For the Novell NetWare server, the parameters are set on the command line or on the `load IBMTRPO` line in the AUTOEXEC.NCF file.

For the LAN Client environment, the parameters are set on the `load IBMRTPO` line of the STARTNET.BAT file.

Table G-1 (Page 1 of 5). Novell NetWare Driver Parameters

Parameter	Explanation
DATARATE=	Configures the token-ring data rate for the IBM PCI Token-Ring Adapter. It is recommended for servers that the DATARATE be set to M16 or M4, and clients be set to AUTO. **Valid values:** AUTO AutoSense – automatic ring-speed detection. **Note:** The adapter will not function with AutoSense if the adapter is the first one on the ring. M16 16-Mbps ring speed operation. M4 4-Mbps ring speed operation. The default value is AUTO. **Note:** If using Novell NetWare SFTIII, M16 or M4 must be selected for the DATARATE parameter on both of the SFTIII machines. Do not use AUTO.

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Table G-1 (Page 2 of 5). Novell NetWare Driver Parameters

Parameter	Explanation
FRAME=	This string defines the frame type to be used with the IBM PCI Token-Ring Adapter adapter when loading the IBMTRPO LAN driver. Token-Ring drivers can add most significant bit (MSB) or least significant bit (LSB) following the frame type designation. LSB forces canonical addresses to be passed between the MLID and the upper layers. The MSB designation forces non-canonical addresses to be passed (this is the default for Token-Ring media). **Valid values** TOKEN-RING or TOKEN-RING_SNAP The default value is TOKEN-RING.
FULLDUPLEX=	This keyword permits the IBMTRPO LAN driver to activate token-ring full-duplex operation supported by the PCI Token-Ring Adapter and the NetWare server environment. **Valid values** YES, NO The default value is YES.

Table G-1 (Page 3 of 5). Novell NetWare Driver Parameters

Parameter	Explanation
NODE=	This keyword is used to set a locally administered address for the IBM PCI Token-Ring Adapter. A local address must contain 12 hexadecimal characters and can be specified in either most significant bit (MSB) or least significant bit (LSB) format. To specify an MSB node address, the letter M immediately follows the last digit of the node address. To specify an LSB node address, the letter L immediately follows the last digit of the node address. If neither an M nor L is specified after the last digit of the node address, MSB will be assumed. If a node address is specified in MSB format, the value must be within the range X'400000000000' to X'7FFFFFFFFFFF' (for example, X'400000000002'M). This same address specified in LSB format would be X'020000000080'L with an L optionally appended to the end. **Notes:** 1. Do not assign the same local address to two or more stations. Severe station communication or network failures can occur when two or more stations are assigned the same address. 2. If you do not assign a locally administered address, the adapter uses the universally administered address permanently encoded in the adapter's memory.
RXBUFFERS=	This keyword defines the number of receive buffers used by the IBMTRPO LAN driver. **Valid values** 4 to 64 The default value is 32. For IBM LAN Client, the default value is 4. **Note:** Receive buffer size is defined by the server SET command. Refer to your Novell NetWare system administration documentation for more information.

Table G-1 (Page 4 of 5). Novell NetWare Driver Parameters

Parameter	Explanation
SLOT=	This keyword defines the slot number of the corresponding IBM PCI Token-Ring Adapter in the computer. To avoid being prompted to enter a slot number when the IBMTRPO LAN driver is loaded, specify this keyword. One SLOT number is required for each PCI Token-Ring Adapter if you are using more than one.
TXBUFFERS=	This keyword defines the number of transmit buffers used by the IBMTRPO LAN driver. **Valid values** 1 to 16 The default value is 16. **Note:** Maximum transmit frame size is defined by the server SET command. Refer to your Novell NetWare system administration documentation for more information.
RTSWEnable (OS/2 only)	This parameter indicates whether the driver should enable code that attempts to send routable traffic directly to a destination rather than through the router. This can improve the performance of these connections and reduce workload at the router. There will be some performance penalty for non-routable traffic (for example, NetBIOS and SNA). If the value is No, all routable frames will be sent through the router. **Valid values:** Yes Enable the code. No Do not enable the code. The default value is No.

Table G-1 (Page 5 of 5). Novell NetWare Driver Parameters

Parameter	Explanation
RTSWTableSize (OS/2 only)	This parameter specifies the number of entries in the route table for Route Switch client support. This should be set equal to or greater than the number of remote stations to which this station will send data using routable frames (for example, TCP/IP, IPX). If it is set too low, some of the traffic that could be sent directly will instead be sent through the router. *Valid values*: 16, 32, 64, 128, 256, 512, 1024 The default is 16. **Note:** At this time, the maximum value for RouteSwitch Client table entries for the Novell Server driver is limited to the range 16 to 200. This means that setting the value to 200 will allow as many as 200 simultaneous connections to be switched instead of being routed.

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Appendix H. Novell NetWare Server and LAN Client Driver Messages

IBMTRPO-xx-202: The PCI Token-Ring Adapter UAA (BIA) is xxx.

Explanation: Information only.

User Action: None.

