Turbo 16/4 Token-Ring PC Card 2

User's Guide

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Note

Before using this information and the product it supports, be sure to read the general information under “Appendix G. Notices and Warranty” on page 95.

Eighth Edition (July 1999)

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Contents

Preface

This manual contains the information you need to install and use your PC Card. Unless specified, all references in this book to the PC Card apply to the IBM Turbo 16/4 Token-Ring PC Card 2.

On this CD-ROM are the installation aids, device drivers, and documentation for the PC Card.

Who Should Read This Manual

This manual is intended for use by network administrators and other end users of the IBM Turbo 16/4 Token-Ring PC Card 2.

How This Manual Is Organized

Related Information

Refer to these publications for additional information:

- *BOF for LAN Technical Reference Adapter Interfaces*, SBOF-6221
- *IBM Token-Ring Network Architecture Reference*, SC30-3374
- *LAN Technical Reference IEEE 802.2 and NETBIOS*, SC30-3587
- *Credit Card Adapter Technical Reference*, SC30-3585
- *NTS/2 LAN Adapter and Protocol Support Configuration Guide*, S96F-8489
- *LAN Technical Reference: Token-Ring Network Shared-RAM*, SC30-3588
- *IBM Token-Ring Adapter Features*, available on the IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM
- IBM Networking home page on the World Wide Web:

  `www.networking.ibm.com`
- You will need the manuals that were shipped with your network operating system.

Note: SBOF-6221 and SC30-3587 replace *Local Area Network Technical Reference*, SC30-3383.

Safety Information

Danger: Before you begin to install this product, read the safety information in *Caution: Safety Information—Read This First*, SD21-0030. This booklet describes safe procedures for cabling and plugging in electrical equipment.

Varning — livsfara: Innan du börjar installera den här produkten bör du läsa säkerhetsinformationen i dokumentet *Varning: Säkerhetsföreskrifter— Läs detta först,* SD21-0030. Där beskrivs hur du på ett säkert sätt ansluter elektrisk utrustning.

Fare: Før du begynner å installere dette produktet, må du lese sikkerhetsinformasjonen i *Advarsel: Sikkerhetsinformasjon — Les dette først*, SD21-0030 som beskriver sikkerhetsrutinene for kabling og tilkobling av elektrisk utstyr.

Fare! Før du installerer dette produkt, skal du læse sikkerhedsforskrifterne i *NB: Sikkerhedsforskrifter—Læs dette først* SD21-0030. Vejledningen beskriver den fremgangsmåde, du skal bruge ved tilslutning af kabler og udstyr.

Gevaar: Voordat u begint met de installatie van dit produkt, moet u eerst de veiligheidsinstructies lezen in de brochure *PAS OP! Veiligheidsinstructies—Lees dit eerst,* SD21-0030. Hierin wordt beschreven hoe u electrische apparatuur op een veilige manier moet bekabelen en aansluiten.

Gevaar Voordat u begint met het installeren van dit produkt, dient u eerst de veiligheidsrichtlijnen te lezen die zijn vermeld in de publikatie *Caution: Safety*

Information - Read This First, SD21-0030. In dit boekje vindt u veilige procedures voor het aansluiten van elektrische appratuur.

Vorsicht: Bevor mit der Installation des Produktes begonnen wird, die Sicherheitshinweise in *Achtung: Sicherheitsinformationen—Bitte zuerst lesen,* IBM Form SD21-0030. Diese Veröffentlichung beschreibt die Sicherheitsvorkehrungen für das Verkabeln und Anschließen elektrischer Geräte.

危険： 導入作業を開始する前に、安全に関する
小冊子SD21-0030 の「最初にお読みください」
(Read This First)の項をお読みください。
この小冊子は、電気機器の安全な配線と接続の
手順について説明しています。

Danger : Avant d'installer le présent produit, consultez le livret *Attention : Informations pour la sécurité — Lisez-moi d'abord*, SD21-0030, qui décrit les procédures à respecter pour effectuer les opérations de câblage et brancher les équipements électriques en toute sécurité.

Danger: Avant de procéder à l'installation de ce produit, lisez d'abord les consignes de sécurité dans la brochure *ATTENTION: Consignes de sécurité—A lire au préalable,* SD21-0030. Cette brochure décrit les procédures pour câbler et connecter les appareils électriques en toute sécurité.

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.

Perigo: Antes de iniciar a instalação deste produto, leia as informações de segurança *Cuidado: Informações de Segurança — Leia Primeiro*, SD21-0030. Este documento descreve como efectuar, de um modo seguro, as ligações eléctricas dos equipamentos.

Peligro: Antes de empezar a instalar este producto, lea la información de seguridad en *Atención: Información de Seguridad — Lea Esto Primero,* SD21-0030. Este documento describe los procedimientos de seguridad para cablear y enchufar equipos eléctricos.

Perigo: Antes de começar a instalar este produto, leia as informações de segurança contidas em *Cuidado: Informações Sobre Segurança—Leia Isto Primeiro,* SD21-0030. Esse folheto descreve procedimentos de segurança para a instalação de cabos e conexões em equipamentos elétricos.

VAARA: Ennen kuin aloitat tämän tuotteen asennuksen, lue julkaisussa *Varoitus: Turvaohjeet—Lue tämä ensin*, SD21-0030, olevat turvaohjeet. Tässä kirjasessa on ohjeet siitä, miten sähkölaitteet kaapeloidaan ja kytketään turvallisesti.

위험: 이 제품을 설치하기 전에 반드시
"주의: 안전 정보-시작하기 전에"
(SD21-0030) 에 있는 안전 정보를
읽으십시오.

危險：安裝本產品之前， 請先閱讀
"Caution: Safety Information–Read
This First" SD21-0030 手冊中所提
供的安全注意事項。 這本手冊將會說明
使用電器設備的纜線及電源的安全程序。

Uwaga:
Przed rozpoczęciem instalacji produktu należy zapoznać się z instrukcją:
"Caution: Safety Information - Read This First", SD21-0030.
Zawiera ona warunki bezpieczeństwa przy podłączaniu do sieci elektrycznej
i eksploatacji.

Upozornění: než zahájíte instalaci tohoto produktu, přečtěte si nejprve bezpečnostní informace v pokynech „Bezpečnostní informace“ č. 21-0030. Tato brožurka popisuje bezpečnostní opatření pro kabeláž a zapojení elektrického zařízení.

Vigyázat: Mielôtt megkezdi a berendezés üzembe helyezését, olvassa el a *“Caution: Safety Information— Read This First,* SD21-0030 könyvecskében leírt biztonsági információkat. Ez a könyv leírja, milyen biztonsági intézkedéseket kell megtenni az elektromos berendezés huzalozásakor illetve csatlakoztatásakor.

Pozor: Preden zaènete z instalacijo tega produkta
preberite poglavje: ‘Opozorilo: Informacije
o varnem rokovanju-preberi pred uporabo,"
SD21-0030. To poglavje opisuje pravilne
postopke za kabliranje,

Opasnost: Prije nego sto pčcnete sa instalacijom produkta, pročitajte naputak o pravilima o sigurnom rukovanju u Upozorenje: Pravila o sigurnom rukovanju - Prvo pročitaj ovo, SD21-0030. Ovaj privitak opisuje sigurnosne postupke za prikljućivanje kabela i prikljućivanje na električno napajanje.

Κίνδυνος: Πριν ξεκινήσετε την εγκατάσταση αυτού του προϊόντος, διαβάστε τις πληροφορίες ασφάλειας στο φυλλάδιο *Caution: Safety Information-Read this first,* SD21-0030. Στο φυλλάδιο αυτό περιγράφονται οι ασφαλείς διαδικασίες για την καλωδίωση των ηλεκτρικών συσκευών και τη σύνδεσή τους στην πρίζα.

סכנה: לפני שמתחילים בהתקנת מוצר זה, יש לקרוא את הוראות הבטיחות בחוברת
Caution: Safety Information - Read This First, SD21-0030
חוברת זו מתארת את הוראות הבטיחות לחיבור הכבלים ולחיבור לחשמל של ציוד חשמלי.

ОПАСНОСТ
Пред да почнете да го инсталирате овој продукт, прочитајте ја информацијата за безбедност:
"Предупредување: Информација за безбедност: Прочитајте го прво ова", SD21-0030.
Оваа брошура опишува безбедносни процедури за каблирање и вклучување на електрична опрема.

ОСТОРОЖНО: Прежде чем инсталлировать этот продукт, прочтите Инструкцию по технике безопасности в документе "Внимание: Инструкция по технике безопасности -- Прочесть в первую очередь", SD21-0030. В этой брошюре описаны безопасные способы каблирования и подключения электрического оборудования.

Nebezpečenstvo: Pred inštaláciou výrobku si prečítajte bezpečnosté predpisy v
Výstraha: Bezpeč osté predpisy - Prečítaj ako prvé, SD21 0030. V tejto brožúrke sú opísané bezpečnosté postupy pre pripojenie elektrických zariadení.

危險：

開始安裝此產品之前，請先閱讀安全資訊。

注意：

請先閱讀 - 安全資訊 SD21-0030

此冊子說明插接電器設備之電纜線的安全程序。

Chapter 1. Introduction

The IBM Turbo 16/4 Token-Ring PC Card 2 (referred to as *PC Card*) is a credit-card-sized adapter that provides an interface between computers and Token-Ring networks. It is part of the shared RAM family of adapters. The PC Card is designed for computers with slots that comply with the standards for the Personal Computer Memory Card International Association (PCMCIA) Release 2.1, Type II slots.

Features include:

- Remote Program Load (RPL)
- Full-duplex-ready.
- Supports the Desktop Management Interface (DMI).
- Easy to install — variable interrupt levels and I/O address choices.
- Includes RJ-45 cable and STP media access adapter for easy connection to either UTP or STP cables.
- Mobile computing possible because the PC Card does not have to be removed; simply disconnect the cable and reconnect when you are in the new location. See “Stealth Mode” on page 2.
- Compliance with PCMCIA Revision 6.2 and IEEE 802.5 standards. This allows use of the PC Card with a variety of application programs.
- Auto Ring Speed, a configurable option that permits the PC Card device driver to detect and operate at the data rate of the ring.
- Support for a variety of network operating systems and network applications.

Auto Ring Speed

The Auto Ring Speed function avoids problems due to manual configuration of an incorrect data rate. The function also eliminates the need to reconfigure the PC Card if the data rate of the ring is changed.

You should not select Auto Ring Speed if you might be the first one to attach to your ring. The PC Card will not allow you to connect in this case. You will have to try to connect again after another Token-Ring user is on the ring.

When using the PC Card in Auto Ring Speed mode, it is important to be aware of transmit buffer limitations that may cause problems. A 16-Mbps Token Ring can support transmit buffer sizes up to 17 960 bytes. A 4-Mbps Token Ring can support transmit buffer sizes up to 4464 bytes. This is a restriction due to the speed of the media. This might affect your application.

If your software is configured to try 16-Mbps ring operation first and you plan to utilize Auto Ring Speed, use a transmit buffer size less than or equal to 4464 bytes. This will ensure that you will not have any open PC Card errors due to improper transmit buffer size if your PC Card must change ring speed.

Stealth Mode

The device drivers for Turbo 16/4 Token-Ring PC Card 2 are fully backward-compatible with all of the previous versions of IBM Token-Ring Credit Cards, however there have been improvements in the hardware with the introduction of the Turbo PC Cards. That new hardware feature is referred to as Stealth Mode and can be used in the Turbo 16/4 Token-Ring PC Card 2 to remove power from the card by removing only the cable. The operating system will not sense the presence of the card in the slot with the cable detached.

With previous IBM Token-Ring Credit Cards, with the exception of the IBM Turbo 16/4 Token-Ring PC Card, the card and cable had to be removed from the computer to remove power to the slot and the detection of the adapter from the operating system.

When removing the cable from the PC Card while the system is running or connected to the network or both, stop the PC Card before you remove the cable or card, just as you normally would when removing any adapter from the system.

Note: If the cable is disconnected at boot time under a Plug and Play operating system, the operating system will not be aware of the PC Card's presence and will not try to load the device drivers for the PC Card. However, under an operating system which is not Plug and Play compliant, the operating system will try to load the PC card device drivers anyway and as a result the operating system will generate an error message referring to the adapter or the device drivers or both.

Chapter 2. Installation

Checklist

The PC Card cannot be installed without a network operating system on the computer. Ensure that a network operating system has been installed, or use LCINST to install IBM LAN Client as described in *IBM Token-Ring Adapter Features*.

To install this PC Card, complete the following steps in order.

1. Read the information in Chapter 1, “Introduction.”
2. Check the shipping package contents list and tips that begin on page 3.
3. Insert the PC Card; see page 5 .
4. Connect the cable to the PC Card and to the network. The cable must connect to the PC Card, or the system will not recognize the PC Card.
5. Install the new driver according to the operating system on your computer. See “Chapter 4. Software Installation” on page 9.
6. Installation is now complete. You must reboot your system for the changes to take effect. If you have not inserted the PC Card already, insert it before rebooting the system. “Hot-Pluggability and Suspend/Resume Issues” on page 7 gives information about hot-plugging the PC Card.

Kit Contents

Your kit contains the following items:

- IBM Turbo 16/4 Token-Ring PC Card 2 (also called *PC Card*)
- Token-Ring PC Card cable, P/N 38H7044. (The standard cable uses an RJ-45 connector for use with UTP network wiring.)
- One IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM.
- An STP connector for connection to STP network wiring, P/N 73G8314. See “Chapter 3. Inserting and Removing the PC Card” on page 5 for information on installing the PC Card, the cable, and, if needed, the STP connector.

  Note: If you are connecting to a standard Token-Ring cable that uses a D-shell connector (P/N 6339098), you should order PC Card cable P/N 38H7046.
- Adapter Support Information card
- Registration card.

Installation Tips

This section provides references to other sections of this book, telephone numbers, and tips about the PC Card.

1. Check to see if there is a newer level of the driver available. See “Chapter 4. Software Installation” on page 9.
2. If you have problems with your computer or PC Card or you need assistance, contact your IBM representative or call the IBM Help Center. See “Questions, Problems?” on page 50.

3. If you plan to use Card and Socket Services software, Version 2.0 or higher, install it and reboot your computer. The software might have been provided with your computer or operating system. See page 38 for a description of these services.

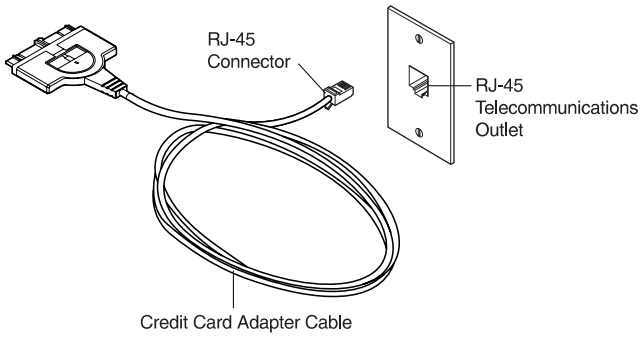
Return to page 3 to continue. Step 2 of the Installation Checklist is now complete.

Chapter 3. Inserting and Removing the PC Card

Inserting the PC Card

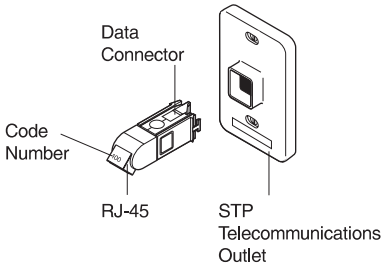
Note: If you are using Card and Socket Services, you might be able to use *hot-pluggability* features with your PC Card. See “Hot-Pluggability and Suspend/Resume Issues” on page 7.

1. Switch OFF (**O**) the power to the computer.
2. Determine which type of network cabling you will be using as shown in the following figures, and connect the PC Card cable to the network as described.
   - If your network uses UTP cabling, attach the RJ-45 (8-pin modular) connector on the PC Card cable (P/N 38H7044) to the RJ-45 telecommunications outlet.



   - If your network uses STP cabling, attach the RJ-45 connector on the PC Card cable (P/N 38H7044) to the RJ-45 end of the STP connector (P/N 73G8314). Attach the STP connector to the STP telecommunications outlet.

     The STP connector has been specifically designed to work with the IBM Token-Ring PC Cards.



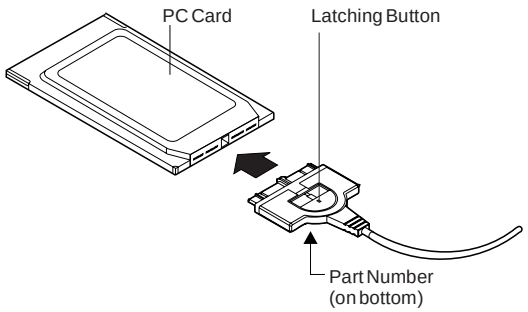
STP Connector for Data Connector

Note: Verify that you are using the correct STP connector. The correct STP connector and PC Card cable have the code number 100 on the connectors that attach to each other.

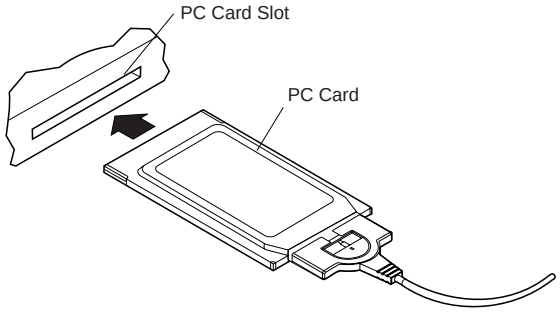
3. To attach the cable to the PC Card, move the latching button (the half-circle in the center of the PC Card connector) toward the cable. The cable cannot be connected or disconnected unless the latch is retracted.

   Attach the cable to the PC Card with the part number on the bottom.

   The connector is keyed to attach to the PC Card only one way. If you feel any resistance, remove the connector, turn it over, and reattach it.



4. To lock the cable securely, move the latching button in toward the PC Card. In some cases, you might want to leave the PC Card cable latch retracted. If the PC Card cable is pulled, it will disconnect from the PC Card, possibly saving your computer from being pulled off a table.
5. Insert the PC Card in the slot. If you are using a point enabler, note which slot you use.



   The PC Card is keyed to go in only one way. If you feel resistance before the PC Card is fully inserted, remove the PC Card, turn it over, and reinsert it.

6. Switch ON (**|**) the power to the computer.
7. Return to page 3 to continue. Step 3 of the Installation Checklist is now complete.

Removing the PC Card

Note: If you are using Card and Socket Services, you may be able to use *hot-pluggability* features with your PC Card. See “Hot-Pluggability and Suspend/Resume Issues” on page 7 for more information.

