

IBM Ethernet  
Quad-BT and -B2 PeerMaster  
Server Adapters

**Installation Instructions**



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IBM Ethernet  
Quad-BT and -B2 PeerMaster  
Server Adapters

## **Installation Instructions**

**Note**

Before using this information and the product it supports, be sure to read the general information under Appendix D, "Product Warranties, Licenses, and Notices" on page 72.

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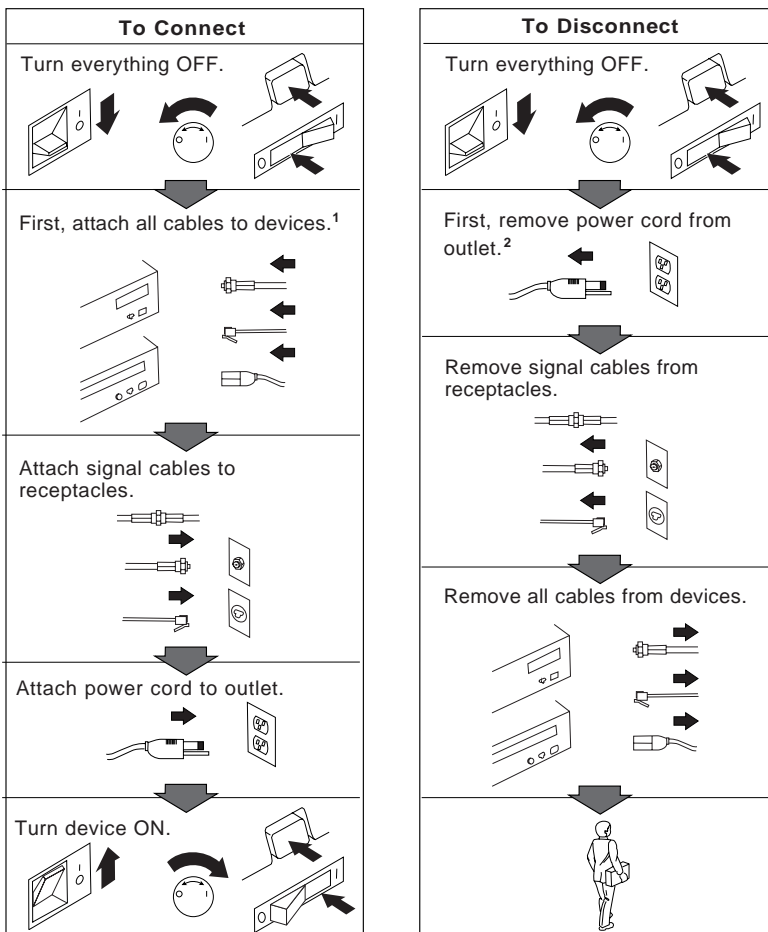
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## Safety Information



### DANGER:

Electrical current from power, telephone, and communication cables is hazardous. To avoid shock hazard, connect and disconnect cables as shown below when installing, moving or opening the covers of this product or attached devices. The power cord must be used with a properly grounded outlet.



<sup>1</sup> In the U.K., by law, the telephone cable must be connected after the power cord.

<sup>2</sup> In the U.K., by law, the power cord must be disconnected after the telephone line cable.



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## About This Book

This book contains instructions for installing the IBM Ethernet Quad-BT or -B2 PeerMaster Server Adapter in a PS/2 Micro Channel server, as well as information about configuring the network and installing IBM NetFinity Services device drivers. You will also find a listing of screen messages that might appear during installation or operation of your adapter.

Before you begin installation, be sure to read "Choosing a Mode of Operation" on page 3. This information will help you understand the features of the adapter so that you can decide on the best configuration for your needs.

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## Who Should Use These Instructions

These instructions are intended for a local area network (LAN) administrator or a person who is responsible for planning, installing, setting up, or managing the LAN network.

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## Other Items You Will Need

In addition to this book, you will need the following:

- The documentation that came with your computer
- The documentation that came with your operating system
- The Option Diskette that came with this adapter
- A backup copy of the Reference Diskette that came with your computer
- A small, flat-blade screwdriver



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## Product Description

The IBM\* Quad-BT or -B2 PeerMaster\* Micro Channel\* Adapters provide the ability to connect your PS/2\* Micro Channel server to four separate 10Mbps Ethernet LAN segments. Quad-BT refers to a 10Base-T adapter; Quad-B2 refers to a 10Base2 adapter.

These adapters:

- Perform high performance data transfers between the host PC and adapter

- Provide high performance data transfers among ports on an adapter

- Provide high performance data transfers among ports across multiple adapters with no host processor intervention

- Provide a cost efficient, high performance means to forward cross-segment traffic without impacting server performance

- Performs 64-bit data transfers across the Micro Channel at burst rates of 640Mbps, which equals the total bandwidth of 64 Ethernet ports

These adapters are type 5 Micro Channel adapters. You can install them only in type 5 adapter system-bus slots. (You can install type 5 adapters in IBM PS/2 Models 85 and 95 and later-version PS/2 Micro Channel servers.) See the documentation that came with your computer to determine if it accepts type 5 Micro Channel adapters.

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## Network Operating System Requirements

Use one of the following network operating systems:

OS/2\* LAN Server 2.x or 3.x

Novell\*\* NetWare\*\* 3.1x or 4.0x

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## Package Contents

In addition to this publication, your package contains the following items:

IBM Ethernet Quad-BT or -B2 PeerMaster Server Adapter

*IBM PeerMaster Server Adapter Option Diskette*

This diskette contains device drivers, setup programs, NetFinity enablers, and diagnostic programs.

If any items are missing or damaged, contact your place of purchase.

### Where To Go Next:

Before you install your adapter, go to "Choosing a Mode of Operation" on page 3.

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\*\* Trademark of Novell, Inc.

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## Choosing a Mode of Operation

**Important!**

Before you begin installation of your adapter, you must choose a mode of operation.

You may configure your Quad-BT or -B2 PeerMaster adapter to operate in either of two modes: the Traditional Adapter mode or VNET Switch mode. Use the Traditional Adapter mode when you expect little or no cross-subnetwork traffic. (Subnetwork is also called *subnet*.) Use the VNET Switch mode when you need to build subnets to provide cross-segment traffic. Choose the mode of operation and configuration that fits the needs of your network. Both modes of operation are described in this section; examples of configurations begin on page 5.

---

### Traditional Adapter Mode

When the adapter is functioning in this mode, the drivers for your adapter register each individual LAN segment with the network operating system (NOS) as a unique subnet. Thus, your NOS views your adapter as four separate adapters. Therefore, you must configure each network segment with a unique network number.

All cross-subnet traffic must be routed. Routing may be performed internally by the server itself, or externally by a local router. Internal routing is the least expensive alternative, but impairs server responsiveness by involving the server in frame forwarding. External routers provide high-performance frame forwarding without impacting the server. However, they are cumbersome, expensive, and difficult to configure and manage.

Following are guidelines for using the Traditional Adapter mode:

- Do not externally join (using bridges, switches, or concentrators) ports of adapters.

You can configure as many nodes as you need; the adapter places no limit on the number of nodes per port.

Ensure that each port is bound to the protocol with a unique network number.

---

## VNET Switch Mode

When the adapter is operating in this mode, multiple LAN segments are registered with the NOS as a single subnet, called a *VNET*. VNETs are multisegment virtual subnets.