IBMTRPO-xx-203: The PCI Token-Ring Adapter is using an LAA of xxx.

Explanation: Information only.

User Action: None.

IBMTRPO-xx-204: Revision level xxx of the PCI Token-Ring Adapter is incompatible with this driver version.

Explanation: The Revision ID of the PCI Token-Ring Adapter is not one that is supported by this version of the device driver. This correlation is enforced to ensure an appropriate match between the adapter hardware and the device driver software.

User Action: Contact your customer service center for assistance. You might need to upgrade your PCI Token-Ring Adapter, use a different version of the device driver, or both.

IBMTRPO-xx-205: A device driver initialization error occurred (failure code xxx).

Explanation: An unexpected error occurred during initialization of the device driver.

User Action: Shut down the computer and switch OFF the power to the machine. Restart the computer by switching it ON again. If the error persists, contact your customer service center.

IBMTRPO-xx-206: The configuration parameter xxx was specified incorrectly. Its default value will be used.

Explanation: The value of a configuration parameter was incorrectly specified.

User Action: Edit the configuration file (or rerun the configuration program) to specify a value that is of the correct type and within the allowed range. Check the adapter installation instructions for additional information.

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IBMTRPO-xx-207: The configuration parameter values have forced the internal data blocks to exceed the allowed limit.

Explanation: The combination of configuration parameters being used requires more than the 64-KB memory area that is available for this adapter instance to hold its internal control information.

User Action: Lower the value of the TXBUFFERS or RXBUFFERS parameters from their current setting to reduce the amount of control-block storage required by the device driver. Unload and load IBMTRPO to activate this configuration change.

IBMTRPO-xx-208: Unable to register interrupt level xxx for this adapter.

Explanation: The hardware interrupt level assigned to this adapter was not able to be registered (hooked) by the device driver.

User Action: Check the configuration of your computer, looking for other devices that are assigned the same interrupt level as this adapter. Try removing the conflicting device from the machine and restart the computer to see if the problem goes away. If so, determine whether the conflicting device can be left out of the machine, or whether the machine can be reconfigured to resolve the conflict. Note that in most PCI machines, the PCI BIOS assigns certain system resources to the devices found in the computer, including the interrupt level.

IBMTRPO-xx-210: A hardware failure occurred while attempting to open the adapter.

Explanation: An adapter hardware error was detected when opening the adapter for network operation.

User Action: Run the adapter diagnostics program. See “Adapter Diagnostics” on page 5-17.

IBMTRPO-xx-211: A possible lobe wire failure was detected while attempting to insert into the network.

Explanation: The adapter is not correctly connected to the token-ring network.

User Action: Check that the cable is securely attached to both the adapter and to the token-ring network. You might need to contact your local network administrator to ensure that the cabling in the building is intact and that the network concentrator to which you are attached is operational. If the error persists, try using a different cable.

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IBMTRPO-xx-212: A signal loss condition was detected while attempting to insert into the network.

Explanation: The token-ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

IBMTRPO-xx-213: The lobe wire connected to the adapter is not attached to the network.

Explanation: The adapter is not correctly connected to the token-ring network.

User Action: Check that the cable is securely attached to both the adapter and to the token-ring network. You may need to contact your local network administrator to ensure that the cabling in the building is intact and that the network concentrator to which you are attached is operational. If the error persists, try using a different cable.

IBMTRPO-xx-214: The configured data rate for the adapter does not match that of the network.

Explanation: The operational speed of the token-ring network does not match the configured speed of the adapter.

User Action: Change the setting of the DATARATE configuration parameter to match the speed of the network to which the adapter is attached. Your local network administrator should be able to tell you which speed to use. Setting the DataRate parameter value to AUTO will allow the adapter to automatically determine the correct speed setting to use when connecting to the network, provided that this is not the only adapter active on the Token Ring. Consult the adapter installation instructions for additional information on setting the DataRate parameter.

IBMTRPO-xx-215: An adapter timeout occurred while attempting to insert into the network.

Explanation: The token-ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

IBMTRPO-xx-216: A ring failure condition was detected while attempting to insert into the network.

Explanation: The Token-Ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

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IBMTRPO-xx-217: A ring beaconing condition was detected while attempting to insert into the network.

Explanation: The token-ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

IBMTRPO-xx-218: A duplicate network address was detected while attempting to insert into the network.

Explanation: The address specified for the NetAddress configuration parameter is being used by another adapter (ring station) on the network.

User Action: Modify the configuration file to change the Node parameter value being used for this adapter, or remove the Node parameter to allow the adapter's universally administered address to be used. Contact your local network administrator for assistance with choosing a new Node parameter value, or to have the conflicting adapter removed from the same token-ring network as this adapter.

IBMTRPO-xx-219: A ring parameter failure occurred while attempting to insert into the network.

Explanation: The token-ring network is not functioning correctly.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

IBMTRPO-xx-220: The adapter was forced to remove itself while attempting to insert into the network.

Explanation: The token-ring network rejected the attempt by this adapter to connect to it.

User Action: Contact your local network administrator to determine the status of your network, or try connecting again at a later time.