Follow these steps to remove the PC Card:

1. Switch OFF (**O**) the power to the computer.
2. With the cable still attached to the PC Card, pull the PC Card from the computer.
3. To detach the cable from the PC Card, retract the latching button (the half-circle in the center of the connector) by moving it toward the cable.
4. Grasp the connector and unplug it from the PC Card.
5. Store the PC Card.

Note: When the cable is removed from the PC Card, the PC Card appears to the system as if it has been physically removed from the socket.

Hot-Pluggability and Suspend/Resume Issues

The DOS ODI, DOS NDIS, OS/2 ODI, OS/2 NDIS, Card Wizard 4.1 and 5.0 on Windows NT, Windows 95 and Windows 98 (NDIS 3) drivers support a level of *hot-pluggability* and Suspend/Resume. Hot-pluggability refers to the ability to remove and insert your card at any time while the machine is running. If you follow these guidelines, no damage will occur to either your PC Card, machine, or software. Hot-plugging has the advantage of allowing you to remove your card when you are using battery power, thus reducing the drain on your battery. It also provides greater freedom in using portable computers in a portable manner. The IBM Turbo 16/4 Token-Ring PC Card 2 appears to be removed physically from a system when the cable is removed. The PC Card appears to the system to be inserted when its cable is reattached to the PC Card. This makes it possible to hot-plug the PC Card without physically removing it from the socket. Attach or remove your cable instead of physically removing the PC Card.

To use the hot-plugging features of this card, you must:

- Use Card and Socket Services. If you are using a point enabler, *do not* attempt to unplug your card while the machine is powered on. You might damage both your card and the machine in this case.
- Use the Windows 95, DOS ODI environment, DOS NDIS environment, OS/2 ODI environment, or OS/2 NDIS environment. At the present time the DOS Native environment does not support hot-pluggability. Removing your card while using this environment might result in a system failure or the inability to access your LAN applications.
- Do not hot-plug a card when in a Windows for Workgroups environment. Your card does not have to be present when NET START is run. If you plan to access your network in your Windows session, insert your card before starting Windows. If you plan to pull out your card, shut down Windows before doing so. It is suggested that you include your Network Address in the protocol.ini if you execute NET START without a card present. This ensures that the system has your card's address even if the card is not present.

The following sections describe, in more detail, the exact procedure to follow for each of the supported hot-plugging environments.

Windows 95 and Windows 98

Windows 95 and Windows 98 have built-in support for hot plugging and suspend/resume. They recognize the PC Card when it is inserted into a PCMCIA socket (or the cable is attached to an inserted PC Card) and load the correct driver and configured protocol stack for the PC Card.

If you plan to disconnect from your network, click the PC Card icon on the status bar. A message box appears with a message to stop the PC Card. Click this box. When the Safe to remove message appears, you can either remove the cable or physically remove your PC Card.

DOS ODI Hot-Pluggability and Suspend/Resume

It is recommended that you use the NetWare Event Service Layer program (NESL.COM) for hot-plugging to work in this environment. Without this support, you should use the following procedure.

To remove the card or go into a suspend mode, you must first unload all the drivers. This is done by removing them in the reverse order they were installed. This can be accomplished by typing the following commands at the DOS prompt:

```
netx u    (or vlm u)
ipxodi u
tokencs u
lsl u
```

At this point, you can remove the card from your machine. Once the card is removed, you can enter and exit suspend mode as often as you like before reinstalling the card. It is best to reinstall the card while the machine is not in suspend mode.

After reinserting the card or resuming, you can restart your network software by typing the following commands at the DOS prompt:

```
lsl
tokencs
ipxodi
netx
```

DOS NDIS Hot-Pluggability

You can insert and remove your card before and after using Windows for Workgroups. You cannot hot-plug the card while using Windows for Workgroups. Insert the card before starting the software. Remove the card only after exiting the Windows for Workgroups environment.

OS/2 NDIS Hot-Pluggability and Suspend/Resume

You can remove the card or go into suspend mode at any time as long as you are not running any applications that use shared resources. After you reinsert the card or resume, you should have all of your LAN shared resources connected. If you use CM/2 to connect to the host, you will have to log on again.

One scenario that does not work is suspending and then removing the card. The card will not be recognized when it is reinserted. If you want to do something like this, you must first remove the card and then suspend. You can then resume later and reinsert the card later.

Chapter 4. Software Installation

1. Get the latest level of LAN driver updates for your operating system to ensure that your code is at the latest level.
2. Be sure that your IBM Turbo 16/4 Token-Ring PC Card 2 has already been installed in your computer. If it has not, follow the instructions in “Chapter 3. Inserting and Removing the PC Card” on page 5.
3. Get the driver for your environment. There are three places to find the driver. If you have a Web connection, we recommend the first one listed here. All three methods will place the driver in a directory according to the structure in Table 1.
   - Method A: Get the driver from a software package on the IBM Networking Hardware Division home page on the Web. This will ensure that you get the latest driver. Go to `x:\startcd.htm` (where x is your CD-ROM drive). Select **IBM Networking Web site — product support**. Select **Downloads** and choose the appropriate software package for your environment. Run the package to expand the files.

     Note: You can also access the Web site directly at `www.networking.ibm.com/support`
   - Method B: Use the driver shipped on this CD-ROM directly with your network operating system’s installation software.
   - Method C: Get the driver from a software package shipped on this CD-ROM. Point your Web browser to `x:\startcd.htm` (where x is your CD-ROM drive). Select **CD-ROM — product support**. Select **Downloads** and choose the appropriate software package for your environment. Run the package to expand the files.
4. Install the driver. Use Table 2 and Table 3 on page 10 to find the location of the installation instructions for your environment. It is recommended that you install the latest service pack for your operating environment before installing the PC Card software.

Table 1. Driver File Directory Structure

Operating System	Directory
Windows 9x	\ (root)
Windows NT	\ (root)
Windows 2000	\ (root)
Novell NetWare Server and Client	\NOVELL\NETWARE
Novell NetWare DOS Requester (16-bit)	\NOVELL\DOS
OS/2	\ (root)
DOS	\DOS
Windows for Workgroups	\WFW

If you are using one of the environments listed in Table 2, you will not use LANAID.

Where to Find the Installation Instructions for Your Environment

Table 2. Do not use LANAID to configure your machine

Novell NetWare 3.12 Server	page 11
Novell NetWare 4.11 Server	page 14
Novell NetWare 5.0 Server	page 17

Table 2. Do not use LANAID to configure your machine (continued)

Novell Client DOS/Windows 3.1x	page 19
Novell NetWare Client32 for Windows 95	page 19
Windows 95/Windows 98	page 23
Windows NT 3.51	page 24
Windows NT 4.0	page 25
Windows 2000	page 25
Remote Unattended Install for Windows 95, Windows 98, and NT 4.0	page 25
OS/2 NDIS 2 Device Driver Using MPTS	page 26
OS/2 NDIS 2 Device Driver Using Other Installation Programs	page 27
ODI 16-bit Client	page 28

If you are using the environment listed in Table 3, you will use LANAID to configure your machine. Even though the network operating system appears to fully install and configure the device driver, it is highly recommended that you run LANAID to ensure that the PC Card is appropriately configured.

Table 3. Use LANAID to configure your machine

Microsoft Windows for Workgroups/NDIS 2	page 27

Note: If you are operating in a server environment, you might not get support from your hardware or network operating system manufacturers.

Novell Installation

Novell NetWare Server Driver and PCMCIA Bus Support

Card Services and Point Enablers: What Works and What Does Not

IBMTOKEN.LAN is used in both the NetWare Server and Client environments. In order to use this driver, your system must enable the card by loading: Socket Services, Card Services, and CS20TOK.EXE. POINTTR.EXE is not supported with IBMTOKEN.LAN.

If Card Services on your system is earlier than version 5.00, enter the following parameter when you load the driver: MEM1=<SRAM Address>

```
LOAD IBMTOKEN.LAN FRAME=TOKEN-RING MEM1=C8000
```

If you do not put this parameter on the driver load line, you will be prompted for this parameter every time you load the driver.

If your Card Services is version 5.00 or higher, you do not need to worry about this parameter.

CS20TOK.EXE Configuration

CS20TOK.EXE is a small software program that configures the PC Card socket controller to allocate resources (memory, I/O Ports, interrupts, DMA channels, and

power) to PCMCIA cards. Once CS20TOK.EXE has run successfully, the PCMCIA Token-Ring card is ready to operate and looks much like any ISA Token-Ring adapter.

Generally, enabling a card is done by loading CS20TOK.EXE in CONFIG.SYS, AUTOEXEC.BAT, or at a DOS prompt.

For a complete list of CS20TOK.EXE parameters, you can enter the following at a DOS prompt:

```
CS20TOK /? or CS20TOK /h
```

Examples:

```
In autoexec.bat:
cs20tok sa mmio=d000 sram=d000,4 rs=16 irq=a io=0a20
In config.sys:
device=c:\cs20tok.exe sa mmio=d000 sram=d000,4 rs=16 irq=a io=0a20
```

Both set the card in slot 1 (sa) to an 8-KB memory region based at X'0D0000', with the card operating in enhanced mode. The card is assigned port X'0A20', interrupt vector X'A' (10 decimal), and Token-Ring speed (rs) will be 16 Mbps. The program runs, then sounds two ascending beeps indicating successful operation. The card is now enabled and ready for the driver to be loaded.

Here is an example of using CS20TOK.EXE with two adapters:

```
cs20tok sa mmio=d000 sram=d000,4 rs=16 irq=a io=0a20 pri
cs20tok sb mmio=c800 sram=c800,4 rs=16 irq=9 io=0a24 alt
```

Novell NetWare 3.12 Server

Before you start this installation, get the latest level of patches for NetWare 3.12 from Novell. The current level is IntraNetWare Support Pack Version 5.0 from the Novell support Web site at support.novell.com. You will install the patches during the following procedure.

If the Novell NetWare server is not on your computer, use the following instructions. If it is on your computer, go to the instructions on page 13.

Server Driver Installation in New NetWare 3.12 Server

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.

1. Create a diskette containing the extracted files from the NETWARE.EXE package file on the IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM.
2. 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.
3. Insert the diskette that you created in step 1 into drive A. Enter the following commands at the server prompt:

   ```
   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. It is for information only and can be ignored.

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

   ```
   LOAD X:\NOVELL\NETWARE\IBMTOKEN.LAN DATARATE=M16
   ```

   In server environments, the DataRate should be set to M16 or M4, and clients should be set to Auto. The default is Auto.

   Note: See “Novell NetWare Server Driver Parameters” on page 20 for a complete list of parameters that can be specified in the LOAD IBMTOKEN command in the AUTOEXEC.NCF file.

5. 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.
6. 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 adapter that is installed.

7. Perform the instructions in ″Create an AUTOEXEC.NCF file″ 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\IBMTOKEN.LAN NAME=IBMLS1 DATARATE=M16
   BIND IPX TO IBMLS1 NET=<unique net number>
   ```

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

   Notes:

   a. See “Novell NetWare Server Driver Messages” on page 50 for a complete list of parameters that you can specify on the LOAD IBMTOKEN 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.

8. Shut down your server by entering **down** and then entering **exit** from the server prompt.
9. Make sure that the diskette that you created in step 1 is inserted in drive A. Enter the following commands at the server prompt. You might be prompted to perform a file overwrite; it is OK to overwrite these files.

   ```
   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\IBMTOKEN.LAN C:\SERVER.312
   COPY A:\NOVELL\NETWARE\IBMTOKEN.LDI C:\SERVER.312
   ```

10. Go to the Novell server directory and enter **server** at the DOS prompt to restart the server.
11. Install the patches obtained earlier now. Make sure to select the v3.31 ODI LAN Updates for Hardware if given the opportunity.
12. Installation is now complete.

    Check for the following conditions to determine whether the adapter is working correctly and whether installation is complete:

    - The device driver files are loading successfully.
    - There are no error messages.

    If you experience problems, go to "Appendix B. Problem Determination" on page 49.

    For information concerning NetWare server error messages, see "Novell NetWare Server Driver Parameters" on page 20.

Server Driver Installation in Existing NetWare 3.12 Server

If Novell NetWare is on your computer, perform the following steps to install the adapter server device driver.

1. Create a diskette containing the extracted files from the NETWARE.EXE file on the IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM.
2. Install the patches obtained earlier now. Make sure to select the v3.31 ODI LAN Updates for Hardware if given the opportunity. Return to the server console when the installation is complete.
3. Make sure that the diskette you created in step 1 has been inserted in drive A. Enter the following commands at the server prompt. You might be prompted to perform a file overwrite; it is OK to overwrite these files.

   ```
   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\IBMTOKEN.LAN C:\SERVER.312
   COPY A:\NOVELL\NETWARE\IBMTOKEN.LDI C:\SERVER.312
   ```

   Note: If you experience any problems after loading the Novell NLM files, check the Novell Web site 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 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.)

   In a server environment, set the DataRate to M16 or M4, and clients to Auto. The default is Auto.

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

See “Novell NetWare Server Driver Parameters” on page 20 for a complete list of parameters that can be specified on the LOAD IBMTOKEN 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 prompt.

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 is complete:

    - The device driver files are loading successfully.
    - There are no error messages.

    If you experience problems, go to “Appendix B. Problem Determination” on page 49.

    For information concerning NetWare server error messages, see “Novell NetWare Server Driver Messages” on page 50.

Novell NetWare 4.11 Server

Before you start this installation, get the latest level of patches for NetWare 4.11 Server from Novell. The current level is IntraNetWare Support Pack Version 5.0 from the Novell support Web site at support.novell.com. You will install the patches during the following procedure.

If Novell NetWare is not on your computer, use the following instructions. If it is on your computer, follow the instructions on page 16.

Server Driver Installation in New NetWare 4.11 Server

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. It is for information only, and can be ignored.

1. Create a diskette containing the extracted files from the NETWARE.EXE package file on the IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM.
2. When you see INSTALL Found the following: IBM Turbo 16/4 Token-Ring PC Card 2 *xxxx xxxx xxxx*, press **Enter**. The actual numbers vary by product. Then press the Insert (**INS**) key to install the unlisted driver.

3. Press **ALT-ESC** to toggle to the server console, and enter the following LOAD statements (make sure that the diskette that you created in step 1 is inserted in drive A):

   ```
   LOAD A:\NOVELL\NETWARE\MSM.NLM
   LOAD A:\NOVELL\NETWARE\TOKENTSM.NLM
   ```

4. Press **ALT-ESC** to toggle back to the INSTALL panel.
5. Press **F3** on the next panel to specify A:\NOVELL\NETWARE as the directory path.

   Press **Enter**, then follow the instructions on the panel to complete the installation of the driver. If you need to make any custom configuration changes to the driver, do so at this time.
6. Follow the instructions in the Novell manual to *Create an AUTOEXEC.NCF file*. In addition to the instructions in the manual, add the following lines to the AUTOEXEC.NCF file immediately after the IPX INTERNAL NET statement (if necessary, replace C:\NWSERVER with the location of the SERVER.EXE executable):

   ```
   LOAD C:\NWSERVER\NBI.NLM
   LOAD C:\NWSERVER\MSM.NLM
   LOAD C:\NWSERVER\TOKENTSM.NLM
   LOAD C:\NWSERVER\IBMTOKEN.LAN NAME=IBMLS1 DATARATE=M16
   ```

   Note: There will be existing LOAD and BIND IPX statements in the AUTOEXEC.NCF. Delete the LOAD statement (we have replaced it with stated LOAD C:\NWSERVER\IBMTOKEN.LAN statement). Also, make any needed modifications to the existing BIND IPX statement (refer to the *Bind the Protocol to the LAN Driver* section of the Novell manual for additional information).

   See “Novell NetWare Server Driver Parameters” on page 20 for a complete list of parameters that can be specified on the LOAD IBMTOKEN command in the AUTOEXEC.NCF file.
7. Press **ESC** and answer **YES** to save the new file to disk. Press **ESC** again to return to the server console.
8. Type the following commands from the server prompt to shut down the server and exit to DOS: **down**, then **exit**.
9. Perform the following COPY commands, making sure that the diskette that you created in step 1 is inserted in drive A. Note that it will prompt you at each of the following files to ask if you want to perform a file overwrite; it is OK to overwrite these files.

   ```
   COPY A:\NOVELL\NETWARE\NBI.NLM C:\NWSERVER
   COPY A:\NOVELL\NETWARE\MSM.NLM C:\NWSERVER
   COPY A:\NOVELL\NETWARE\TOKENTSM.NLM C:\NWSERVER
   COPY A:\NOVELL\NETWARE\IBMTOKEN.LAN C:\NWSERVER
   COPY A:\NOVELL\NETWARE\IBMTOKEN.LDI C:\NWSERVER
   ```

10. Go to the Novell server directory and enter **server** at the DOS prompt to restart the server.
11. Install the latest available Novell patches for NetWare 4.11 now. Make sure to select the Version 3.31 ODI LAN Updates for Hardware if given the opportunity.
12. Issue the following commands from the server prompt to bring the server down, then restart it: **down**, then **restart server**.
13. Installation is now complete. Check for the following conditions to determine whether the adapter is working correctly and whether installation is complete:
    - The device driver files are loading successfully.
    - There are no error messages.

If you experience problems, go to “Appendix B. Problem Determination” on page 49 .

For information concerning NetWare server error messages, see “Novell NetWare Server Driver Messages” on page 50.

Server Driver Installation in Existing NetWare 4.11 Server

If Novell NetWare is in your computer, perform the following steps to install the 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. Create a diskette containing the extracted files from the NETWARE.EXE file on the IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM.
2. Be sure that your IBM Turbo 16/4 Token-Ring PC Card 2 is already in your computer. If it is not, follow the instructions in “Chapter 2. Installation” on page 3.
3. Install the latest available Novell patches for NetWare 4.11. Make sure to select the Version 3.31 ODI LAN Updates for Hardware if given the opportunity. Return to the server console when the installation is complete.
4. **Down** and **restart server** from the server prompt to bring the server down, then restart it again.
5. Check to see if the device driver is loaded. If it is, unload it using the following command: **unload token** or **unload ibmtoken**
6. Type **load install** on the server.
7. Select **Driver Options**.
8. Select **Configure Network Drivers**.
9. Select **Select Drivers**.
10. On the next panel, press the Insert (**INS**) key to install the unlisted driver.
11. Insert the diskette that you created in step 1; press **F3** on the next panel and specify the path A:\NOVELL\NETWARE.
12. Follow the instructions on the panels to complete the installation of the driver. If you need to make any custom configuration changes to the driver, do so at this time.
13. Follow the instructions in the Novell manual to *Create an AUTOEXEC.NCF file*. In addition to the instructions in the manual, add the following lines to the AUTOEXEC.NCF file, immediately after the IPX INTERNAL NET statement. If necessary, replace C:\NWSERVER with the actual location of the SERVER.EXE executable.