VNETs are made possible by a layer of virtual network software that binds to multiple instances of the adapter LAN driver and registers them with the NOS as a single subnet. Multiple PeerMaster adapters may be configured to interoperate in various ways, such as:

- Traditional subnets

- One large VNET

- Multiple independent VNETs

- Any combination of VNETs and traditional subnets

All physical segments within a VNET are configured to the same network number. Cross-segment traffic within a VNET is switched by your adapter instead of by your server, allowing the server to be more productive. The server is shielded from the task of routing, which enables the creation of powerful switched, multi-segment, high-bandwidth workgroups or departments. External internetworking devices are not required to provide communication between segments with a VNET.

Following are guidelines for using the VNET Switch mode:

- Do not externally join (using bridges, switches, or concentrators) ports of adapters that comprise a VNET.

- You can configure as many nodes as you need; the adapter places no limit on the number of nodes per port.

- Ensure that all ports in a VNET are bound to the protocol (by way of VNET) with a common network number.

---

## Examples of Configurations

This section describes the following configurations:

Traditional Adapter mode:

- An 8-port network with two PeerMaster adapters configured in the Traditional Adapter mode

VNET Switch mode:

- An 8-port network with two PeerMaster adapters configured in the VNET Switch mode
- An 8-port network with two PeerMaster adapters each configured as an independent VNET
- An 8-port network with two PeerMaster adapters, one configured in the VNET Switch mode and the other in the Traditional Adapter mode

You can use PeerMaster adapters to create a variety of network configurations. The following examples illustrate some basic network configurations that you can create. Use these examples as guidelines to determine the best configuration for your needs.

## Traditional Adapter Mode Configuration

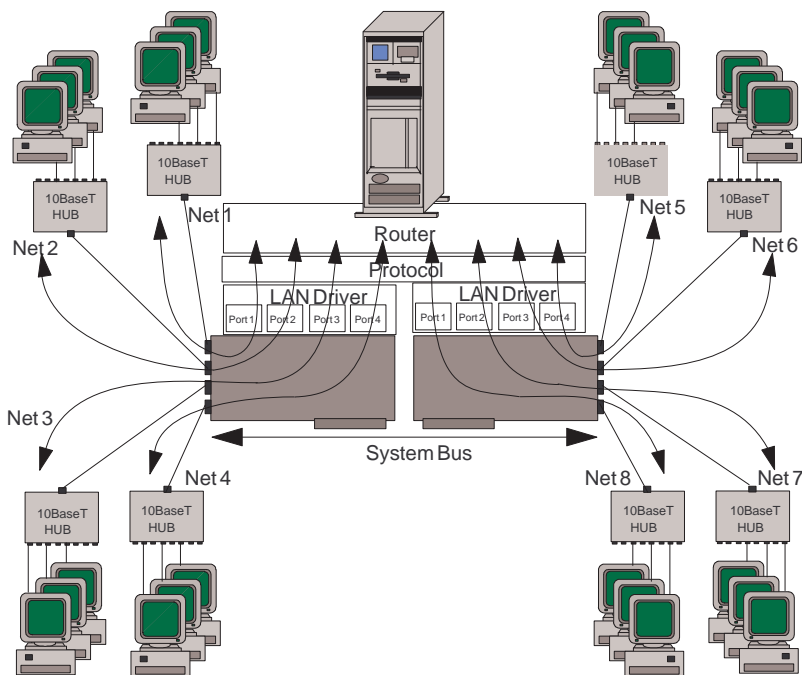


Figure 1. Traditional Adapter Mode

This illustration shows:

A server with two Quad-BT PeerMaster adapters configured in the Traditional Adapter mode.

The network protocol views each LAN segment as a separate subnet with its own network number. Clients on all ports have direct access to the server.

**Note:** The same principles apply to Quad-B2 configurations; however, concentrator hubs are not required for 10Base2 operation.



A configuration of eight separate network numbers.

Curved arrows illustrating the basic flow of cross-subnet traffic.

The server-based router accepts and forwards all frames that require routing between subnets.

Software layers illustrated above the adapters indicating software that is required to route traffic internally, running on the server.

Cross-subnet traffic, such as traffic from Net 1 to Net 2, must be forwarded by a router. The router can be internal to the server or an external stand-alone device.

The advantage of the Traditional Adapter mode is that a router restricts cross-subnet traffic to only those data packets that are uniquely addressed to the target network. The disadvantage of this mode is that server responsiveness might be heavily impaired due to the burden of packet routing. This mode should be used only when little or no cross-subnet traffic is expected.

## VNET Switch Mode Configurations

This section describes three configurations using VNET switch mode.

### Configuration 1

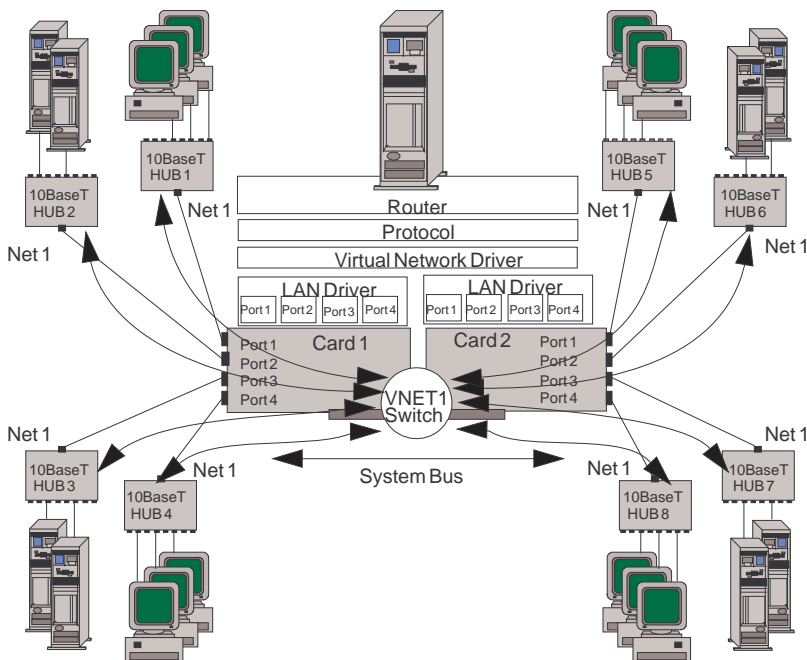


Figure 2. VNET Switch Mode: Single VNET

This illustration shows:

Two Quad-BT PeerMaster adapters (Card 1 and Card 2) forming a single VNET.

In this configuration, the adapter provides the functions of a high-performance network adapter combined with the power of an Ethernet switching hub.

**Note:** The same principles apply to Quad-B2 configurations; however, concentrator hubs are not required for 10Base2 operation.

All segments configured as Network number 1 (Net 1).

Curved arrows indicating the flow of data across ports connected by the VNET switch.

The VNET switch performs all cross-segment traffic and, therefore, server responsiveness is not impaired by heavy cross-segment traffic.

The adapters perform two types of frame switching: port-to-port and peer-to-peer.

Type	Occurrence	Example
Port-to-port	Occurs when the source and destination ports both reside on the same adapter.	The adapter forwards data packets between ports 1 and 2 of adapter 1 (Card 1).
<b>Note:</b> Port-to-port switching is completely transparent to the server microprocessor.		
Peer-to-peer	Occurs when the source and destination ports reside on separate adapters. Peer-to-peer switching is accomplished through peer data transfers across the Micro Channel bus.	The adapters forward data packets between port 1 of adapter 1 (Card 1) and port 1 of adapter 2 (Card 2).