IBMTRPO-xx-221: A hardware failure occurred while attempting to open the adapter.

Explanation: An adapter hardware error was detected when opening the adapter for network operation.

User Action: Run the adapter diagnostics program. See "Adapter Diagnostics" on page 5-17.

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IBMTRPO-xx-222: A hardware failure occurred while attempting to open the adapter.

Explanation: An adapter hardware error was detected when opening the adapter for network operation.

User Action: Run the adapter diagnostics program. See “Adapter Diagnostics” on page 5-17.

IBMTRPO-xx-223: The adapter cannot be opened in AutoSense mode if it is the only active station on the network.

Explanation: The adapter DataRate configuration parameter is set to AUTO (which is also the default value if the parameter is not specified), but the adapter is the first station to open on the token-ring network.

User Action: This adapter is designed to not open onto the attached token-ring network if it is configured to use AutoSense detection and if it would have been the first active ring station.

The possible remedies are to try connecting again at a later time when at least one other ring station is active on the network (such as a network server), or to change the configuration value so that the DATARATE parameter is set to a specific ring-speed value of M16 or M4 and unload and load IBMTRPO to activate this configuration change.

Note that setting a specific value of M16 or M4 for the DataRate parameter will cause this adapter to establish the operational speed of the Token-Ring network if it is still the first active ring station, so consult with your local network administrator if necessary.

Check the adapter installation instructions for additional information on setting the DataRate parameter.

IBMTRPO-xx-225: A network protocol error occurred while attempting to operate the adapter in full-duplex mode.

Explanation: The adapter was unable to successfully communicate with a token-ring switch when attempting to open for full-duplex operation.

User Action: Check that your full-duplex switch is functioning correctly and that the adapter is correctly connected to it. If this problem persists, contact your customer service center.

IBMTRPO-xx-227: The PCI Token-Ring Adapter opened for Token Ring, xxx Mbps, half duplex.

Explanation: Information only.

User Action: None.

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IBMTRPO-xx-228: The PCI Token-Ring Adapter opened for Token Ring, xxx Mbps, full-duplex.

Explanation: Information only.

User Action: None.

IBMTRPO-xx-229: The adapter is configured for full-duplex, but could be opened in half-duplex mode only.

Explanation: Information only.

User Action: None.

IBMTRPO-xx-233: Adapter analysis code is xxx.

Explanation: Information only.

User Action: None.

IBMTRPO-xx-234: Adapter full-duplex operation has now been activated.

Explanation: Information only.

User Action: None.

IBMTRPO-xx-304: Adapter is disconnected from the media.

Explanation: The media network is not functioning correctly.

User Action: Verify that the cable is securely attached to both the adapter and the token-ring network. Run adapter diagnostics if the problem persists. You might need to contact your local administrator to ensure that the cabling in the building is intact and that the network concentrator to which you are attached is operational. If the error persists, try using a different cable.

IBMTRPO-xx-305: Condition restored. The adapter is connected to the media.

Explanation: Information only.

User Action: None.

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Appendix I. Novell NetWare DOS and OS/2 ODI Driver Parameters

The following parameters can be configured in the NET.CFG file.

Table I-1 (Page 1 of 3). DOS and OS/2 Configurable Driver Parameters in NET.CFG

Parameter	Explanation
FRAME	This keyword defines the frame type used with the network adapter. **Valid values:** • TOKEN-RING MSB • TOKEN-RING LSB • TOKEN-RING_SNAP MSB • TOKEN-RING_SNAP LSB The default value is Token-Ring MSB.

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Table I-1 (Page 2 of 3). DOS and OS/2 Configurable Driver Parameters in NET.CFG

Parameter	Explanation
NODE ADDRESS	To set a locally administered address for the adapter, type the local address you want to use. The local address must contain 12 hexadecimal characters and can be specified in either MSB (the default), or LSB format. To specify an MSB node address, the letter "M" immediately follows the last digit of the node address. To specify an LSB node address, the letter "L" immediately follows the last digit of the node address. If a node address is specified in MSB format, the characters must be within the range X'400000000000'–X'7FFFFFFFFFFF'. To specify a node address in MSB format, append an "M" to the end of the address (for example, 400000000001M). This address specified in LSB format would be X'020000000080L'. **Notes:** 1. Do not assign the same local address to two or more stations. Severe station communication or network failures may occur when two or more stations are assigned the same address. 2. If you do not assign a locally administered address, the adapter uses the universally administered address (the address encoded in the adapter memory at the factory). The universally administered address appears on a label on the PCI Token-Ring Adapter. See Figure 5-1 on page 5-13 for an illustration.
SLOT	This keyword defines the slot number of the corresponding PCI Token-Ring Adapter in the computer. Slots must be assigned sequentially. This assignment is used to avoid conflict with other adapters. **Valid values:** 10001 or 10002 The default value is 10001.