    ```
    LOAD C:\NWSERVER\NBI.NLM
    LOAD C:\NWSERVER\MSM.NLM
    LOAD C:\NWSERVER\TOKENTSM.NLM
    LOAD C:\NWSERVER\IBMTOKEN.LAN NAME=IBMLS1 DATARATE=M16
    ```

    Note: There will be existing LOAD and BIND IPX statements in the AUTOEXEC.NCF. Delete the LOAD statement (we have replaced it with the stated LOAD C:\NWSERVER\IBMTOKEN.LAN statement).

    Also, make any needed modifications to the existing BIND IPX statement. Refer to the *Bind the Protocol to the LAN Driver* section of the Novell manual for additional information.

See “Novell NetWare Server Driver Parameters” on page 20 for a complete list of parameters that can be specified on the LOAD IBMTOKEN command in the AUTOEXEC.NCF file.

14. Press **ESC** and answer **YES** to save the new file to disk. Press **ESC** again to return to the server console.
15. Type the following commands from the server prompt to shut down the server and exit to DOS: **down**, and then **exit**.
16. Perform the following COPY commands, making sure that the diskette that you created in step 1 is inserted in the diskette drive. Note that it will prompt you at each of the following files to ask if you want to perform a file overwrite; it is OK to overwrite these files.

    ```
    COPY A:\NOVELL\NETWARE\NBI.NLM C:\NWSERVER
    COPY A:\NOVELL\NETWARE\MSM.NLM C:\NWSERVER
    COPY A:\NOVELL\NETWARE\TOKENTSM.NLM C:\NWSERVER
    COPY A:\NOVELL\NETWARE\IBMTOKEN.LAN C:\NWSERVER
    COPY A:\NOVELL\NETWARE\IBMTOKEN.LDI C:\NWSERVER
    ```

17. Go to the Novell server directory and enter **server** at the DOS prompt to restart the server.
18. 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.

    If you experience problems, go to “Appendix B. Problem Determination” on page 49.

    For information concerning NetWare server error messages, see “Novell NetWare Server Driver Messages” on page 50.

Novell NetWare 5.0 Server

Server Driver Installation During NetWare 5.0 Server Installation

Installation of the network board and its device driver occurs during the combined storage device and network board installation step. Use the following instructions to install the network board and its driver during a new NetWare 5.0 server installation.

1. Create a device driver installation diskette.

   Create a diskette containing the extracted files from the NETWARE.EXE package file on the IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM.
2. During the installation program, when you get to Select a Storage Device and a Network Board:
   - Select and configure the storage device
   - Select and configure the network board
   - Load a NetWare Loadable Module TM program (if required)
3. Select a Storage Device

   Storage devices such as hard disks, CD-ROMs, and tape devices require a software driver to communicate with the storage adapter. The software driver for the storage device is called a custom device module (CDM). Each type of storage device requires a CDM.

   The installation program auto-detects many types of storage devices such as IDE drives, SCSI drives, CD-ROM drives, and tape drives. If your storage

device is not detected, choose the appropriate driver from the list of available drivers provided with NetWare 5.0. You can also add a new driver from a diskette. CDMs can be obtained from the storage device manufacturer.

4. Select a Network Board

   The software driver for a network board is called a LAN driver.

   The installation program auto-detects many types of network boards. If your network board is not detected, choose the driver for the network board from the list provided with NetWare 5.0. You can also use a new or updated driver from the diskette that you created in step 1.

   The network board must be installed and configured correctly. For servers, it is recommended that DATARATE is set to M16 or M4, and clients be set to Auto. You might be able to influence certain network board properties by configuring the system and the network board or both.

5. Load a NetWare Loadable Module (if required)

   Certain server and network configurations might require you to load a NetWare Loadable Module (NLM) before you can complete the server installation. An example is loading ROUTE.NLM for a Token-Ring environment that requires it.

Server Driver Installation in Existing NetWare 5.0 Server

The following procedure explains how to use NWCONFIG to load a LAN driver and bind a protocol.

1. Create a diskette that contains the extracted files from the NETWARE.EXE package file on the IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM.
2. At the server console prompt, enter **NWCONFIG**
3. Select **Driver Options > Configure network drivers**.
4. To select a driver from all of the available drivers, choose **Select a driver**. The screen will display a list of all available drivers.
5. Press **Insert**. Follow the instructions on the panels. Use the diskette that you created in step 1 when you are prompted to supply an unlisted driver. The directory is A:\NOVELL\NETWARE.

   Note: For some drivers, a message might appear indicating that the driver must be loaded manually (at the console prompt). To load a driver manually, follow the screen prompts or press **F1** for more information.
6. Set protocols. When the window containing protocol choices is displayed, select the protocol that you want to use and press the spacebar. If you select TCP/IP, enter the IP address and the IP mask.
7. Set parameters. Use the down arrow key to move the cursor to the parameter window. Enter parameter values as needed. Press F1 for help. It is recommended for servers that the Data Rate is set to 4 Mbps or 16 Mbps, and clients be set to Automatic.

   In some cases, the system displays a pop-up list of values for the field from which you select the desired value. In other cases, you must type in a value and press **Enter** to move to the next field.
8. To specify a particular frame type for a Token-Ring driver, press **F3** to display a list of frame types. Use the arrow keys to move up and down the list. Press **Enter** to select a frame type. When finished, press **F10**. If you do not specify a particular frame type, all frame types are loaded automatically, but only those found on the network are actually bound to the driver.
9. Select **Save parameters and load driver**.
10. Confirm bindings of the protocol with the driver and the network number.

11. Driver installation is now complete. To add another adapter, down the server, power off the server, and insert the additional adapter. NetWare will load the appropriate driver automatically. Then repeat step 10.

Novell Client DOS/Windows 3.1x

1. Download Novell Client DOS/Windows 3.1x Version 2.5 or higher from the Novell Web site (support.novell.com). Unzip the downloaded file to a directory on your computer.
2. Exit Windows.
3. From a DOS prompt, go to the driectory where you put the file. Run INSTALL.EXE.
4. Select **Yes** or **No** to respond to the Novell License Agreement.
5. Select **Novell Client Windows Support** and **Work Station Manager 3.X**. Press **F10** to save and continue.
6. Select **32–bit LAN Drivers** and press **F10** to save and continue.
7. Select **USER SPECIFIED 32–Bit Driver** and press **Enter**. Insert the CD-ROM or the diskette that contains the device drivers into the appropriate drive. Enter the path to the 32–bit ODI driver: **x:\novell\netware** where x is your CD-ROM drive letter. The panel should say

   ```
   IBM Token-Ring PCMCIA
   ```

   Press **Enter**, configure the parameters, and press **F10** to save and continue.
8. At the Installation Configuration Summary panel, confirm that the values are what you selected, and press **F10** to save and continue.
9. The files will be copied at this point.
10. Installation is now complete.
11. Reboot your computer and start Windows to connect to and login to your server.
12. 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.

    If you experience problems, go to “Appendix B. Problem Determination” on page 49.

Novell NetWare Client32 for Windows 95

(Previous version is IntranetWare Client for Windows 95.)

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

If you are installing on a workstation that already has Windows 95 installed using Novell IntranetWare Client Version 2.2 for Windows 95, use the following procedure.

Note: IntranetWare Client Version 2.2 for Windows 95 or Novell Client Version 2.5 for Windows 95 can be downloaded from Novell on the Web at support.novell.com

If you are upgrading from the NetWare DOS Requester (VLM) client or if you do not have any network client installed, you need to have the Windows 95 CD-ROM or diskettes or the Windows 95 .CAB files.

1. If the NDIS driver is not already installed, install it using the instructions in “Windows Installation” on page 23.
2. After downloading the code, run the installation program (SETUP.EXE) for Novell IntranetWare Client Version 2.2 for Windows 95 or Novell Client Version 2.5 for WIndows 95.
3. Select **Yes** or **No** to respond to the Novell License Agreement.
4. Select **Start** to begin the installation.

   If you are prompted to select an adapter, select one that matches your hardware. This step might not be necessary, as you should have already selected the adapter in the first step.
5. If you do not need to customize your installation, select **Reboot**.
6. If you want optional features or need to configure your workstation, select **Customize**. Then select **Reboot**.

Novell NetWare Server Driver Parameters

For the Novell NetWare server, the parameters are set on the command line or on the `load IBMTOKEN` line in the AUTOEXEC.NCF file.

Table 4. Novell NetWare Driver Parameters

Parameter	Explanation
DATARATE=	Configures the Token-Ring data rate for the PC Card. 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 PC Card will not function with AutoSense if it is the first one on the ring. AutoSense is not designed for changing ring speed while the PC Card is operational. It is usually necessary to reload the driver. **M16** 16-Mbps ring speed operation. **M4** 4-Mbps ring speed operation. The default 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.
FRAME=	This string defines the frame type to be used with the PC Card when loading the IBMTOKEN 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 is TOKEN-RING.

Table 4. Novell NetWare Driver Parameters (continued)

Parameter	Explanation
FULLDUPLEX=	This keyword permits the IBMTOKEN LAN driver to activate Token-Ring full-duplex operation supported by the PC Card and the NetWare server environment. **Valid values:** YES, NO The default is YES.
MEM1=	The MEM1 keyword is needed if you are using a Card Services version earlier than version 5.00. This value is the base shared RAM address that your adapter is configured to use. If it is not specified, you will be prompted for this parameter when the driver loads. If you are using a version of Card Services which is 5.00 or higher, this parameter is not needed.. **Valid values:** C0000, C4000, C8000, CC000, D000, D4000, D8000, DC000 There is no default for this parameter.
NODE=	This keyword is used to set a locally administered address for the PC Card. 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 PC Card uses the universally administered address permanently encoded in its memory.
SLOT=	This keyword defines the slot number of the corresponding PC Card in the computer. To avoid being prompted to enter a slot number when the IBMTOKEN LAN driver is loaded, specify this keyword. One SLOT number is required for each NIC if you are using more than one.

Table 4. Novell NetWare Driver Parameters (continued)

Parameter	Explanation
RT=	Route Switching Mode. 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 the workload at the router. If the value is Disable, all routable frames will be sent through the router. **Valid values**: **A** Automatically determines whether to use Peer or Client mode. **P** Communicates with a peer destination station to establish a direct path. **C** Uses an MSS server to determine the direct path. **D** Deactivates the route switching function for this PC Card. The default is D.
RTTS=	Route Switching Table Size. This parameter specifies the number of entries allowed in the route table kept for Route Switching support. This should be set equal to or greater than the number of remote stations this station will send data to using routable IP frames. If it is set too low, some of the traffic that could be sent directly will instead be sent through the router. **Valid values**: 16-1024 The default is 1024.
RTSM=	Route Switching IP Subnet Mask. This parameter contains a character string specifying the IP subnet mask for the IP subnet to which this PC Card will attach. This value is entered as an IP dotted-decimal value (for example, 255.255.255.0). This is a mandatory parameter when the RTSWMode parameter is set to Auto or Peer. **Valid values**: *xxx.xxx.xxx.xxx* A dotted-decimal IP network number (15 characters maximum). **Disable** When not in use. The default is Disable.
RTHT=	Route Switching Holding Time. This parameter specifies the Route Switching information holding time value. This determines how often a remote station must refresh its Route Switching information which pertains to this station. **Valid values**: 2 to 20 The default is 20.

Table 4. Novell NetWare Driver Parameters (continued)

Parameter	Explanation
TPRn=	TCP Port Range. This represents a set of parameters which designate the transmit frame priority value for a specified TCP port range. n is 1, 2, 3, 4, or 5. The format of this 9-digit hexadecimal string is: <PortNumber><PortNumber><PriorityValue> where each PortNumber is a four-character hex value and PriorityValue is a one-character hex value. The two PortNumber fields define a starting and ending value that make up a range, with the starting value less than or equal to the ending value. **Valid values**: **PortNumber** 0x0000 to 0xFFFF **PriorityValue** 1 to 6 There is no default for this parameter.
UPRn=	UDP Port Range. This represents a set of parameters which designate the transmit frame priority value for a specified UDP port range. n is 1, 2, 3, 4, or 5. The format of this 9-digit hexadecimal string is: <PortNumber><PortNumber><PriorityValue> where each PortNumber is a four-character hex value and PriorityValue is a one-character hex value. The two PortNumber fields define a starting and ending value that make up a range, with the starting value less than or equal to the ending value. **Valid values**: **PortNumber** 0x0000 to 0xFFFF **PriorityValue** 1 to 6 There is no default for this parameter.

Windows Installation

Windows 95 and Windows 98

1. Insert the IBM Turbo 16/4 Token-Ring PC Card 2 in your computer and switch it on. When Windows loads, it will alert you to the fact that new hardware was found in your computer. If it does not, see “Troubleshooting and Error Codes” on page 50.
2. When the Update Device Driver Wizard (Windows 95) or the Add New Hardware Wizard (Windows 98) appears, insert the CD-ROM or diskette that contains the driver files.
3. Follow the instructions on the panels to install the driver files for the IBM Turbo 16/4 Token-Ring PC Card 2. During installation, you might be prompted to insert the diskette labeled IBM Shared RAM Token-Ring Adapter NDIS 3/4/5 Device Drivers. At this point, click **OK** and select the path to the driver diskette or CD-ROM in the copy files from box. You might also be prompted to insert the

diskette labeled Windows 95/98. At this point, click **OK** and select the path to the diskettes, CD-ROM, or hard disk where the Windows installation files are located in the copy files from box.

4. When driver installation is complete, Windows will prompt you to reboot your computer. The IBM Turbo 16/4 Token-Ring PC Card 2 will not function until you do so.

Using the IBM Turbo 16/4 Token-Ring PC Card 2 with Texas Instruments Cardbus Controllers and Windows 95 OSR2

Some portable PCs that have support for Cardbus PC Cards use the Texas Instruments Cardbus socket controller. Windows 95 OSR2 (build 4.00.950B) includes support for the chipset. IBM Token-Ring PC Cards will not function correctly if:

- Your portable PC uses the Texas Instruments Cardbus controller chipset and
- Your installation of Windows 95 OSR2 uses the Cardbus drivers that shipped with Windows 95 OSR2

If you are having problems getting your IBM Token-Ring PC Card to function and you suspect that you have the Windows 95 Cardbus socket controller drivers installed, follow the procedures below to determine if you need the Windows 95 Cardbus socket controller driver patch.

1. Right-click **My Computer** on the desktop and select **Properties**. This will bring up the system control panel.
2. Check the version of Microsoft Windows 95. If the version is 4.00.950B, you are running OSR2 and should continue reading; otherwise, you do not need the patch.
3. Click the **Device Manager** tab in the system control panel and check to see if you have the Cardbus Socket Controller devices installed by expanding the PCMCIA socket section. If you do not have this device listed, then you do not need the patch.
4. Click **Start** and select **Find — Files or folders...**
5. Search for the file cbss.vxd on the drive that contains your Windows installation (usually C). When you find it, right-click the cbss.vxd file and select **Properties**.
6. Click the Version tab and check the version of the file. If the version is 4.00.1111, then you are using the Cardbus socket controller drivers that shipped with Windows 95 OSR2. Contact the computer manufacturer to obtain a patch for the Cardbus controller for Windows 95 OSR2.

Windows NT 3.51

1. Insert the IBM Turbo 16/4 Token-Ring PC Card 2 in your computer and switch it on. When Windows NT loads, login to the computer and open the control panel. Double-click **Network**.
2. Click **Add Adapter** and select **<Other> Requires disk from manufacturer**. At this point, Windows NT will prompt you for your driver files. Select the path to your driver diskette or CD-ROM and click **OK**.
3. When prompted to choose the adapter, select **IBM Turbo 16/4 Token-Ring PC Card 2**. After installation is complete, the adapter should appear in the Installed Adapter Cards window.
4. Select **OK** to close the network control panel. You might be prompted to configure your protocols. Consult the documentation that came with your

operating system if you need help doing this. You will also be prompted to reboot your computer. The IBM Turbo 16/4 Token-Ring PC Card 2 will not function until you do so.

Windows NT 4.0

1. Insert the IBM Turbo 16/4 Token-Ring PC Card 2 in your computer and switch it on. When Windows NT loads, login to the computer and open the control panel. Double-click the **Network** icon.
2. Click the **Adapters** tab, then click **Add...**. Click **Have Disk** and specify the location to the driver files.
3. When prompted to choose the adapter, select **IBM Turbo 16/4 Token-Ring PC Card 2**. After installation is complete, the adapter should appear in the Network Adapters list.
4. Close the Network Control Panel. You might be prompted to configure your protocols. Consult the documentation that came with your operating system if you need help doing this. You will also be prompted to reboot your computer. The IBM Turbo 16/4 Token-Ring PC Card 2 will not function until you do so.

Windows 2000

Windows 2000 includes built-in support for your IBM Turbo 16/4 Token-Ring PC Card 2. Windows 2000 will automatically install its built-in driver for you. However, the driver that comes with the adapter includes support for some features that are not supported in the driver that is included with Windows 2000. You might want to update the driver to take advantage of the latest features.

1. Click **Start**, **Settings**, and **Control Panel**.
2. Double-click **System**, select the **Hardware** tab, and select **Device Manager**.
3. Expand the network adapters, double-click **IBM Turbo 16/4 Token-Ring PC Card 2**, and select the **Driver** tab.
4. Select **Update Driver**, and follow the instructions on the panels in the wizard.
5. When the system says *search for a suitable driver for my device*, insert the diskette, and specify the diskette drive (**a:**). Press **OK**.
6. Follow the instructions on the panels until the installation is complete. You might be alerted to the fact that the device driver has not been digitally signed by Microsoft. Choose Yes to continue installation. If your system is set up to block installation of unsigned drivers, contact your system administrator for assistance.
7. Restart your computer.
8. Installation of the driver is now complete.

Remote Unattended Install for Windows 95, Windows 98, and NT 4.0

Instructions are on the adapter CD-ROM and can be read with your Web browser. See “Appendix A. CD-ROM Content and Software Packages” on page 45.

OS/2 Installation

OS/2 NDIS 2 Device Driver Using MPTS

If your OS/2 network operating system has not yet been installed on your computer, install it now and follow its instructions for installing device drivers. If an OS/2 network operating system has previously been installed, follow the instructions here for using MPTS to install device drivers.