## Configuration 2

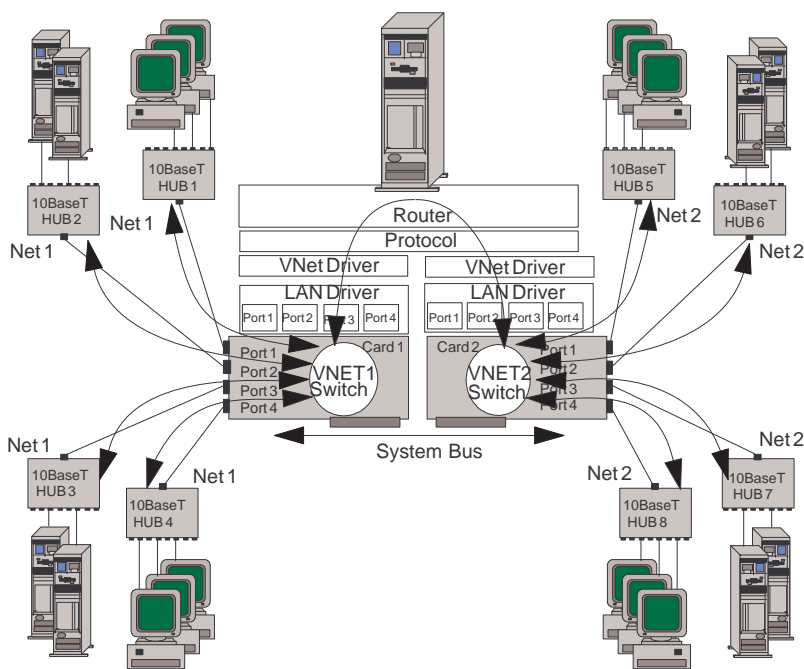


Figure 3. VNET Switch Mode: Multiple VNETs

This illustration shows:

A configuration of two network numbers (Net 1 and Net 2).

An 8-port network with two Quad-BT PeerMaster adapters (Card 1 and Card 2), each configured as an independent VNET (two VNETs).

**Note:** The same principles apply to Quad-B2 configurations; however, concentrator hubs are not required for 10Base2 operation.

The curved arrow that passes through the LAN drivers, protocol stacks, and router in the server represents the connection between the two subnets (Net 1 and Net 2). Cross-subnet traffic, such as traffic from Net 1 to Net 2, must be forwarded by a router. The router can be internal to the server or an external stand-alone device.

Each VNET may represent a separate department or workgroup. The four switched ports within each VNET provide a multisegment workgroup environment. Isolating the two VNETs by way of the server-based router allows you to create a separation between the two departments. You can configure the router to permit restricted traffic to pass between the departments.

### Configuration 3

**Note:** Use this configuration only when you expect little or no cross-VNET traffic.

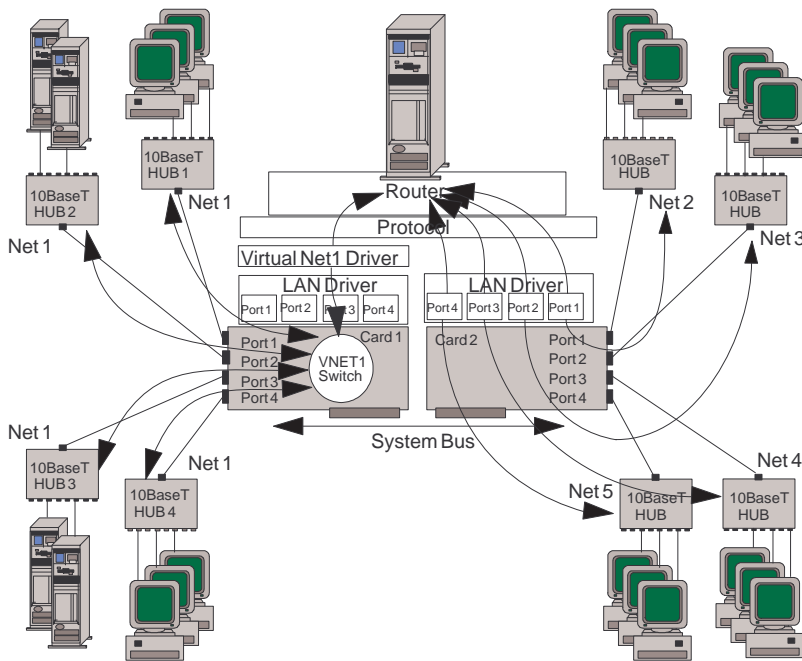


Figure 4. VNET Switch Mode: Combined VNETs and Traditional Nets

This illustration shows:

A five-subnet network (Net 1, Net 2, Net 3, Net 4, and Net 5) configured as one four-segment VNET (VNET1) on Card 1 and four traditional networks on Card 2.

A network using PeerMaster adapters.

**Note:** The same principles apply to Quad-B2 configurations; however, hubs are not required for 10Base2 operation.

Cross-subnet traffic, such as traffic from Net 1 to Net 2, must be forwarded by a router. The router can be internal to the server or an external stand-alone device.

This VNET may represent a large department while the traditional networks may represent small workgroups. You can configure the router to restrict traffic between departments.

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## Handling Instructions

**Warning:** Do not open the static-protective bag containing the adapter until you are ready to install the adapter in your computer. Static electricity can damage the adapter.

When you handle adapters and other computer options, take these precautions to avoid static electricity damage:

- Limit your movement. Movement can cause static electricity to build up around you.

- Always handle the adapter carefully and by the edges.

- Never touch any exposed circuitry.

- Prevent others from touching the adapter.

Before opening the static-protective bag containing the adapter, touch the bag to any unpainted metal surface on your computer, such as the metal expansion-slot covers, for at least 2 seconds. (For the location of the metal expansion-slot covers, see the documentation that came with your computer.) Touching an unpainted metal surface reduces the static electricity in the bag and in your body.

When possible, remove the adapter from the bag and install it directly into the computer without putting the adapter down. If you must put the adapter down, place the static-protective bag on a smooth, level surface and place the adapter, component side up, on the bag. If a static-protective bag is not available, use a piece of paper.

Do not place the adapter on the computer cover or other metal surface.

Continue with "Installing the Adapter" on page 14.

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## Installing the Adapter

Installing your adapter requires both hardware and software installation. After you install the hardware and verify that it is operating, you will then install and configure the Quad PeerMaster LAN software.

The instructions for the hardware installation are in this section of the book. The instructions for the software installation are in "Installing the PeerMaster LAN Software" on page 21.

If you have the IBM NetFinity<sup>\*</sup> Manager installed on your server, *after* installing the Quad PeerMaster adapter hardware and LAN software, you will continue with "Using NetFinity Services with your PeerMaster Adapter" on page 46.

Before continuing with the installation, be sure your server accepts type 5 adapters. Refer to the documentation that came with your computer to determine if it accepts type 5 adapters and, if so, which slots must be used. IBM PS/2 Models 85 and 95 and later-version PS/2 Micro Channel servers accept type 5 adapters in slots 2, 3, and 4.

**Warning:** Do not install a PeerMaster adapter in slot 4 of an IBM PS/2 Model 85 or 95 server. Pressure resulting from contact with foam mounted to the side panel might result in damage to your adapter or computer. Contact your place of purchase if you are unable to install your adapter in slots 2 or 3 of Models 85 or 95.