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Table I-1 (Page 3 of 3). DOS and OS/2 Configurable Driver Parameters in NET.CFG

Parameter	Explanation
DATARATE	This keyword defines the data-rate setting for the adapter. It is recommended that clients be set to AUTO. **Valid values:** AUTO AutoSense – automatic ring-speed detection. **Note:** The adapter will not function with AutoSense if the adapter is the first one on the ring. M16 16-Mbps ring-speed operation. M4 4-Mbps ring-speed operation. The default value is AUTO.
RXBUFFERS	This keyword defines the number of receive buffers used by the driver. **Valid values:** 9 to 64 The default value is 16.
TXBUFFERS	This keyword defines the number of transmit buffers used by the driver. **Valid values:** 1 to 3 The default value is 1.
FULLDUPLEX	This keyword influences whether a full-duplex network connection will be requested by the adapter. **Valid values:** NO, YES The default value is YES.

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Appendix J. Notices

References in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service in this publication is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program, or service. Evaluation and verification of operation in conjunction with other products, programs, or services, except those expressly designated by IBM, are the user's responsibility.

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Safety

Telecommunications Safety Requirements in the United Kingdom

This IBM product is made to high safety standards. It complies inherently with telecommunications safety standard BS 6301. It is not designed to provide protection from excessive voltages appearing externally at its interfaces. Therefore, when this product is connected to a public telecommunications network via any other equipment, and you connect to this product items not supplied by IBM United Kingdom Ltd., you must comply with mandatory telecommunications safety requirements.

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Statement of Compliance with the United Kingdom Telecommunications Act 1984

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connections to the public telecommunications systems in the United Kingdom.

Electronic Emission Notices (Wake-on LAN Only)

This section is the Federal Communications Commission (FCC) Document of Conformity for the IBM PCI Wake on LAN Token-Ring Adapter only. The other FCC notices in this section do not apply to the IBM PCI Wake on LAN Token-Ring Adapter. Any other non-FCC notices in this appendix apply to both the PCI Token-Ring Adapter and the IBM PCI Wake on LAN Token-Ring Adapter.

IBM PCI Wake on LAN Token-Ring Adapter, P/N 86H1879, when using Shielded Twisted Pair Cable Media or when using Unshielded Twisted Pair Cable and a Shielded Power Cord

Federal Communications Commission (FCC) Statement

Note: 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 an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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.

Responsible Party:

International Business Machines Corporation
Old Orchard Road
Armonk, NY 10504
Telephone 1-919-543-2193

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Electronic Emission Notices for STP Media

Federal Communications Commission (FCC) Statement

Note: 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 an IBM authorized dealer or service representative for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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.

Industry Canada Compliance Statement

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This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled: *Digital Apparatus*, ICES-003 of Industry Canada.

Avis de conformité aux normes d'Industrie Canada

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouiller: *Appareils numériques*, NMB-003 édictée par Industrie Canada.

European Norm (EN) Statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment. IBM cannot accept responsibility for any interference caused by using other than recommended cables and connectors.

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Hinweis zur Elektromagnetischen Vertraeglichkeit (EMVG)

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die

IBM UK Ltd
PO Box 30
Spango Valley,
Greenock,
Scotland PA16 0AH.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

Japanese Voluntary Control Council for Interference (VCCI) Statement

Japanese Voluntary Control Council for Interference (VCCI) Statement

This product is a Class B Information Technology Equipment and conforms to the standards set by the Voluntary Control Council for Interference by Technology Equipment (VCCI). This product is aimed to be used in a domestic environment. When used near a radio or TV receiver, it may become the cause of radio interference. Read the instructions for correct handling.

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取扱説明書に従って正しい取り扱いをして下さい。

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Electronic Emission Notices for UTP Media

In order to be compliant with FCC Class B, EN55022 Class B, and VCCI Class B emissions standards, as stated in “Electronic Emission Notices for STP Media” on page J-4 when using this adapter with UTP cabling, you MUST use a shielded power cord as described in “Power Cord Notices for UTP Media” on page J-9 to attach your PC to the AC outlet. Otherwise, the following statements apply for this adapter.

Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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.

Industry Canada Compliance Statement

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This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled: *Digital Apparatus*, ICES-003 of Industry Canada.

Avis de conformité aux normes d'Industrie Canada

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouiller : *Appareils numériques*, NMB-003 édictée par Industrie Canada.

European Norm (EN) Statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

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

Operation of this product in a domestic/residential environment may cause radio interference, which the user may be required to take measures to suppress.

Hinweis zur Elektromagnetischen Vertraeglichkeit (EVMG)

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen. Der Außteller der Konformitätserklärung ist die

IBM UK Ltd
PO Box 30
Spango Valley,

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Greenock,
Scotland PA16 0AH.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse A. Für diese Klasse von Geräten gilt folgende Bestimmung nach dem EMVG:

Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesminesters für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind. (Auszug aus dem EMVG vom 9.Nov.92, Para.3, Abs.4)

Dieses Genehmigungsverfahren ist von der Deutschen Bundespost noch nicht veröffentlicht worden.

Japanese Voluntary Control Council for Interference (VCCI) Statement

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

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Power Cord Notices for UTP Media

When using the PCI Token-Ring Adapter in a Class B environment with UTP cable media, you must use a shielded power cord to attach your PC to the AC outlet in order to be Class B compliant.