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. Put the CD-ROM in the drive. Enter **x:** where x is the letter of your CD-ROM drive. Select **OK** once the Installation Complete 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 Turbo 16/4 Token-Ring PC Card 2** and select **ADD**.

   Note: You can edit parameter settings for this PC Card. Highlight this adapter in the Current Configuration list box and select **Edit**. When you have finished with the parameter settings, select **OK**.
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 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.
    - You are able to log on and communicate with the network.

If you experience problems go to “Appendix B. Problem Determination” on page 49 .

OS/2 NDIS 2 Device Driver Using Other Installation Programs

IBM TCP/IP for OS/2 is an example of a product that provides driver installation programs.

1. Insert the CD-ROM in the drive.
2. Use your product documentation to install the driver (IBMTOKCS.OS2).
3. Change the parameters if needed.
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.

   If you experience problems go to “Appendix B. Problem Determination” on page 49.

DOS Installation

Microsoft Windows for Workgroups/NDIS 2

Perform the following installation steps for the PC Card to install a real mode driver when using Microsoft Windows for Workgroups:

1. Follow the setup instructions included with Windows for Workgroups.

   If Windows for Workgroups is not already installed, you will be prompted to install a network PC Card during the Windows for Workgroups installation process.

   If you are installing the PC Card in a computer that already has Windows for Workgroups installed, refer to the *Microsoft Windows for Workgroups User's Guide* for instructions on how to install and configure a third-party device driver.

   Note: If you have Windows for Workgroups Version 3.11, perform the following steps before proceeding with step 1.a.
   - When you get to the Network Setup window, select **Networks**, and then **Install Microsoft Windows Network**.
   - Change any other items for your environment, and select **OK** and **Continue**.

   a. When prompted to install a new PC Card, select **Unlisted or updated network adapter**. You will be asked to provide the network driver. Insert the CD-ROM, check the path, and select **OK**.

   b. Follow the instructions as they appear on the window to install the IBMTOKCS.DOS device driver.

   c. Accept the defaults for Interrupt, MMIO, and SRAM. You will be given a chance to update these later, if necessary.

   d. Exit the Windows for Workgroups setup. *Do not* reboot your computer at this time. Exit to the DOS prompt.

2. Configure the PC Card.

   Memory management notes

   - If you are using Card and Socket Services, the program will default to Autoset mode, which allows the LAN driver to negotiate with Card and Socket Services for available resources. LANAID will allow you to select values for resources to be used by your PC Card such as Interrupt, memory, and I/O Base Address.
   - If you are not using Card and Socket Services in Autoset mode, you must ensure that the values that you select for Interrupt, MMIO, and SRAM do not conflict with those for other PC Cards and resources installed in your computer (such as video, sound, COM port).
   - If you are using EMM386, in most cases the memory exclusions will be automatically handled by LANAID. If you are using a memory manager, you must exclude the memory ranges being used by your PC Card (8-KB default).

   a. If LANAID is not already installed, install it as described in “Installing LANAID” on page 33.

   b. After LANAID is installed, continue with “Using LANAID to Configure the PC Card” on page 34. When you get to the panel that asks for the existing network operating system, select **Microsoft Windows for Workgroups**.

3. Step 5 of the Installation Checklist is now complete. Continue with the next step on page 3.

ODI 16–bit Client

Note: It is recommended that you use LAN Client (Client32) whenever possible as an efficient solution.

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

To install the TOKENCS.COM ODI driver on a DOS computer, perform the following steps. Consult your Novell NetWare documentation for instructions regarding how to create the NetWare Client for DOS and MS Windows diskettes.

1. Create a diskette containing the extracted files from the DOSODI.EXE file on the IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM.
2. Insert the NetWare Client for DOS and MS Windows Disk 1 into the appropriate drive.
3. At the command prompt, type **a:**, where a is your drive letter, and then press **Enter**.
4. Type **install** and then press **Enter**.
5. Follow the instructions as they appear. In step 5 of the instructions, press **Enter** and select **Other Drivers**.
6. Insert the CD-ROM or the diskette that you created in step 1 into the appropriate drive. When prompted, specify the location to the chosen media and press **Enter**. Specify the path as **a:\novell\dos** (or **x:\novell\dos** for the CD-ROM version).
7. Highlight your adapter and press **Enter**.
8. At this time you can change the default parameters. When you finish making any desired changes, press **F10**. “ODI 16–bit Client Parameters” on page 29 contains the parameters that can be configured in the NET.CFG file.

9. 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
   ```

10. Shut down and restart your computer for all changes to take effect.
11. 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. If error messages are displayed or if you do not see messages that indicate that the drivers have been installed, see “Troubleshooting and Error Codes” on page 50.
    - The adapter LEDs indicate normal operation: green ON, amber OFF.

      If you experience problems go to “Appendix B. Problem Determination” on page 49.

ODI 16–bit Client Parameters

Table 5. ODI 16–bit Client Parameters

Parameter	Explanation
NODE ADDRESS	To set a locally administered address for the adapter, type in the local address that 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. This keyword is specified as NODE ADDRESS in NET.CFG for DOS and OS/2 workstations. 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, add an ″M″ to the end of the address (for example, X'400000000000M'). 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 might 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 adapter.
PORT	The port address for a primary network adapter is X'A20'. The port address for an alternate network adapter is X'A24'. **Valid values:** X'A20' and X'A24' **Default value:** X'A20'

Table 5. ODI 16–bit Client Parameters (continued)

Parameter	Explanation
NIC UAA	This parameter can be used to specify which physical network adapter is to be associated with this load of the LAN driver. The parameter value can be a 1–digit ordinal value or a 12–digit, hexadecimal, universally administered address (MAC address). With ordinal type parameter usage, an ordinal value of 1 indicates the adapter with the *lowest* universally administered address value. An ordinal value of 2 indicates the adapter with the next lowest universally administered address, and so on. If there are two adapters, the one with the higher MAC address has an ordinal value of 2. This parameter is not required for a single network adapter; however, this parameter is necessary if the system contains more than one network adapter and at least one of them is a Turbo 16/4 Token-Ring PC Card 2. Otherwise, system or network errors are likely to result.
NOFULLDUPLEX	This parameter disables full-duplex ring insertion.

MAX FRAME SIZE	This option sets the maximum number of bytes that can be put on the wire by the Turbo 16/4 Token-Ring PC Card 2. The number must be a multiple of 8 and include the number of bytes for the data packet for adapter overhead (6 bytes) and for the maximum header (35 bytes LAN header + 5 bytes SNAP header + 74 bytes protocol header). The total number of bytes is 114.
	
	If the LAN speed is 16 Mbps, the number must be between 632 and 17 960. If the LAN speed is 4 Mbps, the number must be between 632 and 4 464. If 2 KB packets are desired, calculate the maximum frame size as:
	
	2048 + 6 + 35 + 5 + 74 = 2168 (rounding up to next multiple of 8 gives 2168)
	
	An example NET.CFG entry for using 2–KB packets would appear as:
	`LINK DRIVER TOKEN`
	`  MAX FRAME SIZE 2168`
	
	In an OS/2 environment, to set frame sizes greater than 1540 bytes, you must configure LSL buffers equal to or greater than the frame size you desire. To configure the adapter to handle 4210–byte frames, use this statement in your NET.CFG file:
	`LINK SUPPORT`
	`  BUFFERS 14 4210`
	
	Refer to the section that discusses NET.CFG options in *Novell NetWare Workstation 4.0 for OS/2* for information about configuring link suport layer buffers.

FRAME	This parameter indicates the token-ring frame type to be used by the LAN driver and network adapter. **Default value:** Token ring **Valid values:** Token ring, token-ring_SNAP
NOSHALLOWMODE	This parameter disables adapter shallow mode operation.

Table 5. ODI 16–bit Client Parameters (continued)

Parameter	Explanation
RECEIVEBUFFERSIZE	This parameter can be set to a value from 192 to 2048, inclusive. Any value smaller than 192 is changed to 192. Any value larger than 2048 is changed to 2048. Numbers between 192 and 2048 that are not on an eight-byte boundary are rounded up to the next higher eight-byte boundary.
EXPRESSMODE	For DOS only, this parameter enables adapter fast-path receive express mode.
ENHANCEDMODE	Causes the adapter to operate in fast-path receive mode and in the 4–KB paging mode of fast-path transmit operation. The Auto 16/4 Credit Card can not function in Enhanced Mode (Enhanced=NO).
BUS ID PCMCIA 3	This keyword must be present in the NET.CFG file.
PCMCIA	This keyword must be present in the NET.CFG file for configurations that use Card Services to enable the adapter. This keyword must not be used in configurations that enable the adapter by way of a Point Enabler.
AUTORINGSPEED	This keyword will cause the adapter to save the speed of the ring that it is opening into and use that ring-speed value as its speed the next time that it is initialized.

Chapter 5. LANAID

After you have inserted the PC Card, you must configure the PC Card software to operate with your computer and network operating system. You will need the manuals that were shipped with your network operating system.

If your computer does not have a hard disk, contact your network administrator.

About LANAID

LANAID is a software tool that is shipped on the IBM Turbo 16/4 Token-Ring PC Card 2 CD-ROM. Use LANAID to automatically configure the appropriate system files for the IBM Turbo 16/4 Token-Ring PC Card 2 to work with any of the network operating systems that are listed below.

LANAID requires that Card Services or an Intel socket controller that is compatible with the point enabler is installed.

LANAID detects the following network operating systems and changes parameters in the PC Card configuration in order to work with them:

- IBM LAN Client
- DOS Novell NetWare Client-16
- OS/2 Novell NetWare Client
- Artisoft LANtastic 6.0, 7.0
- Banyan VINES 6.x
- Microsoft LAN Manager
- Windows for Workgroups\NDIS 2
- Other DOS NDIS environments

For all other environments, you will use your network operating system to change parameters in the PC Card configuration.

The Net Address

LANAID identifies the PC Card to be configured by its universally administered address. The universally administered address, or net address, of the IBM Turbo 16/4 Token-Ring PC Card 2 was assigned at the factory and is on the back of the card. Ensure that the address shown by LANAID is the same as the address on the PC Card. It may be necessary to remove one or more PC Cards to allow LANAID to find the PC Card to be configured.

Installing LANAID

The LANAID graphical user interface operates under DOS or in a *full-screen* DOS session of OS/2. (A DOS *window* of OS/2 will not work correctly.) You need at least 1.5 MB of free, extended memory and 300 KB of conventional memory to run the program. At a DOS prompt, enter **mem** to find out about the memory availability on your system.

You can select LANAID options in several ways. You can click with a mouse or other pointing device, or you can make selections by tabbing to your selection and

pressing Enter. (If you will be using a mouse with LANAID, make sure that you have a mouse driver installed.) You can also select push buttons with *hot keys*. The hot keys are the letters that correspond to the underlined characters on the push button. Press **Alt** plus the hot-key letter.

You can get help on each LANAID panel by selecting the Help button at the bottom of the panel. You can get context-sensitive help by placing your mouse pointer on any part of the panel and pressing **F1**.

1. Install LANAID on your hard disk:
   a. At the DOS prompt, insert the CD-ROM in the drive and enter **install** from the x:\lanaid directory, where *x* is your CD-ROM drive. The files will automatically decompress and copy to the target directory. When this is complete, the LANAID program will be automatically invoked.
   b. Type the drive, path, and directory you want to use for LANAID. You can let it default to C: for the drive and \LANAID for the directory, or you can enter new values. Press **Enter** for each entry.
2. OR, extract the package file LAIDPKG.EXE to the drive, path, and directory that you want to use for LANAID. See “Appendix A. CD-ROM Content and Software Packages” on page 45. The files will automatically decompress and copy to the target directory. When this is complete, type **lanaid** from the directory to which the package was expanded.

Using LANAID to Configure the PC Card

This section explains how to run LANAID to configure the PC Card for operation with a previously installed network operating system and device driver. See “Chapter 4. Software Installation” on page 9 for information on installing network operating systems and device drivers.

If you are using Card and Socket Services, LANAID will default to Autoset mode, which allows the LAN driver to negotiate with Card and Socket Services for available resources. If you do not use Autoset mode, LANAID will allow you to select values for resources, such as Interrupt and I/O Address, to be used by your PC Card.

1. From the LANAID main panel, select **Network Software**. On the Network Operating System Choices panel, select **Identify Existing Network Operating System**.
2. On the Network Operating System Selection panel, LANAID identifies a network operating system and the directory in which the network operating system is installed. It is important to confirm these choices or manually identify the actual installed operating system and directory. When the information is correct, press the **Continue** push button.
3. From the LANAID main panel, select **View Adapter Configuration**. On the next panel, there are two folders. The Configurable folder shows all the parameters you can set along with their current values. Parameters that are in conflict with other settings are noted. Use the **Suggest** push button to have LANAID suggest non-conflicting values.

   If you are not using Card and Socket Services in Autoset mode, you must ensure that the values that you select for Interrupt and I/O address do not conflict with those for other PC Cards installed in your computer. Use the

Change push button to select from the allowable values yourself. The Hardware folder shows parameters of the computer system that you cannot set, but that might be useful.

Select the **Store** push button.

When you finish with the panels, press the **Done** button and you will be returned to the main panel. Installation is then complete. See “Appendix C. Running the Diagnostics Program” on page 81 if you want to use the diagnostics.

4. Reboot your computer.

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** from the directory on your hard drive where you installed LANAID. You can also boot the Diagnostics and LANAIDC diskette that you create from the DIAGDISK.EXE diskette image (see “Appendix A. CD-ROM Content and Software Packages” on page 45). The diskette will boot to a menu that allows you to select either Diagnostics or LANAIDC. See Appendix D. LANAIDC Parameter Information for more information.

Bypassing Startup Files

If startup configuration files are bypassed, LANAID or LANAIDC does not have the information to determine the resources used; therefore, it will not allow you to set any parameters. Do not bypass the startup configuration if you want to configure your system. (A typical way to bypass startup files is by pressing the F5 key during the DOS boot phase.)

Chapter 6. Point Enablers and Card Services

Computers that support PC Cards have one or more PC Card slots, known as A, B, C... or 1, 2, 3.... The slots are controlled by integrated circuit chips such as the TI1130, TI1131, and TI1250 (Cardbus) controller chip sets, and many more.

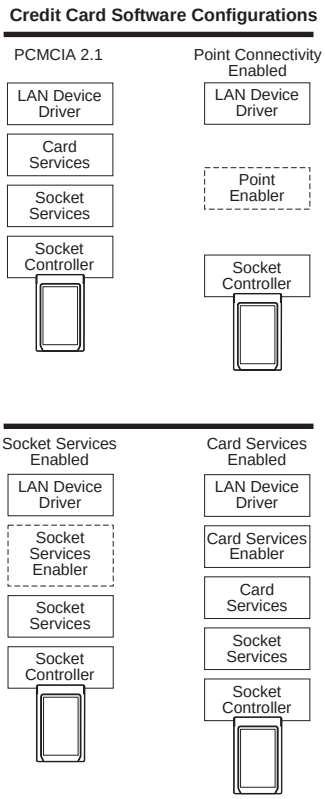
In order for communications programs to use a PC Card, interface software of some sort is needed. At present, several interfaces are available and each has its advantages and disadvantages. The two most important interfaces are those provided by Point Connectivity Enablers and Card Services; both are available under DOS, but OS/2 requires you to use Card Services.

If you decide to use Card Services, you must install and enable it before running LANAID.

A third type of interface is Socket Services.

Relationship Between the Interfaces

The following diagram shows how the interfaces relate to each other:



Point Connectivity Enablers

These are small programs that provide an interface directly to the PC Card controller; therefore, they must be written to support a particular type of controller.

In the DOS environment only, you have the option of using these point connectivity enablers *instead* of Card and Socket Services.

One point enabler is supplied for this PC Card:

POINTTR.EXE
For computers with Intel 32365SL PCMCIA controller chip sets or any controller that is designed to be compatible. These include the IBM ThinkPad, Toshiba 4500 and later, and many other makes.

Notes:

1. When using the point connectivity enabler, it is vitally important that you make certain that the system resources used by the PC Card are different from and do not conflict with the system resources and any other PC Cards installed in your computer.
2. Windows NT currently uses a point enabler called PCMCIA.SYS, which currently ships with Windows NT.

Advantage

- Enablers consume no memory — they remove themselves after configuring the PC Card.

Disadvantages

- You must specify the slot; the point enabler will enable only that slot. Therefore, the PC Card must always be in a specific slot.
- In some computers, the slot may not be switched off when the computer is in suspend mode, so the PC Card will continue to consume power.
- When configuring two or more PC Cards, you must allocate memory and interrupt resources manually under DOS.

Socket Services

This is a BIOS-type interface that provides a way to gain access to the PC Card sockets (slots) of a computer. It identifies how many sockets your computer has and detects the insertion or removal of a PC Card while the computer is switched on. It has an interface to Card Services. Socket Services is part of the PCMCIA Specification.

The Socket Services device driver is usually provided by the manufacturer of the computer, because the driver must understand the computer's BIOS and PCMCIA controller.

Card Services

This is a software management interface that allows system resources (such as memory, interrupts, slots, and I/O ports) to be allocated automatically when Socket Services has detected that a PC Card has been inserted.

Client drivers call Card Services to allocate and de-allocate system resources. When Socket Services detects an insertion or removal of a PC Card, it sends notification to Card Services. Card Services then notifies its registered client drivers, such as IBMTOKCS.OS2, that they should allocate or de-allocate resources.

If the installation program detects Card and Socket Services in your computer, it will default to Autoset mode. Autoset mode allows your LAN driver to negotiate with Card Services for memory space and interrupts. This helps to prevent conflicts with other PC Cards that are installed in your computer; however, you will not know exactly what memory addresses and interrupts have been given to you. It will default to Autoset mode if the driver supports it.

Card Services requires Socket Services. The Card Services interface will usually be provided with the operating system.

Advantages

- Ability to insert and remove PC Cards without computer reconfiguration and without damaging the electrical contacts.
- Automatic allocation of system resources.
- When used with your Token-Ring software in Autoset mode, automatic configuration of your PC Card occurs.

Disadvantage

Stay-resident program that uses system memory. The amount varies according to the type of PC Card support and the drivers used.

Card Services Enabler

If you want to use a Token-Ring device driver that does not have built-in Card Services support on a system that uses Card Services, CS20TOK.EXE is supplied. This program is a Card Services Enabler that uses Card and Socket Services to configure the IBM Turbo 16/4 Token-Ring PC Card 2. As with other enablers, you must specify the resources desired for the PC Card, and they must agree with the settings of the Token-Ring device driver for the system to work correctly.

The DOS Card Services 2.00 interface enabler shipped on the CD-ROM is CS20TOK.EXE.

CS20TOK.EXE
: DOS Card Services 2.00 interface enabler. It uses the Card Services interface to configure the socket and the PC Card. It is used when the Token-Ring device driver is not a Card Services client driver and a Card Services environment is desired. It works with DOS Card Services 2.00 and higher.

Card and Socket Services versus Point Enablers

There is much debate about this. In principle, Card and Socket Services is the better method of connection because it allows you to insert or remove PC Cards from any socket, even while the computer is switched on; and it automatically allocates resources like memory, I/O ports, interrupt levels, and slots.

Point Enablers, of which two are provided with the PC Card, are popular because they remove themselves from memory after having been loaded—as opposed to the 30–40 KB needed for Card and Socket Services.

For point enablers, you have to specify the slot in which a particular PC Card will be used and you have to specify memory locations, interrupt levels, and other

parameters. This is not difficult unless you use several PC Cards at different times, in which case you need to make certain that what you specify does not conflict with any other PC Cards installed in your computer.

Autoset Mode

Card and Socket Services turns out to be most helpful when you have a number of PC Cards installed in your computer. If the installation program detects Card and Socket Services in your computer, it will default to Autoset mode. Autoset mode allows your LAN driver to negotiate with Card and Socket Services for memory space and interrupts every time you switch on your computer. This helps to prevent conflicts with other PC Cards that are installed in your computer; however, you will not know exactly what memory addresses and interrupts you are using.

Using a Memory Manager in DOS Environments

If your computer comes with a memory manager preinstalled, or if you would like to use one, you must configure your computer so that the memory manager does not use the same memory as your PC Card. If you have more than one PC Card, you must reserve the memory needed for all of them. One PC Card cannot use the same memory ranges as another.

To determine whether or not your computer has a memory manager, edit your CONFIG.SYS file and look for the memory manager driver name. For example, when using EMM386, look for:

```
DEVICE=C:\DOS\EMM386.EXE ......
```

When using a memory manager, considerations for your PC Card environment (Point Enabler or Card and Socket Services) are required. Listed here are explanations for handling these environments with a memory manager. It is not intended to be all-inclusive. To understand completely your memory manager and your configuration files, refer to your computer's operating system manual.

Memory Managers with Point Enablers

- To prevent duplicate use of a memory location, the area used by your PC Card must be excluded from the memory manager. To do this, you must edit your CONFIG.SYS file. In certain environments, LANAID will add the exclude statement automatically.

  If you are using enhanced mode, 8 KB of memory must be excluded. If you are using compatibility mode, 24 KB of memory must be excluded.
- For the point enabler, the required exclusions are shown in the example below (using EMM386, this is done using the X= parameter):

  For enhanced mode:

  ```
  DEVICE=C:\POINTTR.EXE SA RS=4 MMIO=D000 IRQ=9 SRAM=D000,4 WS=0
    .
    .
  DEVICE=C:\DOS\HIMEM.SYS
    .
    .
  DEVICE=C:\DOS\EMM386.EXE 1024 RAM X=D000-D1FF
  ```

  For compatibility mode:

```
DEVICE=C:\POINTTR.EXE SA RS=4 MMIO=D000 IRQ=9 SRAM=D800,16 WS=0
  .
  .
DEVICE=C:\DOS\HIMEM.SYS
  .
  .
DEVICE=C:\DOS\EMM386.EXE 1024 RAM X=D000-D1FF X=D800-DBFF
```

Notice that the EMM386 line excludes the ranges that the POINTTR.EXE enabler uses.

Memory Managers with Card and Socket Services

1. To prevent duplicate use of a memory location, the area used by your PC Card must be excluded from the memory manager. To do this, you must edit your CONFIG.SYS file. In certain environments, the installation program will add the exclude statement automatically.

   If you are in enhanced mode, 8 KB of the MMIO range must be excluded.

   If you are in compatibility mode, 8 KB of the MMIO range (MMIO base address default of D000) and 16 KB of the Shared RAM (SRAM) range (SRAM base address default of D800) must be excluded.

   In addition, Card Services needs at least 4 KB excluded for its use. Remember, if you are using more than one PC Card, the memory locations for the other PC Cards must also be excluded.

2. Card Services and memory managers typically do not talk to each other. You must tell them what areas can be used. For example, with IBM Card Services the /MA option is used to tell Card Services what memory range it can use for PC Cards. It also uses some of this area for itself. That same /MA range must be excluded from the memory manager line. This will prohibit the memory manager from also using that same space.

   For IBM CS, the /MA is used to specify the range of memory the PC Cards and Card Services use. The parameter is added to the Resource Map Utility line in your CONFIG.SYS. For example:

   - Using IBM Card Services:

     On a computer using memory range C0000–CFFFF

     ```
     DEVICE=C:\DOS\EMM386.EXE NOEMS X=C000-CFFF
       .
       .
     DEVICE=C:\DOS\DICRMU02.SYS /MA=C000-CFFF
     ```

     The Resource Map Utility driver name may be slightly different for the various computers. Consult your operating manual.

   - Using Phoenix Card Services with the /ADDR option:

     For some versions of Phoenix Card Services, the /ADDR parameter is used to specify the 4-KB memory range used by Card Services. The memory range chosen for the PC Cards must not conflict with this range. The /ADDR parameter is placed on the Phoenix device driver line in the CONFIG.SYS file. Consult your operation manual as to the version you have and whether the /ADDR option is needed.

     Note: The /ADDR needs only the starting address of the Card Services memory area.

     On a computer using memory range D0000–DFFFF

```
DEVICE=C:\DOS\EMM386.EXE NOEMS X=D000-DFFF
  .
  .
DEVICE=C:\PCMPLUS\PCMCS.EXE /WAIT=12 /ADDR=D0 /IRQ=9
```

3. General Rules:

   IBM Card Services

   a. The memory area used by PC Cards must fall within the range specified by /MA.
   b. The memory area used by Card Services itself (4 KB) must be included in the /MA range.
   c. All of the /MA range must be excluded from your memory manager line.

   Phoenix Card Services

   a. The memory used by Card Services starting at the /ADDR address and the memory used by the PC Card should be excluded from the memory manager line.
   b. If the /ADDR line is not used, the driver will use the first available address on a 4-KB boundary for Card Services. The memory manager line must exclude this area and the PC Card memory area.

Expanded Memory Specification

Expanded memory specification (EMS) requires 64 KB (one page frame) of contiguous memory. This may cause you to move your PC Card memory range. With EMM386 you set the page frame base address using the FRAME= option on the memory manager line in the CONFIG.SYS. If the FRAME= option is not used, EMM386 will find the first 64-KB block of contiguous memory. For example:

1. Using a point enabler with the PC Card at D0000–DBFFF, the C0000–CFFFF range is free for the EMS page. A sample enhanced mode memory manager line in your CONFIG.SYS is:

   ```
   DEVICE=C:\DOS\EMM386.EXE RAM 1024 X=D000-D1FF FRAME=C000
   ```

   Note: The Token-Ring PC Card uses D0000–D1FFF for 8-KB MMIO. The FRAME= parameter sets the base address of the EMS page frame (the page frame uses C0000–CFFFF). So, no PC Cards should be set to use memory in the range C0000–CFFFF.

2. Using a point enabler with the PC Card at D0000–DBFFF, the C0000–CFFFF range is free for the EMS page. A sample compatibility mode memory manager line in your CONFIG.SYS is:

   ```
   DEVICE=C:\DOS\EMM386.EXE RAM 1024 X=D000-D1FF
       X=D800-DBFF FRAME=C000
   ```

   Note: The Token-Ring PC Card uses D0000–D1FFF for 8-KB MMIO and D8000–DBFFF for 16-KB SRAM. The FRAME= parameter sets the base address of the EMS page frame (the page frame uses C0000–CFFFF). So, no PC Cards should be set to use memory in the range C0000–CFFFF.

3. Using IBM Card Services, you can set the /MA option such that a 64-KB block is free for the EMS page frame. A sample memory manager line in your CONFIG.SYS is:

   ```
   DEVICE=C:\DOS\EMM386.EXE RAM 1024 X=D000-DBFF FRAME=C000
     .
     .
   DEVICE=C:\DICRMU01.SYS /MA=D000-DBFF
   ```

Note: Because of the /MA option, IBM CS will use memory in the range D0000–DBFFF only. The FRAME= parameter sets the base address of the EMS page frame (the page frame uses C0000–CFFFF). So, no PC Cards should be set to use memory in the range C0000–CFFFF.

Appendix A. CD-ROM Content and Software Packages

The CD-ROM contains PC Card drivers, supporting applications, publications, technical tips, and frequently asked questions related to the IBM Turbo 16/4 Token-Ring PC Card 2. A nagivational tool is provided to assist in accessing the contents of the CD-ROM. This tool can be launched by opening the file x:\startcd.htm (where x is the letter of your CD-ROM drive) in a Web browser. Release date information can be obtained from the CD-ROM by selecting **CD-ROM — product support**. However, the IBM Networking Web site might offer more current information. If you have a Web connection, you can obtain the most current drivers and information by selecting **IBM Networking Web site — product support**.

- *User's Guide* and *Token-Ring Adapter Features* in HTML and PDF format. See "Product Documentation" on page 47.
- Device Drivers that can be installed directly from the CD-ROM during the device driver install process. They are located in the following directories:

Operating System	Directory
Windows 9x	\ (root)
Windows NT	\ (root)
Windows 2000	\ (root)
Novell NetWare Server and Client	\NOVELL\NETWARE
Novell NetWare DOS Requester (16–bit)	\NOVELL\DOS
OS/2	\ (root)
DOS	\DOS
Windows for Workgroups	\WFW

- LAN Client files that can be installed directly from the CD-ROM during the LAN Client installation process.
- Self-expanding software package and diskette image files.

Software Packages

Table 6 lists packages that are available on the Web and on the CD-ROM. Table 7 on page 46 lists diskette images that are available on the Web and on the CD-ROM. They can be obtained using the navigation tool already mentioned. Select the Web link for the latest version of the file, or select the CD-ROM link to copy the file directly from the CD-ROM. The files are located on the CD-ROM at x:\download (where x is your drive letter).

Run the self-extracting package file to expand to a hard drive (or you can expand to a diskette where noted with an asterisk (*)). The directory structure is maintained as it exists on the CD-ROM.

Table 6. Software Packages

Package	Description	Executable
CD-ROM	Complete CD-ROM content	CDIMAGE.EXE

Table 6. Software Packages (continued)

Package	Description	Executable
Device Drivers (*)	• DOS and Windows 3.1x (NDIS 2) • Novell NetWare DOS Requester (16–bit) • Novell NetWare Server and Client • OS/2 • Windows 95/98/NT/2000 • Windows for Workgroups	• DOSNDIS.EXE • DOSODI.EXE • NETWARE.EXE • OS2NDIS.EXE • WIN32PCC.EXE • WFWPKG.EXE
Documentation — HTML and PDF	• User's Guide • Token-Ring Features	• USERGUID.EXE • FEATURES.EXE
IBM LAN Client	IBM LAN Client — Complete package	LCPKG.EXE
LAN Adapter Management Agents	• OS/2 • Windows NT and Windows 9x	• DMIOS2.EXE • DMIWIN.EXE
Tivoli Management Agents (*)	• Windows 3.x • Windows 9x • Windows NT • OS/2 • NetWare 3.x • NetWare 4.x and 5.x	• TMAW3X.EXE • TMAW9X.EXE • TMAWNT.EXE • TMAOS2.EXE • TMANW3X.EXE • TMANW4_5.EXE
LANAID (*)		LAIDPKG.EXE

Diskette Images

Run these diskette image files to create diskettes. Each image file will create a single diskette.

Table 7. Diskette Images

Image	Description	Executable
LAN Adapter Management Agents	• OS/2 — Diskette 1 • OS/2 — Diskette 2 • Windows 95/98/NT — Diskette 1 • Windows 95/98/NT — Diskette 2 • Windows 95/98/NT — Diskette 3	• DMIOS2A.EXE • DMIOS2B.EXE • DMIWINA.EXE • DMIWINB.EXE • DMIWINC.EXE
IBM LAN Client	• IBM LAN Client — Diskette 1 • IBM LAN Client — Diskette 2 • IBM LAN Client — Diskette 3 • IBM LAN Client — Diskette 4	• LCDISK1.EXE • LCDISK2.EXE • LCDISK3.EXE • LCDISK4.EXE
RUI	• Remote Unattended Install diskette for Windows 9x and Windows NT for NetBEUI • Remote Unattended Install diskette for Windows 9x and Windows NT for IP	• RUIPCCNB.EXE • RUIPCCIP.EXE

Product Documentation

Complete product documentation is available for downloading from the CD-ROM and the Web in both PDF and HTML formats. The HTML version can also be viewed directly from your Web browser. Two documents are provided. The *User's Guide* includes hardware and software installation instructions, troubleshooting tips, device driver parameters and error messages. *Token-Ring Adapter Features* provides detailed information about Remote Program Load, LAN Client, LAN Adapter Management Agent, Route Switching, Class of Service, and the Tivoli Management Agent.

To access the product documentation, insert the CD-ROM into the CD-ROM drive of your computer and point your Web browser to x:\startcd.htm (where x is your CD-ROM drive letter). Select **IBM Networking Web Site** or **CD-ROM** and then **Downloads**. Select **Target Operating System** and then select the *User's Guide* or *Token-Ring Adapter Features*. Select the package name that appears. You might be prompted to select an ftp site from which to download the package. In the **Save as...** dialog box, choose the path to the directory where you want to copy the package file. Select **OK** to download the package file. Go to the directory where the package was stored and run the package file to expand the files.

The *User's Guide* in PDF format is stored in the file userguid.pdf. *Token-Ring Adapter Features* in PDF format is stored in the file feature.pdf. The corresponding HTML versions are in userguid.htm and feature.htm.

To view the documentation directly from the CD-ROM, insert the CD-ROM into the CD-ROM drive of your computer and point your Web browser to x:\startcd.htm (where x is your CD-ROM drive letter). Select **CD-ROM — product support**, select your PC Card and then the documentation that you want to view.

Appendix B. Problem Determination

Check this list of possible error conditions if problems occur.

1. Make sure that the PC Card is in the socket and that the cable is connected to the PC Card.
2. You are using EMM386.EXE or another memory manager.

   EMM386 is the source of many problems with PC Cards. The problem occurs when EMM386.EXE and the LAN device driver are using the same memory. This is called *memory contention*. The PC Card will not function correctly if this contention occurs. If you are using Card Services, check to be sure that the memory that Card Services controls is excluded by the memory manager. If you are using a point enabler, be sure that the memory that you use is excluded by the memory manager. As a quick test, you may want to comment out EMM386.EXE in your CONFIG.SYS, reboot, and try the PC Card again.

   If the PC Card functions, you will have to edit the EMM386.EXE command to exclude some memory. The PC Card uses 8 KB of memory in two separate areas. These memory areas may be consecutive. See Using a Memory Manager in DOS Environments for more information.
3. You are using Card Services.

   During reboot, you hear four alternating tones. This indicates that Card Services was unable to give you one or more resources that your program requested. Resources are I/O ports, interrupt level, and memory locations.

   Note: The items in the following paragraph are performed by the installation program.

   If you are using the NDIS driver (IBMTOKCS.DOS), edit the PROTOCOL.INI file and see whether you have specified a particular value for the interrupt level or memory locations. This would be indicated by the keywords INTERRUPT=X, MMIO=0xXXXX, or RAM=0xXXXX. If you are using the ODI driver (TOKENCS.COM), edit the NET.CFG file and see whether you have specified a particular value for the interrupt level or memory locations. This would be indicated by the keywords INT X, MEM #1 XXXXX, or MEM #2 XXXXX.

   These keywords specify a particular value for these parameters. If you find one or more of these keywords, comment them out by placing a semicolon in front of the keyword. Save the file and reboot your computer. If all three are commented out or are not in PROTOCOL.INI or NET.CFG, the driver is in Autoset mode and lets Card Services determine what values are used by the driver. If you reboot and still receive the alternating beep alarm, there is a problem with Card Services. Check your level of Card Services and ensure that it is the latest available.
4. You are using a point enabler.

   When you use a point enabler, it is essential that the I/O ports, interrupt, memory areas, and slot number that are chosen by the enabler agree with what the LAN device driver is expecting. Problems occur when the enabler has set up certain resources and the LAN device driver is expecting others. Typically, the LAN driver will not initialize. Look at the default values for the interrupt, whether the PC Card is a primary or secondary PC Card (this affects the I/O ports), and where the MMIO memory and the SRAM memory are located. Be sure that the enabler settings and the settings of the LAN driver coincide. By the use of parameters on the command line of the enabler and the parameters for

the LAN device driver (in PROTOCOL.INI, NET.CFG, or LSP.INI), you should be able to configure your PC Card to function.

5. If you believe that you have a hardware problem with the PC Card, run the PC Card diagnostics. See “Appendix C. Running the Diagnostics Program” on page 81.
6. Check “Troubleshooting and Error Codes” if your computer displays an error code. If you do not find your error code, use the following information to contact IBM.

Questions, Problems?

World Wide Web

You can download the latest code from the World Wide Web.

On a Web browser:

`www.networking.ibm.com/support`

IBM Product Support