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When you are sure that your system accepts type 5 adapters, and you know which expansion slots may be used for these adapters, proceed with the installation, as follows:

1. Turn off your server.
2. Unplug the power cord from its power source and disconnect all cables from your server.  
**Note:** If you need detailed instructions for removing the cover or installing an adapter, see the documentation that came with your server.
3. Remove your server cover, and choose an available type 5 expansion slot for each adapter being installed.
4. Using a small, flat-blade screwdriver, remove the screw on the expansion-slot cover then remove the cover. Repeat this step for each slot you have chosen. (You will need the screw in step 6.)
5. Remove your adapter from its protective bag. To reduce the risk of static-electric damage to the adapter or server, firmly touch any unpainted metal surface of your server prior to installation.
6. Firmly insert your adapter in the expansion slot and secure it with the screw.
7. Replace your server cover and reconnect the power cord and any cables removed during step 2.
8. Turn on your server.

Continue with “Updating the System Programs” on page 16.

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## Updating the System Programs

When you install or remove optional adapters from a Micro Channel computer, you must update the system programs. The system programs are in the System Partition on the hard disk drive in some computers. Other computers have the system programs on the system diskettes. See the documentation that came with your computer for the location of the system programs and the procedure to update them. Follow the instructions to:

- Run the Automatic Configuration program
- Install the Option Diskette
- Back up the configuration information

During this procedure, you will need the *IBM PeerMaster Server Adapter Option Diskette* that came with your adapter.

After you install the adapter and turn on your server, you will get an adapter-configuration error message. You will be prompted to choose automatic or manual configuration.

To avoid conflicts with your current setup, use the automatic configuration. Type **Y** then follow your system prompts during the installation process.

If you have a specific reason for manually configuring your adapter, you may do so. For instructions, see Appendix B, "Manually Configuring Your Adapter" on page 55.

Continue with "Running the Adapter Diagnostic Program" on page 17.

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## Running the Adapter Diagnostic Program

Before installing your LAN software, verify the proper configuration and operation of your adapter by running the adapter diagnostic program. To run the program, see the documentation that came with your computer.

The results are displayed, as follows:

If the diagnostic test was successful, you will get a message that the tests are completed.

If the test was not successful, a dialog box will display an error message and an error number. See “Diagnostic and Setup Error Messages” on page 59 for a list of error numbers and possible corrective actions. You might have a hardware failure of your adapter, an installation error, or a system conflict.

When the diagnostic program is successfully completed, your adapter is properly installed, configured, and operational. Continue with “Attaching Network Cables to Your Adapter” on page 18.

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## Attaching Network Cables to Your Adapter

The following illustrations identify the location of the four Ethernet connectors on the Ethernet Quad-BT and -B2 PeerMaster Server Adapters. The top connector of each adapter is port 1; the bottom connector is port 4.

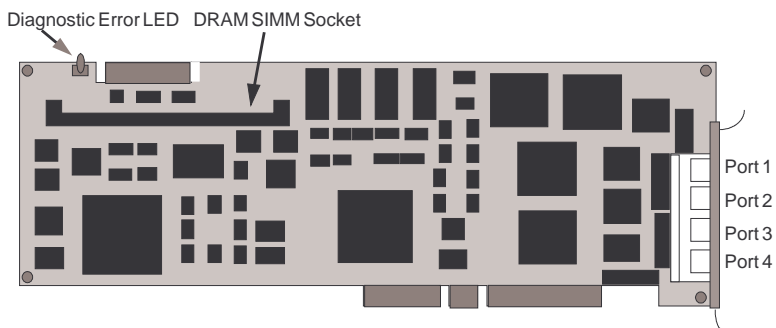


Figure 5. Quad-BT PeerMaster Adapter (10Base-T)

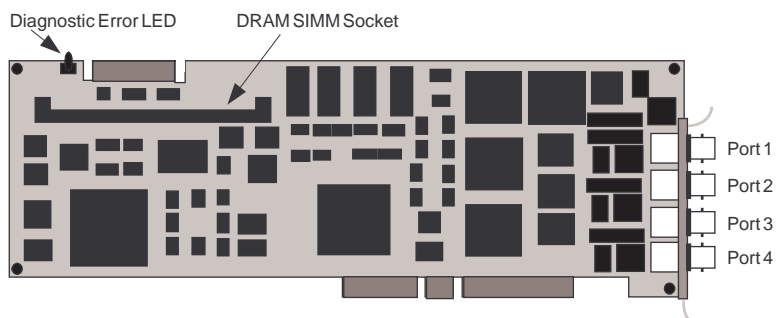


Figure 6. Quad-B2 PeerMaster Adapter (10Base2)

Continue with either “Cabling for 10Base-T Networks” on page 19 or “Cabling for 10Base2 Networks” on page 20.

## Cabling for 10Base-T Networks

Two types of network cables may be connected to the Quad-BT PeerMaster adapter: straight-through and crossover.

Use straight-through cables when connecting your adapter to an external 10Base-T concentrator hub.



Figure 7. Straight-Through Network Cables

Use crossover cables to directly connect your adapter to another 10Base-T device, such as a workstation, server, or another adapter. Crossover cables create *dedicated segments*. A dedicated segment is two point-to-point devices connected to a dedicated link.

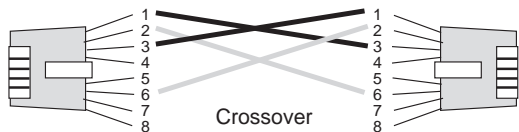


Figure 8. Crossover Network Cables

### CAUTION:

**Ensure that you do not externally join ports of adapters (using bridges, switches, or concentrators).**

Continue with “Installing the PeerMaster LAN Software” on page 21.

## Cabling for 10Base2 Networks

This section provides instructions for attaching any port of your Quad-B2 PeerMaster adapter to a 10Base2 *thin Ethernet cable segment*. A thin Ethernet cable segment is the length of the cable between the repeaters. Follow these steps:

1. Attach a bayonet connector (BNC) T-connector to the BNC network port at the rear of the computer.
2. Attach the end of the coaxial cable to an open end of the T-connector. Align the notches in the cable end with the posts on the T-connector, push the cable in, and twist about one-quarter turn. Avoid severe bending of the cable.
3. Attach the other end of the cable to an open end of the T-connector at the rear of the next workstation in which a 10Base2 is installed. Continue making connections to the rest of the workstations. Do not exceed 185 meters (600 feet) of interconnection without using a signal repeater to attach another network segment.
4. When all workstations have been connected, attach a 50-ohm cable terminator at each end of every segment.

**Note:** Do not attach more than one Quad-B2 PeerMaster 10Base2 port to the same 10Base2 network segment.

Continue with "Installing the PeerMaster LAN Software" on page 21.

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## Installing the PeerMaster LAN Software

Before installing the PeerMaster LAN software, be sure your adapters are physically installed, configured, functional, and properly cabled into your network. (For more information, see "Running the Adapter Diagnostic Program" on page 17.)

To install and configure the PeerMaster LAN software that is required for your server, see the following table for the location of the information for your network operating system.

<b>If you have:</b>	<b>Go to:</b>
OS/2 LAN Server 2.x or 3.x	"Installing the PeerMaster Software for OS/2" on page 22
NetWare 3.1x or 4.0x	"Installing the PeerMaster Software for NetWare" on page 23

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## Installing the PeerMaster Software for OS/2

Before continuing, be sure you have completed the hardware installation for your Quad PeerMaster adapter.

The installation instructions and device drivers for OS/2 LAN Server 2.x or 3.x are on the Option Diskette that came with your adapter. The files are in the OS2 directory.

The OS2 directory includes:

A:\OS2\NDIS.TXT

The NDIS.TXT file contains the device driver installation instructions for the OS/2 LAN server. This file also describes all the files in the OS/2 and NETFINTY\OS2 directories.

A:\OS2\<Install files>

These files are described in the NDIS.TXT file.

Be sure to print the NDIS.TXT file before you begin to install the software.