Shielded power cords used in the United States and Canada are listed by Underwriters Laboratories (UL) and certified by the Canadian Standards Association (CSA). Always purchase a shielded power cord with the UL or CSA rating located on the packaging or power cord itself. These shielded power cords are readily available

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at your local electronic distributors. IBM makes the shielded power cord P/N 6952304 available through your IBM Marketing Representative for use at 115 volts in the United States and Canada. If purchasing other than the IBM P/N, use a UL-listed or CSA-certified shielded power cord consisting of a minimum 18 AWG, type SVT or SJT, three-conductor line cord, a maximum of 15 feet in length, and a NEMA WD-1 5-15P type attachment plug rated at 15 amperes, 125 volts.

For PCs intended to be operated at 230 volts in the United States and Canada, use IBM shielded line cord P/N 1838578, available through your IBM Marketing Representative or purchase a UL-listed or CSA-certified line cord consisting of a minimum 18 AWG, type SVT or SJT, three-conductor cord, a maximum or 15 feet in length, and a NEMA WD-1 6-15P type attachment plug rated at 15 amperes, 250 volts.

For all PCs intended to be operated at 230 volts outside the United States and Canada, use the shielded line cord specific to your country as shown in the following table. These shielded power cords are available through your country IBM Marketing Representative.

Table J-1 (Page 1 of 2). Power Cords Listed by Country

IBM Power Cord Part Number	Used in These Countries
13F9948	Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa

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Table J-1 (Page 2 of 2). Power Cords Listed by Country

IBM Power Cord Part Number	Used in These Countries
13F9988	Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, Chech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Macau, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe
14F0006	Denmark
14F0024	Bangladesh, Burma, Pakistan, South Africa, Sri Lanka
14F0042	Antigua, Bahrain, Brunei, Channel Islands, Cyprus, Dubai, Fiji, Ghana, Hong Kong, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia
14F0060	Liechtenstein, Switzerland
14F0078	Chile, Ethiopia, Italy, Libya, Somalia
14F0096	Israel
1838578	Thailand
6952304 (115v usage) 1838579 (230v usage)	Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela

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International Business Machines Corporation *Armonk, NY 10504*

Statement of Limited Warranty

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Machine PCI Token-Ring Adapter and PCI Wake-on LAN Token-Ring Adapter

Warranty Period* Lifetime

**Elements and accessories are warranted for three months. Contact your place of purchase for warranty service information.*

Production Status

Each Machine is manufactured from new parts, or new and serviceable used parts (which perform like new parts). In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

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IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. IBM calculates the expiration of the warranty period from the Machine's Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period, IBM or your reseller will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine. IBM or your reseller will specify the type of service.

For a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Some of these transactions (called "Net-Priced" transactions) may include additional parts and associated replacement parts that are provided on an exchange basis. All removed parts become the property of IBM and must be returned to IBM.

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To obtain warranty service for the Machine, you should contact your reseller or call IBM. In the United States, call IBM at **1-800-426-7299** In Canada, call IBM at **1-800-565-3344.**. You may be required to present proof of purchase.

Depending on the Machine, the service may be 1) a “Repair” service at your location (called “On-site”) or at one of IBM’s or a reseller’s service locations (called “Carry-in”) or 2) an “Exchange” service, either On-site or Carry-in.

When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced.

It is your responsibility to:

1. obtain authorization from the owner (for example, your lessor) to have IBM or your reseller service a Machine that you do not own;
2. where applicable, before service is provided —
   a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide,
   b. secure all programs, data, and funds contained in a Machine,
   c. inform IBM or your reseller of changes in a Machine’s location, and
   d. for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit when you are responsible for the transportation charges.

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Glossary of Terms and Abbreviations

This glossary defines terms and abbreviations used in this manual. It includes terms and definitions from the *IBM Dictionary of Computing* (New York; McGraw-Hill, Inc., 1994).

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The following cross-references are used in this glossary:

Contrast with. This refers to a term that has an opposed or substantively different meaning.

See. This refers the reader to multiple-word terms in which this term appears.

See also. This refers the reader to terms that have a related, but not synonymous, meaning.

Synonym for. This indicates that the term has the same meaning as a preferred term, which is defined in the glossary.

A

access priority. The maximum priority that a token can have for the adapter to use it for transmission.

adapter address. Twelve hexadecimal digits that identify a LAN adapter.

address. (1) In data communication, the IEEE-assigned unique code or the unique locally administered code assigned to each device or workstation connected to a network. (2) A character, group of characters, or a value that identifies a register, a particular part of

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storage, a data source, or a data sink. The value is represented by one or more characters. (3) To refer to a device or an item of data by its address. (4) The location in the storage of a computer where data is stored. (5) In word processing, the location, identified by the address code, of a specific section of the recording medium or storage.

APAR. Authorized program analysis report.

ARP. Address Resolution Protocol.

attach. To make a device a part of a network logically.