```
1-800-772-2227 IBM HelpCenter
1-800-565-3344 HelpPC (Canada)
1-800-237-5511 IBM Support Services
```

Troubleshooting and Error Codes

Novell NetWare Server Driver Messages

Error Code	Explanation and Action
IBMTOKEN-xx-201	IBM Token-Ring Shared RAM Adapter, Version xxx **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-202	The IBM Token-Ring Shared RAM Adapter UAA (BIA) is *xxx*. **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-203	The IBM Token-Ring Shared RAM Adapter is using an LAA of *xxx*. **Explanation:** Information only. **User Action:** None.

Error Code	Explanation and Action
IBMTOKEN-xx-204	Revision level *xxx* of the IBM Token-Ring Shared RAM Adapter is incompatible with this driver version. **Explanation:** The Revision ID of the IBM Token-Ring Shared RAM 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 adapter, use a different version of the device driver, or both.
IBMTOKEN-xx-205	A device driver initialization error occurred (failure code *xxx*). **Explanation:** An unexpected error occurred during initialization of the device driver. **User Action:** Properly 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.
IBMTOKEN-xx-206	The configuration parameter *xxx* was specified improperly. Its default value will be used. **Explanation:** The value of a configuration parameter was improperly 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.

Error Code	Explanation and Action
IBMTOKEN-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 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 to activate this configuration change.
IBMTOKEN-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 (or *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, then determine if he conflicting device can be left out of the machine, or if the machine can be reconfigured to resolve the conflict. Note that in most machines, the BIOS assigns certain system resources to the devices found in the computer, including the interrupt level.
IBMTOKEN-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 to isolate the problem and contact your customer service center. 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). Turn the computer off and then on again to restart the machine. If the problem persists, contact your customer service center.

Error Code	Explanation and Action
IBMTOKEN-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.
IBMTOKEN-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.
IBMTOKEN-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 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.

Error Code	Explanation and Action
IBMTOKEN-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.
IBMTOKEN-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.
IBMTOKEN-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.
IBMTOKEN-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.

Error Code	Explanation and Action
IBMTOKEN-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 (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 burned-in address (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.
IBMTOKEN-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.
IBMTOKEN-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.

Error Code	Explanation and Action
IBMTOKEN-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 to isolate the problem and contact your customer service center. 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). Turn the computer off and then on again to restart the machine. If the problem persists, contact your customer service center.
IBMTOKEN-xx-222	A hardware failure occurred while attempting to open the adapter. **Explanation:** A 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 customer service center. 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). Turn the computer off and then on again to restart the machine. If the problem persists, contact your customer service center.

Error Code	Explanation and Action
IBMTOKEN-xx-223	The adapter cannot be opened in AutoSense mode if it is the only active station on the network. **Explanation:** The 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 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 with your local network administrator if necessary. Check the adapter installation instructions for additional information on setting the DataRate parameter.
IBMTOKEN-xx-224	Port *xxx*: The adapter attempted to perform a Remote Program Load but failed monitor contention. **Explanation:** The adapter was opened as a Remote Proram 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 network address.

Error Code	Explanation and Action
IBMTOKEN-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.
IBMTOKEN-xx-226	The adapter failed to open during an enhanced mode open sequence. **Explanation:** The adapter failed during some phase of an enhanced mode open sequence. **User Action:** Restart the computer. If the problem still occurs run diagnostics. If the diagnostics indicates that the adapter is not defective then record this message number and contact your customer service center.
IBMTOKEN-xx-227	The IBM Token-Ring Shared RAM Adapter opened at *xxx* Mbps, half duplex. **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-228	The IBM Token-Ring Shared RAM Adapter opened at *xxx* Mbps, full-duplex. **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-229	The adapter is configured for full duplex, but could only be opened in half duplex mode. **Explanation:** Information only. **User Action:** None.

Error Code	Explanation and Action
IBMTOKEN-xx-233	Adapter analysis code is *xxx*. **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-234	Adapter full-duplex operation has now been activated. **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-240	IBM Token-Ring Shared RAM Adapter **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-301	ODI 3.3 and Above HSM **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-304	Adapter is disconnected from the media. **Explanation:** The media network is not functioning correctly. **User Action:** Check that the cable is securely attached to both the adapter and the Token-Ring network. Run adapter diagnostics if problems persist. 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.
IBMTOKEN-xx-305	Condition restored. The adapter is connected to the media. **Explanation:** Information only. **User Action:** None.

Error Code	Explanation and Action
IBMTOKEN-xx-312	Insufficient memory for minimum number of receive buffers. **Explanation:** The HSM driver was not able to allocate the minimum number of receive buffers. **User Action:** Increase the number of buffers that the server's operating system can allocate by editing the STARTUP.NCF file on the server. Increase the Minimum Packet Receive Buffers parameter in this file by the total number of transmit (TxBuffers =) and receive (RxBuffers =) that the HSM driver is using. Down and restart the Novell NetWare server.
IBMTOKEN-xx-401	NetWare *xxx xxx* **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-402	Unable to find a supported board in this machine. **Explanation:** Information only. **User Action:** None.
IBMTOKEN-xx-403	Unable to acquire the configuration parameters for the PCMCIA adapter. **Explanation:** Needed parameters have not been correctly configured. **User Action:** Make sure that your computer is loading Card and Socket Services. You must also be loading the Token-Ring 16/4 PC Card Connectivity Enabler (CS20TOK.EXE) in CONFIG.SYS to configure your adapter.

Windows 95 and Windows 98

Windows 95 sometimes has trouble selecting available resources for the PC Card, causing the PC Card not to function. If you find that your PC Card is not functioning, follow this procedure.

1. Click **Start**.
2. Go to the Settings menu selection and click **Control Panel**.
3. Click **System**.
4. Click the **Device Manager** tab.

5. Go to the icon for Network Adapters. You might see a yellow or red circle with an exclamation point inside beside an entry for the IBM Turbo 16/4 Token-Ring PC Card 2. If you see this, click the entry. This will take you to the properties dialog for the PC Card.
6. Click the **Resources** tab of the dialog box. There are three resources that must be correct before the IBM Turbo 16/4 Token-Ring PC Card 2 will function correctly. Acceptable values for the input/output range include any four consecutive values beginning at 0300. The interrupt request value should be a value between 3 and 15 that does not conflict with any other devices. The memory range is often set incorrectly by Windows 95. It is recommended that the memory range be set in the 000D0000 to 000DC000 in a non-conflicting memory region. The memory range 000C0000 to 000CFFFF is often used for video caches and Windows 95 does not always exclude memory regions that are already in use.
7. If EMM386.EXE is in your CONFIG.SYS, comment it out.

Windows NT

Windows NT 3.51 and 4.0 use a point enabler called PCMCIA.SYS that is supplied with Windows NT. PCMCIA.SYS configures the Intel compatible socket controller with settings gleaned from the registry entry for the PC Card. Windows NT will indicate resource conflicts only after an attempt is made to configure a device. As when using a DOS enabler, you must manually choose your PC Card resources. By looking at the event viewer in the administrative tools, you might find that there is an I/O, IRQ, or memory conflict. A program called WINMSD is included with Windows NT which allows you to see the resources of your machine and determine if there are any conflicts. Make a note of your configured resources and compare them to the settings indicated by WINMSD. Make corrections to your configuration as needed. This is done by the following procedure:

1. Right-click **Network Neighborhood**.
2. Select **Properties**.
3. Select the **Adapter** tab.
4. Select **IBM Turbo 16/4 Token-Ring PC Card 2** and click **Properties**.

You can now change your configuration as needed.

Windows 2000

Windows 2000 sometimes has trouble selecting available resources for the PC Card, causing the PC Card not to function. If you find that your PC Card is not functioning, follow this procedure:

1. From the Control Panel, double-click the **System** icon. Select the **Hardware** tab, and click the **Device Manager** button.
2. From the Device Manager, look for a yellow or red circle with an exclamation point beside an entry for the IBM Turbo 16/4 Token-Ring PC Card 2. If you see this, then double-click the adapter. The properties dialog for the adapter will now be displayed.
3. The device status window will tell you why the device is not functioning. You might choose to try to resolve the problem yourself based on the problem description, or Windows 2000 will help you solve the problem if you click the **Troubleshooter** button.

OS/2 NDIS Error Codes

The following sections provide messages that can be received from the NDIS driver function. The messages are logged to a file. The NDIS driver signals the user when a Card Services call fails; the error signal is an alternating beep. If you hear this sound, and you are running OS/2, a problem is occurring during configuration of the PC Card and you must review the LANTRAN.LOG file in your \IBMCOM subdirectory to determine what is wrong. Depending on the error, you may see one or more of the following error codes.

Error Code	Explanation and Action
LTG0022E	A failure during initialization of te IBMTOKCS device driver has occurred. This is a generic **Explanation:** This is a generic initialization failure message. If the IBMTOKCS device driver encounters any errors during initialization, the specific message related to the error will accompany this generic message. **User Action:** Resolve the specific error that accompanies this message. In addition, ensure that the Protocol Manager device driver, PROTMAN.OS2, is located in the \IBMCOM directory, and that a DEVICE statement for PROTMAN.OS2 exists in the CONFIG.SYS file.
LTG0023I	An unrecognized parameter was found in PROTOCOL.INI. **Explanation:** The parameter displayed was found while the installation program wa sprocessing the IBM Token-Ring Network Driver section of PROTOCOL.INI. The parameter is not valid. **User Action:** Correct the parameter or remove it from PROTOCOL.INI.
LTG024I	A value specified for a parameter in PROTOCOL.INI is not valid. **Explanation:** The value provided for the parameter is not the correct type or is not a valid value. **User Action:** Change the value for the parameter in PROTOCOL.INI.

Error Code	Explanation and Action
LTG0025I	A configuration error was found in PROTOCOL.INI. **Explanation:** Conflicting parameter values were found while the installation program was processing the IBM Token-Ring Network Driver section of PROTOCOL.INI. **User Action:** Examine the configuration parameters and correct the conflicting values in PROTOCOL.INI.
LTG0026I	The PC Card is not responding or was not found. **Explanation:** One of the following conditions has caused this error: • The logical primary or alternate setting in the PROTOCOL.INI file does not map to the physical primary or alternate setting. • The PC Card is not responding to a request to start. • There is no physical PC Card in your computer. **User Action:** If there is already a PC Card in this system, check the logical primary or alternate setting. Check the cable and ensure that the connection to the token-ring network addressable unit is functioning correctly. Then, run the hardware diagnostics for the token-ring PC Card to ensure that the PC Card and options have been installed correctly. If there is no PC Card in your computer, install a token-ring PC Card or remove the device driver statement from the CONFIG.SYS file.
LTG0027I	The 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 specified path.

Error Code	Explanation and Action
LTG0029I	The PC Card encountered a lobe wire fault. **Explanation:** The PC Card will be closed. **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the Multistation Access Unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, refer to the documentation that was shipped with your PC Card to run diagnostics; then, try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.
LTG0030I	There are not adequate receive bufers for the PC Card to open. **Explanation:** The requested DIR.OPEN.ADAPTER paramaeter has not allowed enough receive buffer space in the PC Card shared-RAM area. **User Action:** Reduce the RAM requirements by reconfiguring the parameters in PROTOCOL.INI. The parameters that will reduce the space requirements for the receive buffer are the transmit buffers (if more than one is specified).
LTG0032I	An invalid node address error occurred when the program attempted to open the PC Card. **Explanation:** The node address defined is not valid. **User Action:** Specify a valid node address. Refer to the *IBM Token-Ring Network Architecture Reference* (SC30–3374) for node address restrictions.

Error Code	Explanation and Action
LTG0033I	The receive buffer length defined is not valid. **Explanation:** The PC Card was not opened. The receive buffer length defined in PROTOCOL.INI is not valid. The value specified must be greater than the allowable maximum, less than the allowable minimum, or not a multiple of 8. **User Action:** Specify a valid receive buffer length.
LTG0034E	The PC Card transmit buffer length defined is not valid. **Explanation:** The PC Card was not opened. The PC Card transmit buffer length defined in PROTOCOL.INI is not valid. The value specified must be greater than the allowable maximum, less than the allowable minimum, or not a multiple of 8. **User Action:** Specify a valid PC Card transmit buffer length.
LTG0037I	An unexpected error caused the Open Adapter Command in the IBMTOKCS.OS2 device driver. **Explanation:** The PC Card was closed because of an unexpected error condition. **User Action:** See the message log, LANTRAN.LOG, for additional information about this error. The error must be corrected before you can use this PC Card.

Error Code	Explanation and Action
LTG0038I	An auto-removal error has been detected. **Explanation:** The PC Card will be closed. The PC Card has either detected a monitor contention failure or received a beacon frame from the ring. The problem might be that your PC Card speed is different from the speed at which the LAN is running. **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.
LTG0039I	A remove medium access control (MAC) frame has been received. **Explanation:** The PC Card will be closed. A command forcing the PC Card to remove itself from the ring has been received. **User Action:** Contact your LAN administrator to determine why the REMOVE command was issued for your computer.
LTG0041I	An open error occurred during the lobe media test phase. **Explanation:** The PC Card has detected a problem on your local lobe between the PC Card and the multistation access unit (MSAU). **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the MSAU. Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again.

Error Code	Explanation and Action
LTG0042I	An open error occurred during the physical insertion phase. **Explanation:** The PC Card has detected one of the following open errors while trying to insert into the LAN: • Ring failure • Ring beaconing • Timeout **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again.
LTG0043I	An open error occurred during the address verification phase. **Explanation:** The PC Card has detected one of the following open errors during the address verification phase of the PC Card open process: • Signal loss • Timeout • Ring failure • Ring beaconing • Duplicate node • REMOVE command received **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again.

Error Code	Explanation and Action
LTG0044I	An open error occurred during the roll-call poll phase. **Explanation:** The PC Card has detected one of the following open errors during the roll-call poll phase of the PC Card open process: • Signal loss • Timeout • Ring failure • Ring beaconing • REMOVE command received **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.
LTG0045I	An open error occurred during the request parameter phase. **Explanation:** The PC Card has detected one of the following open errors during the request parameter phase of the PC Card open process: • Signal loss • Timeout • Ring failure • Ring beaconing • Parameter request • REMOVE command received **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.

Error Code	Explanation and Action
LTG0051I	The open error type is function failure. **Explanation:** The PC Card has detected a lobe media failure while trying to open the PC Card. **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.
LTG0052I	The open error type is signal loss. **Explanation:** The PC Card has detected a signal loss failure while trying to open the PC Card. **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.

Error Code	Explanation and Action
LTG0055I	The open error type is timeout. **Explanation:** The PC Card has detected an insertion timer expiration while trying to open the PC Card. This condition indicates that the ring might be congested, experiencing a high bit-error rate, or is losing an unusually high number of tokens or frames. **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.
LTG0056I	The open error type is ring failure. **Explanation:** The PC Card has detected a ring failure while trying to open the PC Card. **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.

Error Code	Explanation and Action
LTG0057I	The open error type is ring beaconing. **Explanation:** The PC Card has detected a monitor contention failure or has received a beacon frame from the ring while trying to open the PC Card. **User Action:** Perform the following steps: 1. Check and secure all cable connecetions between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, run the diagnostics; then, try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.
LTG0058I	The open error type is duplicate node address. **Explanation:** The PC Card has detected that another station on the ring has a PC Card address equal to the address specified for your PC Card. **User Action:** Note the identification number of this message and then contact your LAN administrator.
LTG0059I	The open error type is parameter request. **Explanation:** The PC Card has detected a parameter request error while trying to open the PC Card. **User Action:** Perform the following steps: 1. Check and secure all cable connections between your PC Card and the multistation access unit (MSAU). Correct any related problems and try the operation again. 2. If there are no related problems, refer to the documentation that was shipped with your PC Card to run the diagnostics; then, try the operation again. 3. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.

Error Code	Explanation and Action
LTG0060I	The open error type is REMOVE received. **Explanation:** While attempting to insert into the ring, your computer received a command forcing this PC Card to remove from the ring. **User Action:** Contact your LAN administrator to determine why the REMOVE command was issued for your computer.
LTG0063I	Your computer is the first attempting to insert onto the ring in AUTORINGSPEED mode. **Explanation:** **User Action:** Either remove the AUTORINGSPEED keyword from PROTOCOL.INI or make sure that another computer is on the network and has set the ring speed. If the problem persists, print or save the LANTRAN.LOG file and contact your LAN administrator.
LTG0064I	Physical insertion of your computer onto the ring failed. **Explanation:** **User Action:** Check the PC Card configuration and retry the open request. If the problem persists, refer to the documentation that was shipped with your PC Card to run diagnostics; then, try the operation again.
LTG0070I	A problem was detected on microcode level 00 00 00 C2 45 50. **Explanation:** **User Action:** Request and install engineering change ECA0066, P/N 92F9122, on your system, or use the configuration feature of the LAN Adapter Protocol Support installation program to change the value for the number of transmit buffers to be greater than 1.
LTG0083E	Token-Ring Credit Card Request I/O failed. **Explanation:** Card Services would not give IBMTOKCS access to the I/O ports it requested. **User Action:** Make sure that no other PC Cards are using the range of I/O ports that the adapter needs. For a primary PC Card the range is A20–A23. For a secondary PC Card the range is A24–A27.

Error Code	Explanation and Action
LTG0084E	Token-Ring Credit Card Request IRQ failed. **Explanation:** Card Services would not give IBMTOKCS access to the interrupt request (IRQ) line it requested. **User Action:** Make sure that no other PC Cards are using the IRQ requested. IBMTOKCS defaults to IRQ 9. To change the IRQ that IBMTOKCS uses, add the line INTERRUPT=X to your PROTOCOL.INI file. X can be any one of the following values: 3, 4, 5, 7, 9, 10, or 11. The IRQ chosen should not be used by any other device.
LTG0085E	Token-Ring Credit Card RAM Request Window failed. **Explanation:** Card Services would not give IBMTOKCS access to the memory window that it requested. **User Action:** Make sure that no other PC Cards are using the memory window requested. IBMTOKCS defaults the MMIO memory window to CC00 for the primary PC Card ot DC00 for the alternate PC Card. It also defaults the SRAM memory window to D800 for the primary PC Card or D400 for the alternate PC Card. To change the MMIO memory window, add the line MMIO=XXXX to your PROTOCOL.INI file. XXXX can be any unused 8–KB, 16–KB, 32–KB, or 64–KB region in the range C000–DC00. You might also have to asjust the RAMSIZE keyword accordingly.
LTG0086E	Token-Ring Credit Card Request Configuration failed. **Explanation:** Card Services would not give IBMTOKCS the configuration that it requested. **User Action:** Try a different interrupt line by using the INTERRUPT=X statement in your PROTOCOL.INI file. X can be any unused interrupt line in the range 3–15.

Error Code	Explanation and Action
LTG0087E	Token-Ring Credit Card RAM MapMemPage failed. **Explanation:** Card Services would not map the shared-RAM memory on the PC Card to the required memory window. **User Action:** Try changing the memory window. IBMTOKCS defaults the MMIO memory window to CC00 for the primary PC Card or DC00 for the alternate PC Card. It also defaults the SRAM memory window to D800 for the primary PC Card or D400 for the alternate PC Card. To change the MMIO meory window, add the line MMIO=XXXX to your PROTOCOL.INI file. XXXX can be any unused 8–KB region in the range C000–DE00. To change the SRAM memory window, add the line RAM=XXXX to your PROTOCOL.INI file. XXXX can be any unused 8–KB, 16–KB, 32–KB, or 64–KB region in the range C000–DC00. You might also have to adjust the RAMSIZE keyword accordingly.