If you have the IBM NetFinity Services for OS/2 installed on your server, or if you desire to install these services:

1. Follow the instructions in the NDIS.TXT file on the Option Diskette for installing the PeerMaster LAN software for OS/2 servers.
2. Then, continue with "Using NetFinity Services with your PeerMaster Adapter" on page 46.



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## Installing the PeerMaster Software for NetWare

Before continuing, be sure you have completed the hardware installation for your Quad PeerMaster adapter. This section contains the instructions to install and configure the NetWare LAN software.

For more information about NetWare, see the documentation that came with it.

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### Installation Overview

The following list provides the basic flow of the LAN software installation process. The details required to install the software begin with "Precautions, Limitations, and Guidelines" on page 24.

**Note:** The software that comes with your Quad PeerMaster adapter enables multiple LAN segments to be registered with NetWare as a single virtual subnetwork, hereafter called VNET. The software that creates these virtual subnetworks is a file called VNET.LAN.

Review "Precautions, Limitations, and Guidelines" on page 24 for specific NetWare information.

Copy the LAN software onto your server's hard disk drive. Install the files for your Quad PeerMaster adapter onto the DOS partition of your server by copying them from the Option Diskette. "Installing Network Device Drivers" on page 25 guides you through this process.

Start your server and activate the NetWare operating system at this time. "Starting NetWare" on page 25 guides you through this process.

Load the Quad PeerMaster device drivers. Two drivers are provided for the Quad PeerMaster adapter. One driver, MXMCA4BT.LAN, is the LAN device driver for the adapter. This driver enables the adapter to perform traditional adapter functions. The other driver, VNET.LAN, is the virtual network driver. This driver enables the Quad PeerMaster adapter to

operate in VNET Switch mode. “Loading the Network Device Drivers” on page 26 and “Sample AUTOEXEC.NCF Files” on page 37 guide you through this process.

**Note:** If you are using a Quad-B2 PeerMaster adapter, the device driver will be MXMCA4B2.LAN.

Update the NetWare system files. Your Quad PeerMaster adapter is shipped with the latest versions of several NetWare Loadable Modules (NLM) files. These files include fixes required for the proper operation of your Quad PeerMaster adapters under various versions of NetWare. Copy these files directly onto the NetWare partition of your server. “Updating NetWare System Files” on page 30 guides you through this process.

Modify the AUTOEXEC.NCF file, if desired. Update your server startup configuration files to enable automatic loading of your newly installed adapter. “Loading the Network Device Drivers” on page 26, and “Sample AUTOEXEC.NCF Files” on page 37, guide you through this process.

Read through “Unloading the Network Device Drivers” on page 32, and “Using the NetWare Monitor” on page 32.

---

## Precautions, Limitations, and Guidelines

Review this section before you begin the NetWare software installation.

All ports within a VNET must use the same frame type.

To support various frame types across the same physical adapters, VNET.LAN may be loaded multiple times. When this is done, each instance must be bound to a unique network number and include the identical grouping of adapters.

A single Quad PeerMaster adapter may be included into multiple VNETs only if all of the VNETs into which it is included are comprised of the identical grouping of adapters.

A single Quad PeerMaster adapter must be configured to operate exclusively either as a VNET switch or a traditional adapter. Both modes cannot be supported simultaneously by a single adapter.

Frame types loaded for VNET.LAN must be loaded for MXMCA4BT.LAN.

A newly loaded instance of VNET.LAN assumes control of all currently active ports on each Quad PeerMaster adapter included into the VNET. A port is considered active after MXMCA4BT.LAN is successfully loaded with the SLOT parameter value equal to the number for that port.

To include previously inactive ports into an existing VNET, it is necessary to unload VNET.LAN, activate the additional ports, then reload VNET.LAN. Thus, it is best to activate all ports of a Quad PeerMaster adapter prior to loading VNET.LAN.

---

## Installing Network Device Drivers

To install the network device drivers:

1. Insert the adapter Option Diskette into drive A and change to the NetWare driver directory (CD A:\NETWARE).
2. Select a target directory on the DOS partition of your server, such as C:\NETWARE.
3. Copy the contents of the driver directory on the Option Diskette to the target directory.

The driver directory on your Option Diskette contains the ODI (Open Datalink Interface) device drivers for your adapter, the latest-released versions of various NetWare NLM files, and several sample AUTOEXEC.NCF files.

---

## Starting NetWare

Start your NetWare server at this time. If your server is running NetWare 3.11, manually load the system file, LSLENH.NLM. Load the file from the DOS directory into which the drivers from your Option Diskette were copied, as follows:

```
:LOAD C:[PATH]\LSLENH
```

The power-on-self-test (POST) results are displayed at driver load time. POST failures typically indicate an installation or hardware problem with the adapter. For more information on POST errors, see Appendix C, “Quad PeerMaster Adapter Screen Messages” on page 59.

---

## Loading the Network Device Drivers

Your Quad PeerMaster adapter is shipped with two device drivers, as follows:

**MXMCA4BT.LAN:** This is the base device driver for your adapter. Once loaded and bound to a protocol, this driver enables your adapter to deliver the functions associated with traditional network adapter cards.

**Note:** If you are using a Quad-B2 PeerMaster adapter, the device driver will be **MXMCA4B2.LAN**.

**VNET.LAN:** This device driver enables your multiport Quad PeerMaster adapters to be bound to a protocol, such as IPX, as a single subnet.

This multisegment subnet is referred to as a virtual subnet, or VNET. VNETs enable Quad PeerMaster adapters to provide high performance Ethernet switching functions transparently under NetWare.

Quad PeerMaster adapters are high-performance, multi-port LAN adapters that can also function as an Ethernet switching hub. The manner in which you load and configure the Quad PeerMaster adapter device drivers defines the operational characteristics of the adapter. You must take special care to properly load and configure the drivers.

This section provides three examples of the load process. The first example illustrates the driver loading procedure to configure Quad PeerMaster adapters to operate in the Traditional Adapter mode. The second example illustrates the driver loading procedure to configure Quad PeerMaster adapters to operate in the VNET Switch mode. The third example illustrates the driver loading procedure to

configure multiple Quad PeerMaster adapters to operate in a combination of Traditional Adapter and VNET Switch modes.

**Note:** If you are installing the software on an IBM Model 85 server, see “Special Instructions for Model 85” on page 42, for additional installation instructions.

## Loading Procedure for Traditional Adapter Mode

You must register each port of a Quad PeerMaster adapter as a separate network segment when configuring it to operate as a traditional network adapter. In this mode, the protocol stack treats the Quad PeerMaster adapter as four separate adapters. This creates a configuration problem. Internally, NetWare maps slot numbers to LAN segments. Quad PeerMaster adapters, however, provide multiple segments per expansion slot. Thus, it becomes necessary to configure Quad PeerMaster adapters using *pseudo slot numbers* to separately register the four ports on an adapter. Pseudo slot numbers are two-digit, decimal numbers, *xy*, where *x* is the expansion slot location and *y* is the adapter port in that slot. For example, a pseudo slot number of 23 represents port 3 of the adapter in expansion slot 2.

Most Significant Digit = Physical Slot Number  
(Slot 1, 2, 3, and so forth)  
Least Significant Digit = Port Number  
(Port 1, 2, 3, 4)

The Port Number refers to one of the four Ethernet ports on the Quad PeerMaster adapter.