> **Note:**
>
> Not to be confused with *connect,* which implies physically connecting a device to a network.

attaching device. Any device that is physically connected to a network and can communicate over the network.

auto-removal. The removal of a device from data-passing activity without human intervention. This action is accomplished by the adapter in the device, and can be initiated by a network management program.

available memory. In a personal computer, the number of bytes of memory that can be used after memory requirements for the operating system, device drivers, and other application programs have been satisfied.

B

beaconing. An error-indicating function of token-ring adapters that assists in locating a problem causing a hard error on a token-ring network.

BIA. Burned-In Address. The address of a LAN adapter card, burned into the card and unique to the card.

BIOS. Basic Input/Output Services. See also *NetBIOS*.

block size. (1) The minimum size that frames are grouped into for retransmission. (2) The number of data elements (such as bits, bytes, characters, or records) that are recorded or transmitted as a unit.

buffer. (1) A portion of storage used to hold input or output data temporarily. (2) A routine or storage used to compensate for a difference in data rate or time of occurrence of events, when transferring data from one device to another.

bus. (1) In a processor, a physical facility on which data is transferred to all destinations, but from which only addressed destinations may read in accordance with appropriate conventions. (2) A network configuration in which nodes are interconnected through a bidirectional transmission medium. (3) One or more conductors used for transmitting signals or power.

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C

CPU. Central processing unit.

CRC. See *cyclic redundancy check (CRC)*.

CSD. corrective service diskette.

cable segment. A section of cable between components or devices on a network. A segment may consist of a single patch cable, multiple patch cables connected together, or a combination of building cable and patch cables connected together. See *LAN segment*, *ring segment*.

computer architecture. The organizational structure of a computer system, including hardware and software.

configuration. (1) The arrangement of a computer system or network as defined by the nature, number, and chief characteristics of its functional units. More specifically, the term may refer to a hardware configuration or a software configuration. (2) The devices and programs that make up a system, subsystem, or network. (3) See also *system configuration*.

connect. In a LAN, to physically join a cable from a station to an access unit or network connection point. Contrast with *attach*.

control block. (1) A storage area used by a computer program to hold control information. (2) In the IBM Token-Ring Network, a specifically formatted block of information provided from the application program to the Adapter Support Interface to request an operation.

cyclic redundancy check (CRC). Synonym for *frame check sequence (FCS)*.

D

data rate. See *data transfer rate, line data rate*.

data transfer rate. The average number of bits, characters, or blocks per unit of time passing between equipment in a data-transmission session. The rate is expressed in bits, characters, or blocks per second, minute, or hour.

default. Pertaining to an attribute, value, or option that is assumed when none is explicitly specified.

default value. A value assumed when no value has been specified.

device driver. The code needed to attach and use a device on a computer or a network.

diagnostics. Modules or tests used by computer users and service personnel to diagnose hardware problems.

DLS. DOS LAN Services

DOS. See *IBM Personal Computer Disk Operating System (DOS)*.

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duplex. In data communication, pertaining to a simultaneous two-way independent transmission in both directions. Synonymous with *full-duplex*. Contrast with *half-duplex*.

E

EISA. Extended Industry Standard Architecture.

enabled. (1) On a LAN, pertaining to an adapter or device that is active, operational, and able to receive frames from the network. (2) Pertaining to a state of a processing unit that allows the occurrence of certain types of interruptions. (3) Pertaining to the state in which a transmission control unit or an audio response unit can accept incoming calls on a line.

F

FCS. See *frame check sequence (FCS)*

frame. (1) The unit of transmission in some LANs, including the IBM Token-Ring Network and the IBM PC Network. It includes delimiters, control characters, information, and checking characters. On a token-ring network, a frame is created from a token when the token has data appended to it. On a token bus network (IBM PC Network), all frames including the token frame contain a preamble, start delimiter, control address, optional data and checking characters, end delimiter, and are followed by a minimum silence period. (2) A housing for machine elements. (3) In synchronous data link control (SDLC), the vehicle for every command, every response, and all information that is transmitted using SDLC procedures. Each frame begins and ends with a flag.

frame check sequence (FCS). (1) A system of error checking performed at both the sending and receiving station after a block check character has been accumulated. (2) A numeric value derived from the bits in a message that is used to check for any bit errors in transmission. (3) A redundancy check in which the check key is generated by a cyclic algorithm. Synonymous with *cyclic redundancy check (CRC)*.

FTP. File Transfer Protocol.

full-duplex. Synonym for *duplex*.

G

group address. In a LAN, a locally administered address assigned to two or more adapters to allow the adapters to copy the same frame. Contrast *locally administered address* with *universally administered address*.

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H

half-duplex. In data communication, pertaining to transmission in only one direction at a time. Contrast with *duplex*.

hard error. An error condition on a network that requires that the source of the error be removed or that the network be reconfigured before the network can resume reliable operation. See also *beaconing*. Contrast with *soft error*.

I

IBM Personal Computer Disk Operating System (DOS). A disk operating system based on MS-DOS.

IDE. Integrated drive electronics.

IEEE. Institute of Electrical and Electronics Engineers.