LTG0090E	Token-Ring Credit Card Register Client failed. **Explanation:** Card Services would not register the PC Card callback handler. **User Action:** Make sure that you have Card Services 2.0 (PCMCIA.SYS) correctly installed.
LTG0091E	Card Services could not be found. **Explanation:** **User Action:** Add the appropriate statements to your CONFIG.SYS file so that Card Services will be installed.

Error Code	Explanation and Action
LTG0093E	No sockets were found by Card Services. **Explanation:** The Card Services function GetCardServicesInfo reported that there are no sockets in your computer. This can be for any of the following reasons: 1. Socket Services is not installed or is installed incorrectly. 2. There are no physical sockets on your computer. 3. No PC Card with sockets is installed or is installed incorrectly. **User Action:** Perform the following steps: 1. Make sure that you have Socket Services installed correctly. 2. Make sure that your computer has physical sockets. 3. Make sure that you have installed the PC Card correctly.
LTG0094I	A Token-Ring Auto 16/4 Credit Card Adapter was not found in any socket in your computer. **Explanation:** **User Action:** Insert the PC Card in a socket.
LTG0095E	A NETADDRESS must be specified to boot without the PC Card present in a socket. **Explanation:** You attempted to boot your computer without a Token-Ring Auto 16/4 Credit Card Adapter inserted in a socket and without a NETADDRESS. **User Action:** Either insert the PC Card in a socket and reboot your computer or add the NETADDRESS= parameter to PROTOCOL.INI and reboot your computer. By adding the NETADDRESS parameter you can insert the Token-Ring Auto 16/4 Credit Card Adapter after the reboot. Make sure that the address you use is either a locally administered address or the universally administered address on your PC Card. To find out your universally administered address, run the diagnostics program that is on the diskettes that came with your adapter.

Error Code	Explanation and Action
LTG0097E	Token-Ring Credit Card MMIO RequestWindow failed. **Explanation:** Card Services would not give IBMTOKCS access to the MMIO memory window it requested. **User Action:** Make sure that no other PC Cards are using the memory window requested. IBMTOKCS defaults the MMIO memory window to CC00 for the primary PC Card or DC00 for the alternate PC Card. To change the MMIO memory window, add the line MMIO=XXXX to your PROTOCOL.INI file. XXXX can be any unused 8–KB region in the range C000–DC00.
LTG0098E	Token-Ring Credit Card MMIO MapMemPage failed. **Explanation:** Card Services would not map the MMIO memory on the PC Card to the requested memory window. **User Action:** Try changing the MMIO memory window. IBMTOKCS defaults the MMIO memory window to CC00 for the primary PC Card or DC00 for the alternate PC Card. To change the MMIO memory window, add the line MMIO=XXXX to your PROTOCOL.INI file. XXXX can be any unused 8–KB region in the range C000–DC00.
LTG0099E	PROTOCOL.INI did not have a section with a DriverName=IBMTCS$ keyword. **Explanation:** A common cause of this is not using LAPS to install new drivers. **User Action:** Use LAPS to install the new PC Card Token-Ring Driver.

DOS NDIS Error Codes

Error Code	Explanation and Action
LTG0022E	A failure during initialization of the IBMTOKCS device driver has occurred. This is a generic initialization failure message. If the IBMTOKCS device driver encounters any errors during initialization, the specific message related to the error will accompany this generic message. Resolve the specific error message that accompanies this message. In addition, ensure that the Protocol Manager device driver, PROTMAN.DOS, exists, and that a DEVICE statement for it exists in the CONFIG.SYS file.

ODI 16-bit Client Error Codes

Error Code	Explanation and Action
TOKENCS-DOS-32	Driver registered as a NESL Suspend Class producer. **Explanation:** This is an informational only message. **User Action:** No action is required.
TOKENCS-DOS-33	Driver registered as a NESL Resume Class producer. **Explanation:** This is an informational only message. **User Action:** No action is required.
TOKENCS-DOS-34	Driver registered as a NESL Service Change Class producer. **Explanation:** This is an informational only message. **User Action:** No action is required.
TOKENCS-DOS-36	NetWare Event Service Layer (NESL) is Loaded. **Explanation:** This is an informational only message. **User Action:** No action is required.
TOKENCS-DOS-50	The board cannot be found or the cable is not attached. **Explanation:** The PC Card has not been inserted in the PCMCIA socket. **User Action:** Insert your PC Card in the socket and try again.
TOKENCS-DOS-204	The shared RAM is on incorrect boundary. **Explanation:** **User Action:** Change the Shared RAM base address and place it on a 16–KB boundary (C0000, C4000, C8000, CC000, D0000, D4000, D8000, DC000).

Error Code	Explanation and Action
TOKENCS-DOS-205	The PC Card did not reset during initialization. **Explanation:** During initialization, no interrupt occurred. **User Action:** This can happen if you are using an enabler and it is setting an interrupt level that is different from the interrupt level TOKENCS.COM is using. Check to make sure that both interrupts are the same.
TOKENCS-DOS-206	An interrupt failed to occur during initialization. **Explanation:** During initialization, no interrupt occurred. **User Action:** This can happen if you are using an enabler and it is setting an interrupt level that is different from the interrupt level TOKENCS.COM is using. Check to make sure that both interrupts are the same.
TOKENCS-DOS-226	The ROM and shared RAM address ranges overlap. **Explanation:** The ROM and RAM memory areas are overlapping. **User Action:** Check the settings in NET.CFG for MEM #1 and MEM #2. MEM #1 determines the ROM (MMIO) base address. MEM #2 determines the Shared RAM base address. If you are using an enabler, check where it is placing the ROM (MMIO) and the RAM address. ROM is 8 KB in size. RAM is usually 16 KB in size.
TOKENCS-DOS-228	The MAX FRAME SIZE in NET.CFG file is too large (Max=17 960) **Explanation:** The maximum frame size has been exceeded. **User Action:** Change the maximum frame size to a valid value.
TOKENCS-DOS-229	The MAX FRAME SIZE in NET.CFG file is too small (Min=632). **Explanation:** The maximum frame size is too small. **User Action:** Increase the maximum frame size to a valid value.

Error Code	Explanation and Action
TOKENCS-DOS-230	The specified MAX FRAME SIZE in NET.CFG is not a multiple of 8. **Explanation:** The maximum frame size has been set to a value that is not valid. **User Action:** Change the MAX FRAME SIZE to a multiple of 8.
TOKENCS-DOS-231	The MAX FRAME SIZE in NET.CFG is too big for this PC Card. **Explanation:** The maximum value at this speed for this PC Card is *xx*. **User Action:** Change the MAX FRAME SIZE to a valid value.
TOKENCS-DOS-233	Card Services could not be found. **Explanation:** TOKENCS.COM could not find Card Services. **User Action:** Check your CONFIG.SYS and ensure that Card Services is loading. If Card Services support is not wanted, take the PCMCIA keyword out of NET.CFG.
TOKENCS-DOS-235	A Card Services error has occurred. **Explanation:** You have heard an alternating tone and this message is posted to the panel. This indicates that Card Services was unable to provide the resources requested. **User Action:** Check your NET.CFG parameters INT, MEM #1, MEM #2. If they are not in NET.CFG, Card Services has a problem. If they are specified in NET.CFG, comment (REM) them out and try again.
TOKENCS-DOS-237	PCMCIA Token-Ring MLID Loaded, but PC Card is not in socket. **Explanation:** This is an informational only message. **User Action:** No action is required.

Error Code	Explanation and Action
TOKENCS-DOS-246	The DATA RATE specified in NET.CFG must be either 4 or 16 Mbps. **Explanation:** You have specified an incorrect ring speed. It must be either 4 or 16 Mbps. The DATA RATE keyword is used to set the speed. **User Action:**
(no message)	Please insert an IBM Turbo 16/4 Token-Ring PC Card 2 or press **Esc** to avoid loading the driver. **Explanation:** This message occurs when you have not inserted an IBM Turbo 16/4 Token-Ring PC Card 2 in the computer and have started TOKENCS.COM. **User Action:** Insert an IBM Turbo 16/4 Token-Ring PC Card 2 at this time or press **Esc** to leave.

Appendix C. Running the Diagnostics Program

Important

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

The Diagnostics and LANAIDC diskette must be created before you run the following procedure. See “Appendix A. CD-ROM Content and Software Packages” on page 45 for instructions.

Use the diagnostics program on the Diagnostics and LANAIDC diskette to test the hardware components of the PC Card. Different operating systems will show resources differently.

The diagnostics program performs a series of tests and displays the results of each one by showing success or failure. An error during any test will end the test in progress and display an error message and error code. See the following tables for a description of error codes and recommended actions.

Note: The testing process might run as long as 3 minutes and can be exited at any time by pressing Enter or by removing the Diagnostics and LANAIDC diskette and pressing Esc. Pressing Esc will cause the computer to reboot. Pressing Enter will end the test in progress and allow the user to select another test option.

1. Insert the Diagnostics and LANAIDC diskette.
2. Switch ON the power to the computer.
3. At the DOS Menu, select **2, IBM Turbo 16/4 Token-Ring PC Card Extended Diagnostics**.
4. Follow the instructions as they appear. You will be prompted to select a test option. See “Test Options” for descriptions.

Test Options

There are two test options: the wrap test and the on-ring test. The on-ring test will not function on a 4–MB token-ring network.

The wrap test ensures that the adapter and cable hardware are functioning properly. For this test, connect the adapter and cable to the network to perform a wrap test through the hub or concentrator, or insert a wrap plug (no wrap plug is required if you have an STP cable connection) to help isolate a failure to the adapter, the cable, or the wiring to the hub or concentrator.

Diagnostics Error Codes and Suggested Actions

Initialization Error Codes

Failure during adapter initialization usually indicates a hardware error on the PC card. Reboot your computer using the diagnostics on the Diagnostics and LANAIDC diskette, and run the diagnostic program again. If the PC card continues to fail, replace it and the cable.

One of the following codes will be shown to indicate the results of the initialization test. The error codes are displayed in hexadecimal format and represent the BRING_UP_CODE set by the adapter.

0000 Initialization success

0014 No microcode

0020 Diagnostics could not be executed

0022 ROM diagnostics failed

0024 Shared RAM diagnostics failed

0026 Processor instruction test failed

0028 Processor interrupt test failed

002A Shared RAM interface register diagnostics failed

002C Protocol-handler diagnostics failed

0040 PC Card's programmable timer for the computer failed (set by the microcode)

0042 Cannot write to shared RAM (set by microcode)

0044 Reading from shared RAM read-only area caused an incorrect error indication (interrupt)

0046 Writing into shared RAM read-only area did not cause an error indication (interrupt)

0048 Initialization timed out

Open Errors

Failure during the adapter open test might indicate that the adapter is not properly configured to run on the network it is trying to open onto or that the adapter is not properly configured for the system. The open test provides a return code and an open error code. If the return code is 07, then see "Open Error Codes" on page 83 for a more accurate description of the failure and suggested actions. If the return code is a value other than 00 or 07, problem determination of the PC Card and the diagnostics is necessary. Record the error and contact your network administrator.

00 Open completed successfully

01 Incorrect command code

03 Adapter open, should be closed

05 Required parameters not provided

07 Command cancelled, unrecoverable failure (see open error codes to isolate problem)

30 Inadequate receive buffers

32 Incorrect MAC address

33 Incorrect adapter receive buffer length

34 Incorrect adapter transmit buffer length

Open Error Codes

If the open provides a return code of 7, there will be a corresponding error code. The open errors are returned in 2 bytes. The high-order byte is always 0 and the low-order byte contains the following information:

1. The phase of testing in which the error was encountered is in the high-order nibble (half-byte) of the low-order byte.
2. The error condition is in the low order nibble of the low-order byte.

Phases

Value	Meaning
1n	Lobe media test
2n	Physical insertion
3n	Address verification
4n	Roll call poll (neighbor notification)
5n	Request parameters

Errors

Value	Meaning
n1	Function failure
n2	Signal loss
n3	Reserved
n4	Frequency error (see note)
n5	Time-out
n6	Ring failure
n7	Ring beaconing
n8	Duplicate node address
n9	Parameter request—retry count exceeded
nA	Remove received
nB	IMPL force received
nC	Duplicate modifier
nD	No monitor detected
nE	Monitor contention failed for RPL

Suggested Actions in Response to Open Errors

When the following phase-error combination values are presented, they are the result of certain specific occurrences. Explanation of the occurrences follows with recommended actions listed. Table 8 on page 86 lists the recommended actions for both the application program and the computer operator.

Error Code	Explanation	Action
11	Lobe Media, Function Failure: The testing of the lobe between the PC Card and the access unit has been unsuccessful because the lobe has a bit-error rate that is too high, or the PC Card cannot receive successfully.	1, 3, and 5

Error Code	Explanation	Action
24	Physical Insertion, Frequency Error: The PC Card has detected that the ring is operating at a speed other than the speed at which it was inserting.	2
26	Physical Insertion, Ring Failure: The PC Card, acting as an active monitor, was unable to complete the ring purge function successfully. This indicates that an error condition has occurred since the successful completion of monitor contention (claim token), when this PC Card became the active monitor.	1 and 2a
27	Physical Insertion, Ring Beaconing: The PC Card has detected one of the following conditions: • The PC Card tried to insert on a ring that was operating at a different data rate. • A monitor contention (claim token) failure occurred. • The PC Card received a beacon MAC frame from the ring.	1, 2, and 2b
2A	Physical Insertion, Remove Received: The PC Card has received a remove ring station MAC frame, indicating that a network management function has directed this PC Card to get off the ring.	2a and 4
2D	Physical Insertion, No Monitor Detected: RPL station is the first station attempting to insert onto the ring.	1 and 2a
2E	Physical Insertion, Monitor Contention Failed for RPL: Physical insertion failure of RPL station.	2
32	Address Verification, Signal Loss: The PC Card has detected a 250-ms signal loss (receiver cannot recognize signal), indicating that an error condition has occurred since the PC Card successfully completed the ring signal recognition phase of the open operation.	1 and 2a
35	Address Verification, Time-out: The insertion timer expired before this function was completed, indicating that the ring can be congested, experiencing a high bit-error rate, or losing an abnormally high number of tokens or frames, thus preventing successful Address Verification MAC frame transmissions.	1 and 2a
36	Address Verification, Ring Failure: The PC Card, acting as an active monitor, was unable to complete the ring purge function successfully. This indicates that an error condition has occurred since the successful completion of monitor contention (claim token), when this PC Card became the active monitor.	1 and 2a
37	Address Verification, Ring Beaconing: The PC Card has either detected a monitor contention (claim token) failure or received a beacon MAC frame from the ring.	1 and 2b
38	Address Verification, Duplicate Node Address: The PC Card has detected that another station on the ring has a PC Card address that is the same as the PC card address being tested.	4
3A	Address Verification, Remove Received: The PC Card has received a remove ring station MAC frame, indicating that a network management function has directed this specific address to get off the ring.	2a and 4

Error Code	Explanation	Action
42	Ring Poll, Signal Loss: The PC Card has detected a 250-ms signal loss (receiver cannot recognize signal) indicating that an error condition has occurred since the PC Card successfully completed the ring signal recognition phase of the open operation.	1 and 2a
45	Ring Poll, Time-out: The insertion timer expired before this function was completed, indicating that the ring can be congested, experiencing a high bit-error rate, or losing an abnormally high number of tokens or frames. This prevents the PC Card's successful reception of either the ring poll request or response MAC frame, or transmission of the required ring poll response MAC frame.	1 and 2a
46	Ring Poll, Ring Failure: The PC Card, acting as an active monitor, was unable to complete the ring purge function successfully. This indicates that an error condition has occurred since the successful completion of monitor contention (claim token), when this PC Card became the active monitor.	1 and 2a
47	Ring Poll, Ring Beaconing: The PC Card has either detected a monitor contention (claim token) failure or received a beacon MAC frame from the ring.	1 and 2b
4A	Ring Poll, Remove Received: The PC Card has received a remove ring station MAC frame, indicating that a network management function has directed this PC Card to get off the ring.	2a and 4
55	Request Parameters, Time-out: The insertion timer expired before this function was completed, indicating that the ring can be congested, experiencing a high bit-error rate, or losing an abnormally high number of tokens or frames. This prevents successful transmission of the request parameter MAC frame or reception of either the set parameter 1 or set parameter 2 MAC frame (required response to the PC Card's request).	1 and 2a
56	Request Parameters, Ring Failure: The PC Card, acting as an active monitor, was unable to complete the ring purge function successfully. This indicates that an error condition has occurred since the successful completion of monitor contention (when this PC Card became the active monitor).	1 and 2a
57	Request Parameters, Ring Beaconing: The PC Card has received a beacon MAC frame from the ring.	1 and 2b
59	Request Parameters, Parameter Request - Retry Count Exceeded: The PC Card has detected that the ring parameter server is present on the ring but that the required response (set parameter 1 or set parameter 2 MAC frame) was not received in the allotted time. This indicates that the ring can be congested, experiencing a high bit-error rate, or losing an abnormally high number of tokens or frames.	1 and 2a
5A	Request Parameters, Remove Received: The PC Card has received a remove ring station MAC frame, indicating that a network management function has directed this PC Card to get off the ring.	2a and 4

Recommended Actions Table

Table 8. Recommended Actions

Number	Description
1	After delaying at least 30 seconds, retry the open two times, inserting the same delay between each try.
2	After delaying at least 30 seconds, check the PC Card configuration (especially the PC Card data rate) and retry the open.
2a	If this error persists, contact your network administrator for assistance and provide Open Error information.
2b	If this error persists, contact your network administrator for assistance.
3	Contact your network administrator for assistance and provide Open Error information.
4	Contact your network administrator for assistance and provide Node Address information, and try attaching to the ring after 6 minutes.
5	If this error persists, problem determination of the PC Card or lobe is necessary. Contact your network administrator for problem determination assistance.

Transmit Error Codes

If you experience time-out errors during the on-ring test, try running the wrap test in the diagnostics. If the wrap test is completed successfully, but the on-ring test fails, it might indicate problems on the Token-Ring network that the adapter is opening onto during the on-ring test.

For any other errors, ensure that the adapter and cabling are properly connected, and retry the test. If the adapter continues to fail, record the error and contact your network administrator.

01 Unrecognized command code

08 Unauthorized access priority

22 Error on frame transmission, examine STRIPPED_FS

23 Error on frame transmit or strip process

24 Unauthorized MAC frame

25 Maximum commands exceeded

26 Correlator not acceptable

27 Link not transmitting I frames, status changed from link open

28 Transmit frame length not acceptable

29 Link retransmission in process, buffers free

40 Station ID not acceptable

41 Protocol error, link not in acceptable state for command

Appendix D. LANAIDC Parameter Information

LANAIDC is the command line version of LANAID. It contains all of the function of LANAID without the graphical user interface. Its primary intended users are LAN administrators and other users who want to duplicate a certain IBM Turbo 16/4 Token-Ring PC Card 2 configuration on multiple computers.

The LANAIDC program is in the same directory on your hard drive where LANAID was installed (see “Installing LANAID” on page 33). Typing LANAIDC without parameters will cause LANAIDC to use a configuration file called LANAIDC.CFG to configure the PC Card. This file is created by the graphical LANAID program after it successfully completes a PC Card configuration. See “Using LANAIDC to Duplicate Configurations” for more information about using the configuration file.

Type **lanaidc /h** to show the long help list for all the configuration parameters, and type **lanaidc /?** to show the short help list. Also, you can choose LANAIDC from the menu that is displayed when the computer is booted from the Diagnostic and LANAIDC diskette. Using this method to configure the PC Card with LANAIDC is not recommended, however, since correct configuration depends on the computer being booted in the environment under which the PC Card will run.

Using LANAIDC to Duplicate Configurations

In order to take a configuration performed by LANAID on one computer and duplicate it on others, follow these steps:

1. Boot the computer in the same environment that the PC Card will use.
2. If LANAID has not yet been installed, install it according to the instructions. See Chapter 5. LANAID.
3. Use LANAID to configure that computer for the PC Card, and exit LANAID. During configuration, LANAID creates a file called LANAIDC.CFG that contains all of the information required to recreate the same environment. The LANAIDC.CFG file will have been placed in the same directory as LANAID.
4. Copy the following files to a diskette from the directory where LANAID was installed:

   ```
   LANAIDC.EXE
   LANAIDC.MSG
   DDPRINS.MSG
   INSTALL.LST
   LANAIDC.CFG
   ```

5. Place the diskette in the computer on which the PC Card configuration is to be duplicated. At this point, you can either copy the files to a directory on the hard disk, which will allow LANAIDC to run more quickly, or you can run LANAIDC from the diskette.
6. Type **lanaidc** and press **Enter**, either from the diskette or the directory on the hard disk where the files were copied.
7. Upon completion, LANAIDC should display the PC Card configuration values.

LANAIDC Parameters

The parameters LANAIDC uses to configure the PC Card are listed here. If no options are given, LANAIDC.CFG will be used for input parameters. LANAIDC.CFG is created by LANAID after a successful store has been performed.