When loading device drivers for Quad PeerMaster adapters, use pseudo slot numbers in place of physical slot numbers. In all other respects, load drivers for Quad PeerMaster adapters in the same manner as drivers for traditional, single-port adapters. If the SLOT keyword is not used on a load command, the driver presents a list of available pseudo slot numbers. Pseudo slot numbers that have already been used will not be included. The following is a typical load command:

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=21
```

This command will cause NetWare to load the driver for port 1 of the adapter physically installed in expansion slot 2.

For each adapter, you may issue a maximum of four load commands per frame type. NetWare loads the default frame type for each driver instance unless the FRAME keyword is used to request a specific frame type. The adapter is preconfigured with unique Ethernet MAC addresses. Thus, there is no need to use the NODE keyword to create unique addresses for each port. You may, however, override the factory-provided MAC address using the NODE keyword.

Each time the load command is issued, NetWare creates a unique instance of the LAN driver. You may use the NAME keyword to bind a unique name to each instance of the driver. You may use this unique driver name when binding a specific instance of the driver to a network protocol. The following example illustrates the use of the NAME keyword.

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=21 NAME=SLOT21
:LOAD [PATH]MXMCA4BT.LAN SLOT=22 NAME=SLOT22
:LOAD [PATH]MXMCA4BT.LAN SLOT=23 NAME=SLOT23
:LOAD [PATH]MXMCA4BT.LAN SLOT=24 NAME=SLOT24
```

These commands cause NetWare to load one instance of the LAN driver for each LAN port of the adapter physically installed in expansion slot 2. The NAME keyword associates each driver instance with a unique name, such as slot21, slot22, and so forth.

In this mode, you must bind each driver instance to a network protocol using a unique network number. The unique driver names established using the NAME keyword bind each driver instance to a protocol. The following example illustrates the bind process:

```
:BIND IPX SLOT21 NET=21
:BIND IPX SLOT22 NET=22
:BIND IPX SLOT23 NET=23
:BIND IPX SLOT24 NET=24
```

When issuing the load command, use of the NAME keyword is optional. Alternatively, you may specify the actual driver name (MXMCA4BT.LAN or MXMCA4B2.LAN) in the bind command. The bind command presents you with the list of driver instances to

choose from if a specific instance is not specified. Unique driver names enable the bind process to occur without manual intervention. In this manner, you can automate the process using the AUTOEXEC.NCF file.

The process for loading multiple Quad PeerMaster adapters is identical to the process for loading a single adapter. Load successive adapters in the same manner as the first, with the exception that the Most Significant Digit of the pseudo slot number is the expansion slot number of the adapter being loaded.

## Loading Procedure for the VNET Switch Mode

This section describes the loading procedure for the VNET Switch mode. The first step is to load the Quad PeerMaster adapter device driver once for each port, as follows:

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=21
:LOAD [PATH]MXMCA4BT.LAN SLOT=22
:LOAD [PATH]MXMCA4BT.LAN SLOT=23
:LOAD [PATH]MXMCA4BT.LAN SLOT=24
```

Next, load the Virtual Network driver (VNET.LAN). By default, the driver takes control of all loaded slots (active ports). This is performed as follows:

```
:LOAD [PATH]VNET.LAN
```

Finally, bind all of the ports to the protocol using a common network number, as follows:

```
:BIND IPX VNET NET=2
```

You may load multiple instances of VNET.LAN to create multiple VNETs. The command line syntax for loading multiple VNETs is described in "Sample AUTOEXEC.NCF Files" on page 37.

Frame types, other than the default frame type, specified when loading MXMCA4BT.LAN must also be specified when loading VNET.LAN. The VNET.LAN load command will fail if the proper frame types are not specified. The following lines illustrate this requirement.

```
:LOAD [PATH]MXMCA4BT.LAN  SLOT=21  FRAME=ETHERNET_II
:LOAD [PATH]MXMCA4BT.LAN  SLOT=22  FRAME=ETHERNET_II
:LOAD [PATH]MXMCA4BT.LAN  SLOT=23  FRAME=ETHERNET_II
:LOAD [PATH]MXMCA4BT.LAN  SLOT=24  FRAME=ETHERNET_II
:LOAD [PATH]VNET.LAN  FRAME=ETHERNET_II
```

To support packet-switching functions, Quad PeerMaster adapters maintain an internal database containing packet-forwarding information. This table allows for 4096 entries. To prevent the overflow of this table, unused entries are aged out on a periodic basis. The default value of this aging timer is 60 seconds. If you have the need to modify the duration of the aging timer, refer to “Adjusting the Aging Timers” on page 43, for details.

## Loading Combined VNETs and Traditional Networks

Various transmit and receive control blocks and buffers exist to support the PeerMaster adapter to the host bus-master interface. The number of transmit and receive packets that can be handled by the interface are controlled by the count of these resources. There should be no reason to adjust the count of these resources unless packets are being dropped due to lack of resources. To determine if packets have been dropped due to lack of resources, you can view the PeerMaster custom statistics using MONITOR.NLM. If you need to modify the count of these resources, see “Adjusting Transmit and Receive Resources” on page 44 for details.

**Note:** Specific instructions on how to create hybrid networks are provided in “Sample AUTOEXEC.NCF Files” on page 37.

---

## Updating NetWare System Files

Your Quad PeerMaster adapter is shipped with the latest versions of several NetWare NLM files. These files include fixes required for the proper operation of your Quad PeerMaster adapter under various versions of NetWare. Copy these files directly onto the NetWare partition of your server. The following table indicates the system files to replace.



Filename	NetWare 3.11	NetWare 3.12	NetWare 4.01
MONITOR.NLM	replace		
LSLENH.NLM	replace		
MSM.NLM			replace
MSM31X.NLM	replace	replace	
ETHERTSM.NLM	replace	replace	
PATCHMAN.NLM	replace		

You can update the system files, as follows:

1. Insert the Option Diskette into the diskette drive of a workstation attached to your server.
2. Compare the file dates of the NLM files on your Option Diskette with the dates of the same files located on the SYS:\SYSTEM directory of your server. If the specified system file does not already exist, copy it to your server. If the specified file does exist and it is an old version, replace it with the newer version provided on the Option Diskette.

**Note:** To copy a file, you might require supervisor access to your server. Some files may be restricted to read-only access. You must alter the attributes of such files to successfully overwrite them.

After you copy these system files to your server, you will no longer have to manually load system files from your DOS partition.

The installation process of your Quad PeerMaster adapters is now complete.

If you have the IBM NetFinity Services for OS/2 installed on your server, or if you desire to install these services, continue with "Using NetFinity Services with your PeerMaster Adapter" on page 46.

---

## Unloading the Network Device Drivers

Using NetWare, you can unload LAN drivers after they are loaded and operational. When both MXMCA4BT.LAN and VNET.LAN are loaded, it is important to unload VNET.LAN first, then unload MXMCA4BT.LAN. When you unload either driver, all ports controlled by the driver will become unbound from the protocol stack. Specific instances of the driver may not be selectively unloaded.

**Note:** If you are using a Quad-B2 PeerMaster adapter, the device driver will be MXMCA4B2.LAN.

---

## Using the NetWare Monitor

The NetWare MONITOR.NLM provides custom statistics for VNET.LAN and MXMCA4BT.

### Custom Statistics for VNET.LAN

You can display custom statistics for VNET.LAN using MONITOR.NLM. You can select a specific instance of VNET.LAN when multiple instances are loaded. A specific instance of VNET.LAN can be uniquely identified by two parameters: slot number and frame type. The following sample menu items illustrate how MONITOR.NLM prompts you to select among three instances of VNET.LAN.