IEEE 802.2. Data Link protocol standard for use with IEEE 802.3 (Ethernet), 802.4 (Token Bus), and 802.5 (Token Ring) standards.

initialize. In a LAN, to prepare the adapter (and adapter support code, if used) for use by an application program.

insert. To make an attaching device an active part of a LAN.

interrupt. (1) A suspension of a process, such as execution of a computer program, caused by an external event and performed in such a way that the process can be resumed. (2) To stop a process in such a way that it can be resumed. (3) In data communication, to take an action at a receiving station that causes the sending station to end a transmission. (4) A means of passing processing control from one software or microcode module or routine to another, or of requesting a particular software, microcode, or hardware function.

interrupt level. The means of identifying the source of an interrupt, the function requested by an interrupt, or the code or feature that provides a function or service.

I/O. Input/output.

IP. Internet Protocol.

IPX. (1) Internet Packet Exchange. (2) Internetwork Packet Exchange.

ISA. Industry Standard Architecture.

K

KB. (1) For processor storage and real and virtual memory, 1024 bytes. (2) For disk storage capacity and transmission rates, 1000 bytes.

L

LAN. See *local area network (LAN)*.

LANAID. LAN Adapter Installation and Diagnostic program. A LAN adapter installation and configuration program used in environments that do not support Plug-and-Play.

LAN Client. IBM LAN adapter environment that minimizes the amount of DOS conventional memory (below 1 MB) used by drivers and protocol stacks.

LAN segment. (1) Any portion of a LAN (for example, a single bus or ring) that can operate independently but is connected to other parts of the establishment network via bridges. (2) An entire ring or bus network without bridges. See *cable segment*, *ring segment*.

LAPS. LAN Adapter and Protocol Support.

LED. Light-emitting diode.

line data rate. The rate of data transmission over a telecommunications link.

link. (1) The logical connection between nodes including the end-to-end link control procedures. (2) The combination of physical media, protocols, and programming that connects devices on a network. (3) In computer programming, the part of a program, in some cases a single instruction or an address, that passes control and parameters between separate portions of the computer program. (4) To interconnect items of data or portions of one or more computer programs. (5) In SNA, the combination of the link connection and link stations joining network nodes.

LLC. Logical link control.

local area network (LAN). A computer network located on a user's premises within a limited geographical area.
Note: Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary may be subject to some form of regulation.

locally administered address. An adapter address that the user can assign to override the universally administered address. Contrast with *universally administered address*.

LSB. Least significant bit.

LSL. Link support layer.

M

Mbps. Megabits per second.

MBps. Megabytes per second.

medium. A physical carrier of electrical or optical energy.

media access control (MAC) protocol. In a local area network,

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the part of the protocol that governs communication on the transmission medium without concern for the physical characteristics of the medium, but taking into account the topological aspects of the network, in order to enable the exchange of data between data stations.

MHz. Megahertz.

MPTS. Multiple Protocol Transport Services.

MSB. Most significant bit.

N

NDIS. Network driver interface specification.

NetBIOS. Network Basic Input/Output System. An operating system interface for application programs used on IBM personal computers that are attached to the IBM Token-Ring Network. See also *BIOS*.

NLM. NetWare loadable module.

network administrator. A person who manages the use and maintenance of a network.

network architecture. The logical structure and operating principles of a computer network. See also *systems network architecture (SNA)* and *Open Systems Interconnection (OSI) architecture*.
Note: The operating principles of a network include those of services, functions, and protocols.

node. (1) Any device, attached to a network, that transmits and/or receives data. (2) An endpoint of a link, or a junction common to two or more links in a network. (3) In a network, a point where one or more functional units interconnect transmission lines.

node address. The address of an adapter on a LAN.

O

OEM. Original equipment manufacturer.

open. (1) To make an adapter ready for use. (2) A break in an electrical circuit. (3) To make a file ready for use.

Open Systems Interconnection (OSI). (1) The interconnection of open systems in accordance with specific ISO standards. (2) The use of standardized procedures to enable the interconnection of data processing systems.
Note: OSI architecture establishes a framework for coordinating the development of current and future standards for the interconnection of computer systems. Network functions are divided into seven layers. Each layer represents a group of related data processing and communication functions that can be carried out in a standard way to support different applications.

Open Systems Interconnection (OSI) architecture. Network

architecture that adheres to a particular set of ISO standards that relates to Open Systems Interconnection.

Open Systems Interconnection (OSI) reference model. A model that represents the hierarchical arrangement of the seven layers described by the Open Systems Interconnection architecture.

option. (1) A specification in a statement, a selection from a menu, or a setting of a switch, that may be used to influence the execution of a program. (2) A hardware or software function that may be selected or enabled as part of a configuration process. (3) A piece of hardware (such as a network adapter) that can be installed in a device to modify or enhance device function.

P

packet. (1) In data communication, a sequence of binary digits, including data and control signals, that is transmitted and switched as a composite whole. (2) Synonymous with *data frame*. Contrast with *frame*.

parameter. (1) A variable that is given a constant value for a specified application and that may denote the application. (2) An item in a menu or for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed between programs or procedures.

path. (1) In a network, any route between any two nodes. (2) The route traversed by the information exchanged between two attaching devices in a network. (3) A command in IBM Personal Computer Disk Operating System (PC DOS) and IBM Operating System/2 (OS/2) that specifies directories to be searched for commands or batch files that are not found by a search of the current directory.