```
/FILE=<drive:\path\filename> - specify a file with input
                               parameters
/CFGSYS=<drive>     - specify the drive of the CONFIG.SYS
/MENUITEM=<keyword> - specify the menu item to install to in
                      CONFIG.SYS
/NOS                - specify one of the following Network
                      Operating Systems
    /NOS=NOVELL
    /NOS=W4W
    /NOS=LSPNDIS
    /NOS=VINES
    /NOS=LANTASTIC
    /NOS=OTHERNDIS
    /NOS=IBMLC
    /NOS=LSPNATIVE
    /NOS=MSLANMAN

/NOSDIR=<drive:\dir> - specify directory where Network Operating
                       System is installed
/MODE=ENHANCED      - specify Enhanced Mode
/MODE=AUTO16        - specify Auto 16/4 Mode
/IO=<###>           - specify Hex IO address
     - Enhanced Mode values: 300 to EFC on a 4 byte boundary
     - Auto16 Mode values: A20 or A24
/INT=<##> or /INT=AUTOSET - specify interrupt level
  (3,4,5,7,9,10,11,14,15) or Autoset if Card Services is present
/MMIO=<#####> or /MMIO=AUTOSET- specify Hex MMIO address
 - values: C0000-DE000 on an 8K boundary or Autoset if Card
           Services is present
/SRAM=<#####> or /SRAM=AUTOSET- specify Hex SRAM address
           (Auto16 Mode only)
 - values: C0000-DC000 on a 16K boundary or Autoset if Card
           Services is present
/RS=<##>            - specify ring speed (4 or 16)
/AUTO=Y or /AUTO=N  - enable/disable Auto Sense

/RSPROMPT=Y or /RSPROMPT=N - enable Ring Speed Prompt
/SOCKET=<x>         - specify socket letter (Point Enabler only)
/VIEW               - view the current configuration
 /? - display abbreviated help
/H or /HELP - display extended help
```

Appendix E. Token.lan and LAN Client Driver Parameters

In addition to the standard Novell keywords (such as slot, port, int, and frame), a number of custom keywords are available in the driver. This list is dynamic: it changes as support is added for new hardware as ODI specifications change. If it is known, the driver revision level in which the keyword is available is included. This list describes those keywords that are available and useful to users. All of these keywords are optional unless otherwise noted.

Note: Some parameters, if misused, can cause problems with adapter operation and must be set with a thorough understanding of adapter operations.

Custom Keywords

NOFULLDUPLEX

By default, the driver will first try to open on the ring in full-duplex mode (connected to a switched Token-Ring network) on those adapters that are capable of this function. Otherwise, it will try to open in half-duplex mode (a traditional shared-media LAN). The presence of this keyword will prevent the attempted open in full-duplex mode.

NOSHALLOWMODE

Shallow-mode operation is fast-path transmit, fast-path receive, and no LLC processing (802.2) by adapter firmware. NoShallowmode is fast-path transmit, standard receive, and 802.2 processing. Shallowmode is the default on turbo-class adapters and is designed for higher performance. Including this keyword will disable fast-path receive and enable LLC processing on the adapter.

AUTORINGSPEED

This PCMCIA-specific keyword is used to enable autoringspeed detection of the adapter on the ring when the ring speed is not known or changes because of mobility needs (for exampke, with a laptop). The first adapter that opens on the ring must define the ring speed, and therefore cannot use the autoringspeed keyword. Adapters opened subsequently can automatically adjust to the ring speed by use of the autoringspeed keyword. If the first adapter to try to open on the ring has the autoringspeed keyword specified, the opening will fail.

EXPRESSMODE

Valid in shallowmode operation only. During normal (shallowmode) receive processing, the host is interrupted after every buffer is received. Use of this keyword reduces the number (and processing overhead) of interrupts per frame, but lowers overall receive performance. Use this keyword on slower machines or on fast machines that are heavily loaded.

Keywords with Parameters

SAPS

```
Default: 1
Range 0-125
```

The numbef of adapter service access points that can be open at one time. This parameter is not used in the ODI environment and should not be used unless an application specifically requires it.

LS

```
Default: 0
Range: 0-255
```

The number of adapter link staaaations that can be open at one time. This parameter is not used in the ODI environment and should not be used unless an application specifically requires it.

TBZ

```
Default: (ring speed, mode, adapter dependent)
Range: 96-17960
```

The transmit buffer size, expressed in bytes. The value must be a multiple of 8 and must not exceed 4464 in a 4–Mbps environment, or 17960 in a 16–Mbps environment. This value is the size of a transmit frame in non-fast-path transmit mode and the maximum frame size in fast-path receive mode. Generally, this value is set automatically by the driver as the minimum of the LSL, hardware, and this value. In normal operation this parameter can be ignored.

PCMCIA_INT

```
Default: none
Range: 2-F in hexadecimal (Version 3.32 and higher)
```

The interrupt assigned to a PCMCIA Token-Ring adapter. Since PCMCIA adapters are handled differently from other bus types, this parameter also indicates to the driver that a PCMCIA adapter is being initialized. On a point-enabled card, the only way the driver can determine the interrupt vector that the card is using is to get it from the command line. This parameter is required on PCMCIA cards that are point-enabled.

MEM0

```
Default: CC000
Range: 0-100000h in hexadecimal (Version 3.21 and higher)
```

This parameter indicates the shared-RAM base address to the driver since in some cases the driver cannot determine the shared-RAM base address without getting it from the command line. This parameter is required on point-enabled PCMCIA cards, especially if more than one is in the system. The value given must be on the proper boundary depending on shared-RAM size. See the table below.

Shared-RAM Size	Address must be a multiple of
4 KB or 8 KB	8 KB
16 KB	16 KB
32 KB	32 KB
64 KB	64 KB

PORT

```
Default A20h
Range: A20 or A24 in non-enhanced mode, 200-0FFFCH in enhanced mode.
```

The base address of the I/O port the adapter uses. The adapter requires 4 contiguous I/O ports.

NIC_UAA

```
Default: None
Range: hexadecimal string 1-FFFFFFFFFFFFh (Version 3.21)
```

This parameter selects the adapter to initialize by its universally administered address (UAA), which is in read-only storage on the card.

Enhanced-mode adapters can be located at most addresses and can be selected by either their UAA or ofdinal number (1=lowest UAA, 2=highest UAA).

RECEIVEBUFFERSIZE

```
Default: Varies with mode.
Range: 192-2048 (Version 3.33)
```

Changes the adapter shallow-mode receive buffer size. Allows tuning of receive buffers to more closely match the LAN traffic environment. This parameter is not needed for normal operations. Value must be a multiple of 8 bytes. Smaller values increase performance and processor utilization while larger values decrease performance and lower processor utilization.

DATARATE

```
Default: varies
Range: 4 or 16 (Version 3.36b and higher)
```

Used to set the adapter data rate for dual-speed adapters. Some dual-speed adapters, notably MCA adapters, might not support this keyword. If the speed selected does not match the ring speed, the open will fail. On PCMCIA adapters, see the complementary keyword, autoringspeed.

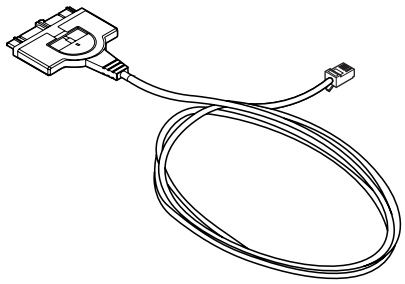
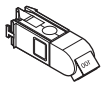
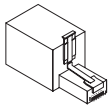
SRAMSIZE

```
Default: 4
Range: 4, 8, 16, 32 or 64 (Version 4.01 and higher)
```

PCMCIA only in the Windows 95 environment. Allows setting the shared-RAM size in compatibility modes in a card services environment.

Appendix F. Parts Information

Table 9. Part Numbers

Part Number	Description	Diagram
38H7044	PC Card Cable	
73G8314	STP Connector (RJ-45 for Data Connector); converts RJ-45 to Token-Ring	
73G2305	RJ-11 to RJ-45 Modular Adapter	

To order these items, call the IBM Maintenance Parts and Warranty Center 1-800-388-7080 (United States only).

Appendix G. Notices and Warranty

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Notice to Users in the United Kingdom

The United Kingdom Telecommunications Act 1984. This apparatus is approved under General Approval number NS/G/1234/J/100003 for indirect connections to public telecommunications systems in the United Kingdom.

Electronic Emission Notices

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 on and off, the suer 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 Class B Emission Compliance Statement

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

Avid de conformité aux normes d'Industrie Canada

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

European Community (EC) Mark of Conformity Statement

This product is in conformity with the protection requirements of EU 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.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

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 Corporation, 3039 Cornwallis Road, Research Triangle Park, NC 27709.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

Japanese Voluntary Control Council for Interference (VCCI) Statement

This equipment is in the 2nd Class category (information equipment to be used in a residential area or an adjacent area thereto) and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment aimed at preventing radio interference in such residential areas.

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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Product Warranty

International Business Machines Corporation Armonk, New York, 10504

Statement of Limited Warranty

The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you originally purchase for your use, and not for resale, from IBM or an IBM authorized reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. Machines are subject to these terms only if purchased in the United States or Puerto Rico, or Canada, and located in the country of purchase. If you have any questions, contact IBM or your reseller.

Machine: IBM Turbo 16/4 Token-Ring PC Card 2

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.

The IBM Warranty

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.
Replacement parts assume the remaining warranty of the parts they replace.
If a Machine does not function as warranted during the warranty period, IBM in its sole discretion will repair, replace it (with a Machine that is at least functionally equivalent), or refund the purchase price. To obtain coverage under the warranty you may be required to present proof of purchase.
This warranty is non-transferable by the end-user customer.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM. In the United States, call IBM at **1-800-IBM-SERV (426-7378)**. 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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2. the amount of any other actual loss or damage, up to the greater of $100,000 or the charge for the Machine that is the subject of the claim.

Under no circumstances is IBM liable for any of the following:

1. third-party claims against you for losses or damages (other than those under the first item listed above);
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3. economic consequential damages (including lost profits or savings) or incidental damages, even if IBM is informed of their possibility.

Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from jurisdiction to jurisdiction.

Glossary of Terms and Abbreviations

This glossary defines terms and abbreviations used in this manual. If you do not find the term you are looking for, refer to the index or to the *IBM Dictionary of Computing*, SC20-1699 (New York/ McGraw-Hill, Inc., 1994).

A

access unit. A unit that allows multiple attaching devices access to a Token-Ring network at a central point such as a wiring closet or in an open work area.

adapter address. Twelve hexadecimal digits that identify a LAN adapter.

address. In data communication, the IEEE-assigned unique code or the unique locally administered code assigned to each device or workstation connected to a network. A character, group of characters, or a value that identifies a register, a particular part of storage, a data source, or a data sink. The value is represented by one or more characters. To refer to a device or an item of data by its address. The location in the storage of a computer where data is stored. In word processing, the location, identified by the address code, of a specific section of the recording medium or storage.

alert. For IBM LAN management products, a notification indicating a possible security violation, a persistent error condition, or an interruption or potential interruption in the flow of data around the network. See also *network management vector transport*. In SNA, a record sent to a system problem management focal point to communicate the existence of an alert condition. In the NetView program, a high-priority event that warrants immediate attention. This data base record is generated for certain event types that are defined by user-constructed filters.

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.

B

Basic Input/Output System (BIOS). In IBM personal computers with PC I/O channel architecture, microcode that controls basic hardware operations such as interactions with diskette drives, fixed disk drives, and the keyboard.

C

command. A request for performance of an operation or execution of a program. A character string from a source external to a system that represents a request for system action.

configuration. 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. The devices and programs that make up a system, subsystem, or network. See also *system configuration*.

configuration parameters. Variables in a configuration definition, the values of which characterize the relationship of a product, such as a bridge, to other products in the same network.

connect. In a LAN, to physically join a cable from a station to an access unit or network connection point. Contrast with *attach*.

D

default. Pertaining to an attribute, value, or option that is assumed when none is explicitly 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.

diskette drive. The mechanism used to seek, read, and write data on diskettes.

F

fastpath transmit. An alternate transmit interface to the PC Card that provides higher throughput.

fault. An accidental condition that causes a functional unit to fail to perform its required function.

fixed disk drive. Synonym for hard disk drive.

frame. 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. A

housing for machine elements. 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.

H

hard disk drive. A stand-alone disk drive that reads and writes data on rigid disks and can be attached to a port on the system unit. Synonymous with fixed disk drive, hard drive.

hot plugging. The ability to remove your adapter as long as you have shut down all the applications using the adapter. When you insert your adapter again, you can restart those applications.

I

initialize. In a LAN, to prepare the adapter (and adapter support code, if used) for use by an application program.

input/output (I/O). Pertaining to a device whose parts can perform an input process and an output process at the same time. Pertaining to a functional unit or channel involved in an input process, output process, or both, concurrently or not, and to the data involved in such a process.

insert. To make an attaching device an active part of a LAN.

interface. A shared boundary between two functional units, defined by functional characteristics, common physical interconnection characteristics, signal characteristics, and other characteristics as appropriate. A shared boundary. An interface may be a hardware component to link two devices or a portion of storage or registers accessed by two or more computer programs. Hardware, software, or both, that links systems, programs, or devices.

interrupt. 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. To stop a process in such a way that it can be resumed. In data communication, to take an action at a receiving station that causes the sending station to end a transmission. 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.

L

LAN adapter. The circuit card within a communicating device (such as a personal computer) that, together with its associated software, enables the device to be attached to a LAN.

LANAID. The LAN Adapter Installation and Diagnostic program. This program works to simplify the installation and configuration of hardware and software in a non-Plug and Play environment.

LAN Client. IBM LAN Client is a protocol stack that operates in protected mode in the DOS TCP/IP, Novell IPX Client, NetBIOS, and IEEE 802.2 environments.

locally administered address. An adapter address that the user can assign to override the universally administered address. Contrast with *universally administered address*.

M

MAC frame. Frames used to carry information to maintain the ring protocol and for exchange of management information.

medium access control (MAC) protocol. In a local area network, 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.

message. A logical partition of the user device's data stream to and from the adapter. A group of characters and control bits transferred as an entity.

Micro Channel. The architecture used by IBM Personal System/2 computers, Models 50 and above. This term is used to distinguish these computers from personal computers using a PC I/O channel, such as an IBM PC, XT, or an IBM Personal System/2 computer, Model 25 or 30.

N

network administrator. A person who manages the use and maintenance of a network.

node. Any device, attached to a network, that transmits and/or receives data. An endpoint of a link, or a junction common to two or more links in a network. 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

open. To make an adapter ready for use. A break in an electrical circuit. To make a file ready for use.

operating system. Software that controls the execution of programs. An operating system may provide services such as resource allocation, scheduling, input/output control, and data management. Examples are IBM PC DOS and IBM OS/2.

option. 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. A hardware or software function that may be selected or enabled as part of a configuration process. A piece of hardware (such as a network adapter) that can be installed in a device to modify or enhance device function.

P

panel. The complete set of formatted information that appears in a single display on a visual display unit.

parameter. A variable that is given a constant value for a specified application and that may denote the application. 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. Data passed between programs or procedures.

PC Card. In a LAN, within a communicating device, a circuit card that, with its associated software and/or microcode, enables the device to communicate over the network.

port. An access point for data entry or exit. A connector on a device to which cables for other devices such as display stations and printers are attached. Synonymous with *socket*.

protocol. A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication. 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 components. A specification for the format and relative timing of information exchanged between communicating parties.

R

random access memory (RAM). A computer's or adapter's volatile storage area into which data may be entered and retrieved in a nonsequential manner.

read-only memory (ROM). A computer's or adapter's storage area whose contents cannot be modified by the user except under special circumstances.

remove. To take an attaching device off a network. To stop an adapter from participating in data passing on a network.

ring network. A network configuration in which a series of attaching devices is connected by unidirectional transmission links to form a closed path. A ring of an IBM Token-Ring Network is referred to as a LAN segment or as a Token-Ring Network segment.

S

server. A device, program, or code module on a network dedicated to providing a specific service to a network. On a LAN, a data station that provides facilities to other data stations. Examples are a file server, print server, and mail server.

shallowmode. A new mode that allows the workstation to assist the PC Card in the reception of information from the Token Ring. When chosen, fastpath transmit is used as well.

shared RAM. Random access memory (RAM) on an adapter that is shared by the computer in which the adapter is installed.

socket. Synonym for *port (2)*.

system. In data processing, a collection of people, machines, and methods organized to accomplish a set of specific functions.

system configuration. A process that specifies the devices and programs that form a particular data processing system.

T

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).

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. 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. 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. 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*.

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