```
VNET [SLOT=41   FRAME=ETHERNET_8 2.2]
VNET [SLOT= C   FRAME=ETHERNET_8 2.3]
VNET [SLOT= C   FRAME=ETHERNET_8 2.2]
```

**Note:** Slot numbers do not correspond to either physical or pseudo slot numbers. This is because a single instance of VNET.LAN might include multiple physical adapters. For this reason, VNET.LAN slot numbers are represented as bit masks. To ensure that VNET.LAN slot numbers do not conflict with physical slot numbers, the least significant eight bits of the mask are always set to zero. The upper eight bits of the mask—bits 8 through 15—represent the physical slots 1 through 8, respectively.

The following table illustrates the relationship between VNET.LAN slot numbers and physical slot numbers.

<b>VNET.LAN Slot Number</b>	<b>Physical Slot Number</b>
100	1
200	2
400	3
800	4
1000	5
2000	6
4000	7
8000	8

The slot number of 4100 specifies an instance of VNET.LAN that includes the Quad PeerMaster adapters in physical slots 7 and 1. The sample slot value of 0C00 specifies a VNET.LAN including the adapters in physical slots 3 and 4. Note that multiple instances of VNET.LAN include the adapters in physical slots 3 and 4. Instances of VNET.LAN with identical slot numbers may be uniquely selected by their respective frame types.

The following list provides the custom statistics presented by VNET.LAN for each Quad PeerMaster adapter:

**LearnedEntryDiscards:**

The total number of Forwarding Database entries, which have been or would have been learned, but have been discarded due to a lack of space to store them in the Forwarding Database.

If this counter is increasing, it indicates that the Forwarding Database is regularly becoming full. If this counter has a significant value but is not increasing, it indicates that the problem has been occurring but is not persistent.

**Peer Packets Received:**

The number of packets that were sourced by peer adapters and have been received from the system bus interface by this Quad PeerMaster adapter.

A packet received from the system bus interface is counted only if it is for a protocol being processed by the local switching function.

**Peer Packets Transmitted:**

The number of packets that were sent to peer adapters that have been transmitted to the system bus interface by this Quad PeerMaster adapter.

A packet transmitted on the system bus interface is counted only if it is for a protocol being processed by the local switching function.

**Peer Packets Discarded:**

The number of valid packets begun by peer adapters and received from the system bus interface by this Quad PeerMaster adapter, which were discarded (filtered) by the Forwarding Process.

**Port  $n$  Packets Received:**

The number of packets that have been received by port  $n$  (where  $n = 1, 2, 3,$  or  $4$ ) from its segment.

A packet received by the port is counted only if it is for a protocol being processed by the local switching function.

**Port  $n$  Packets Transmitted:**

The number of packets that have been transmitted by port  $n$  (where  $n = 1, 2, 3,$  or  $4$ ) to its segment.

A packet transmitted to the port is counted only if it is for a protocol being processed by the local switching function.

**Port  $n$  Packets Discarded:**

The number of valid packets received by port  $n$  (where  $n = 1, 2, 3,$  or  $4$ ) from its segment which were discarded (filtered) by the switch-forwarding process.

## Custom Statistics for MXMCA4BT.LAN

**Note:** If you are using a Quad-B2 PeerMaster adapter, the device driver will be MXMCA4B2.LAN.

You can display statistics for MXMCA4BT using MONITOR.NLM. You can select a specific instance of MXMCA4BT when multiple instances are loaded. A specific instance of MXMCA4BT can be uniquely identified by two parameters: slot number and packet type. The following sample menu items illustrate how MONITOR.NLM prompts you to select among multiple instances of MXMCA4BT.

```
MXMCA4BT [ SLOT=15  PACKET=ETHERNET_8  2.2 ]
MXMCA4BT [ SLOT=16  PACKET=ETHERNET_8  2.2 ]
MXMCA4BT [ SLOT=17  PACKET=ETHERNET_8  2.2 ]
MXMCA4BT [ SLOT=18  PACKET=ETHERNET_8  2.2 ]
```

Slot numbers are displayed in hex format. Slot numbers specified when loading the driver, however, must be specified in decimal format. Therefore, you must translate slot numbers from hex to decimal when loading the drivers. The above sample represents the drivers loaded with decimal slot numbers 21, 22, 23, and 24. This corresponds to ports 1, 2, 3 and 4 on the Quad PeerMaster adapter installed in physical slot 2.

The following custom statistics are presented on a per-port basis:

Bytes Received: The total number of bytes that the port received from its segment.

Unicast Packets Received: The total number of unicast packets the port received port from its segment.

Multicast Packets Received: The total number of multicast packets that the port received from its segment.

Broadcast Packets Received: The total number of broadcast packets that the port received from its segment.

Discarded Received Packets: The total number of incoming packets the port was not able to receive from its segment due to lack of resources.

Receive Errors: The total number of corrupt packets that the port received from its segment.

**Bytes Transmitted:** The total number of bytes that the port transmitted to its segment.

**Unicast Packets Transmitted:** The total number of unicast packets the port transmitted to its segment.

**Multicast Packets Transmitted:** The total number of multicast packets that the port transmitted to its segment.

**Broadcast Packets Transmitted:** The total number of broadcast packets that the port transmitted to its segment.

**Discarded Transmitted Packets:** The total number of packets that the port was not able to transmit to its segment due to lack of resources.

**Transmit Packets:** The total number of transmissions by the port to its segment that terminated with invalid status.

**Bus Transfer Errors:** The total number of transmission errors that occurred when transferring data between peer adapters or between the host system and a Quad PeerMaster adapter.

**Host Transfer Errors:** The total number of transmission errors that occurred when transferring data between the host system and a Quad PeerMaster adapter.

**Peer Receive Out Of Resources:** The total number of packets that a Quad PeerMaster adapter received from a peer adapter that were discarded due to insufficient resources to transmit the frame.

**Peer Transmit Out Of Resources:** The total number of packets sent to peer adapters that were discarded due to insufficient resources on the peer adapters.

**Adapter Receive Out Of Resources:** The total number of packets sent to the host system that were discarded due to insufficient resources on the host system.

**Adapter Transmit Out Of Resources:** The total number of packets begun by the host system that were discarded by a Quad PeerMaster adapter due to insufficient resources to transmit the packets.

Firmware Version: The revision level of the operational firmware on the Quad PeerMaster adapter.

## Generic Statistics

When operating in VNET Switch mode, Quad PeerMaster adapters switch received packets, as needed, to other LAN segments. This creates transmit and receive statistics that alter the traditional meaning of various generic statistic counters. The following generic counters have a unique interpretation in VNET Switch mode operation:

**Total Packets Sent:** The total number of packet transmissions requested by the host ODI driver.

**Total Packets Received:** The total number of packets received by the host ODI driver.

**Total Send OK Byte Count (Low/High):** The total number of bytes sent by the host ODI driver.

**Total Receive OK Byte Count (Low/High):** The total number of bytes received by the host ODI driver.

**All Ethernet-Specific Statistical Counters:** This includes all Ethernet-specific statistics, such as collisions, transmit and receive status, and so forth. These counters contain the sum of all transmit and receive statistics resulting from both the host ODI driver and VNET Switch activities. Thus, it is possible to observe a value of zero for "Total Packets Sent" at the same time as a nonzero value for a transmit statistic, such as "Send OK Single Collision Count." This combination of statistics indicates that no packets were transmitted through the host driver, and that a nonzero number of VNET Switch packets for the specified port experienced single collisions.

---

## Sample AUTOEXEC.NCF Files

You must add the following command line to your AUTOEXEC.NCF file for NetWare 3.11:

```
:LOAD [PATH]LSLENH
```

Adding the following commands to your AUTOEXEC.NCF file will cause your Quad PeerMaster adapter to operate in the Traditional Adapter mode. In this mode, each port is bound to the protocol stack with a unique network number. Your adapter will not be able to switch packets between segments. Cross-segment traffic, if any, must be routed by your server's microprocessor.

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=21 NAME=SLOT21
:LOAD [PATH]MXMCA4BT.LAN SLOT=22 NAME=SLOT22
:LOAD [PATH]MXMCA4BT.LAN SLOT=23 NAME=SLOT23
:LOAD [PATH]MXMCA4BT.LAN SLOT=24 NAME=SLOT24
:BIND IPX SLOT21 NET=21
:BIND IPX SLOT22 NET=22
:BIND IPX SLOT23 NET=23
:BIND IPX SLOT24 NET=24
```

Adding the following commands to your AUTOEXEC.NCF file will cause your Quad PeerMaster adapter to operate in the VNET Switch mode. In this mode, all ports are bound to the protocol stack with one common network number. Your PeerMaster adapter will switch packets between segments in this mode.