PC. Personal computer.

PCI. Peripheral Component Interconnect.

Peripheral Component Interconnect (PCI). The PCI Local Bus is a high performance 32-bit or 64-bit bus. It is intended for use as an interconnect mechanism between highly integrated peripheral controller components, peripheral add-in boards, and processor/memory systems.

power-on self-test (POST). A series of diagnostic tests that are run automatically each time the computer's power is turned on.

protocol. (1) A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. (2) In SNA, the meanings of and the sequencing rules for requests and responses used for managing the network, transferring data, and synchronizing the states of network

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components. (3) A specification for the format and relative timing of information exchanged between communicating parties.

R

RAM. Random access memory. (A)

RARP. Reverse Address Resolution Protocol.

register. (1) A storage area in a computer's memory where specific data is stored. (2) A storage device having a specified storage capacity such as bit, byte, or computer word, and usually intended for a special purpose.

remove. (1) To take an attaching device off a network. (2) To stop an adapter from participating in data passing on a network.

ring segment. A ring segment is any section of a ring that can be isolated (by unplugging connectors) from the rest of the ring. A segment can consist of a single lobe, the cable between access units, or a combination of cables, lobes, and/or access units. See *cable segment*, *LAN segment*.

ROM. Read only memory. (A)

S

SCSI. Small computer system interface.

segment. See *cable segment*, *LAN segment*, *ring segment*.

shielded twisted pair. A transmission medium of two twisted conductors with a foil or braid shell.

SMP. System Modification Program

soft error. An intermittent error on a network that causes data to have to be transmitted more than once to be received. A soft error affects the network's performance but does not, by itself, affect the network's overall reliability. If the number of soft errors becomes excessive, reliability is affected. Contrast with *hard error*.

station. (1) A communication device attached to a network. The term used most often in LANs is an *attaching device* or *workstation*. (2) An input or output point of a system that uses telecommunication facilities; for example, one or more systems, computers, terminals, devices, and associated programs at a particular location that can send or receive data over a telecommunication line. See also *attaching device, workstation*.

STP. See *shielded twisted pair*.

system. In data processing, a collection of people, machines, and methods organized to accomplish a set of specific functions.

Systems Application Architecture (SAA). An architecture developed by IBM that consists of a set of selected software interfaces, conventions, and protocols, and that serves as a common framework for application development, portability, and use across different IBM hardware systems.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through, and controlling the configuration and operation of, networks.

Note: The layered structure of SNA allows the ultimate origins and destinations of information, that is, the end users, to be independent of and unaffected by the specific SNA network services and facilities used for information exchange.

T

TCP/IP. Transmission Control Protocol/Internet Protocol. A set of communication protocols that support peer-to-peer connectivity functions for both local and wide area networks.

telephone twisted pair. One or more twisted pairs of copper wire in the unshielded voice-grade cable commonly used to connect a telephone to its wall jack. Also referred to as “unshielded twisted pair” (UTP).

threshold. (1) A level, point, or value above which something is true or will take place and below which it is not true or will not take place. (2) In IBM bridge programs, a value set for the maximum number of frames that are not forwarded across a bridge due to errors, before a “threshold exceeded” occurrence is counted and indicated to network management programs. (3) An initial value from which a counter is decremented to zero, or a value to which a counter is incremented or decremented from an initial value. When the counter reaches zero or the threshold value, a decision is made and/or an event occurs.

token. A sequence of bits passed from one device to another on the token-ring network that signifies permission to transmit over the network. It consists of a starting delimiter, an access control field, and an end delimiter. The access control field contains a bit that indicates to a receiving device that the token is ready to accept information. If a device has data to send along the network, it appends the data to the token. When data is appended, the token then becomes a frame. See *frame*.

token ring. A network with a ring topology that passes tokens from one attaching device (node) to another. A node that is ready to send can capture a token and insert data for transmission.

token-ring network. (1) A ring network that allows unidirectional data transmission between data

stations by a token-passing procedure over one transmission medium so that the transmitted data returns to and is removed by the transmitting station. The IBM Token-Ring Network is a baseband LAN with a star-wired ring topology that passes tokens from network adapter to network adapter. (2) A network that uses a ring topology, in which tokens are passed in a sequence from node to node. A node that is ready to send can capture the token and insert data for transmission. (3) A group of interconnected token rings.

twisted pair. A transmission medium that consists of two insulated conductors twisted together to reduce noise.

U

universally administered address. The address permanently encoded in an adapter at the time of manufacture. All universally administered addresses are unique. Contrast with *locally administered address*.

unshielded twisted pair (UTP). See *telephone twisted pair*.

UTP. See *unshielded twisted pair (UTP)* See also *telephone twisted pair*.

W

W. Watt.

wire fault. An error condition caused by a break or a short circuit in the cable segment that connects the adapter port to its access unit.

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