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=11
:LOAD [PATH]MXMCA4BT.LAN SLOT=12
:LOAD [PATH]MXMCA4BT.LAN SLOT=13
:LOAD [PATH]MXMCA4BT.LAN SLOT=14

:LOAD [PATH]MXMCA4BT.LAN SLOT=21
:LOAD [PATH]MXMCA4BT.LAN SLOT=22
:LOAD [PATH]MXMCA4BT.LAN SLOT=23
:LOAD [PATH]MXMCA4BT.LAN SLOT=24
```

```
# Create a VNET that globally includes all ports
# ("include" parameter is omitted).
```

```
:LOAD [PATH]VNET.LAN
:BIND IPX VNET NET=2
```

Adding the following commands to your AUTOEXEC.NCF file will cause your Quad PeerMaster adapters to form a network that is a hybrid composed of an 8-segment virtual network (VNET) and four traditional networks. Cross-segment traffic within the 8 segments of the VNET is switched by your Quad PeerMaster adapters.



Cross-segment traffic from the VNET to a traditional network, or between traditional network segments, is routed internally by your server.

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=11
:LOAD [PATH]MXMCA4BT.LAN SLOT=12
:LOAD [PATH]MXMCA4BT.LAN SLOT=13
:LOAD [PATH]MXMCA4BT.LAN SLOT=14

:LOAD [PATH]MXMCA4BT.LAN SLOT=21 NAME=SLOT21
:LOAD [PATH]MXMCA4BT.LAN SLOT=22 NAME=SLOT22
:LOAD [PATH]MXMCA4BT.LAN SLOT=23 NAME=SLOT23
:LOAD [PATH]MXMCA4BT.LAN SLOT=24 NAME=SLOT24

:LOAD [PATH]MXMCA4BT.LAN SLOT=31
:LOAD [PATH]MXMCA4BT.LAN SLOT=32
:LOAD [PATH]MXMCA4BT.LAN SLOT=33
:LOAD [PATH]MXMCA4BT.LAN SLOT=34

# Create four traditional networks:

:BIND IPX SLOT21 NET=21
:BIND IPX SLOT22 NET=22
:BIND IPX SLOT23 NET=23
:BIND IPX SLOT24 NET=24

# Create an eight-segment VNET consisting of adapters 1
# and 3. Use the i1 and i3 keywords to include adapters
# 1 and 3 into the VNET:

:LOAD VNET.LAN i1 i3
:BIND IPX VNET NET=2
```

The above example illustrates a server with three Quad PeerMaster adapters. The adapters are installed in expansion slots 1, 2, and 3. The adapters in slots 1 and 3 create an eight-segment VNET and are configured as network number 2. The adapter in slot 2 is loaded as a traditional adapter, and the four ports are each bound to the protocol with a unique network number. The protocol is configured to operate as if a total of 5 physical Ethernet segments exist. All ports controlled by VNET.LAN share the network number configured on the VNET.LAN bind command.

Adding the following commands to your AUTOEXEC.NCF file will cause your Quad PeerMaster adapters to form a network that is a hybrid composed of two 4-segment virtual networks (VNETs) and four traditional networks. Cross-segment traffic within each 4-segment VNET is switched by your Quad PeerMaster adapters. Cross-segment traffic entering or leaving a VNET, or between traditional network segments, is routed internally by your server.

The load command for the VNET.LAN driver provides keywords that request the driver to include specific adapters into the VNET. You may load the VNET.LAN driver multiple times to create multiple VNETs. The keywords to include a specific adapter into a VNET are i1, i2, ... i8. The keyword i1 indicates a request to include the adapter in physical slot 1 into the VNET being formed, i2 indicates the adapter in slot 2, and so on. You may name each VNET separately, using the NAME keyword on the load command. Each VNET, when being bound to a protocol, must be assigned a unique network number. The following example illustrates the loading of multiple VNETs.

```

:LOAD [PATH]MXMCA4BT.LAN SLOT=11 NAME=SLOT11
:LOAD [PATH]MXMCA4BT.LAN SLOT=12 NAME=SLOT12
:LOAD [PATH]MXMCA4BT.LAN SLOT=13 NAME=SLOT13
:LOAD [PATH]MXMCA4BT.LAN SLOT=14 NAME=SLOT14

:BIND IPX SLOT11 NET=11
:BIND IPX SLOT12 NET=12
:BIND IPX SLOT13 NET=13
:BIND IPX SLOT14 NET=14

:LOAD [PATH]MXMCA4BT.LAN SLOT=21
:LOAD [PATH]MXMCA4BT.LAN SLOT=22
:LOAD [PATH]MXMCA4BT.LAN SLOT=23
:LOAD [PATH]MXMCA4BT.LAN SLOT=24

:LOAD [PATH]MXMCA4BT.LAN SLOT=31
:LOAD [PATH]MXMCA4BT.LAN SLOT=32
:LOAD [PATH]MXMCA4BT.LAN SLOT=33
:LOAD [PATH]MXMCA4BT.LAN SLOT=34

# Create two named VNETs (VNET2 and VNET3) using the 'i_'
# keyword to include specific adapters into each VNET:

:LOAD [PATH]VNET.LAN i2 NAME=VNET2
:LOAD [PATH]VNET.LAN i3 NAME=VNET3
:BIND IPX VNET2 NET=2
:BIND IPX VNET3 NET=3

```

---

## About NetWare Load-Time Error Messages

If POST completed successfully, the device driver will attempt to initialize and download the Quad PeerMaster adapter. During this process, you might see an error message.

If POST completed unsuccessfully, the device driver will not attempt to load the adapter. If this happens, you will get an error message. If you get an error message during either process, see “NetWare Load-Time Error Messages” on page 64.

---

## Special Instructions for Model 85

To provide for peer data transfers, Quad PeerMaster adapters support a system bus window into their local memory. The location of this window is normally selected, verified, and reserved by the automatic configuration program during the adapter installation process. Due to limitations of the setup program provided on some IBM Model 85 servers, however, this window is not reserved by the automatic configuration program. Instead, the device driver provides a default window location for each installed Quad PeerMaster adapter. The default window location of each installed adapter is based upon the expansion slot of the adapter in the following manner:

Slot Number	Default Window Address
1	255MB
2	254MB
3	253MB
4	252MB
5	251MB
6	250MB
7	249MB
8	248MB

Conflicts cannot be detected and resolved by the device driver. Use the setup program on your system to manually verify that conflicts do not exist with the default window locations. You may override the default window locations to resolve possible conflicts. The MEMORY keyword allows you to override the default values. This keyword specifies a system bus address for the adapter window base, as follows:

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=11 MEMORY=N
```

Where N specifies a window base address in Megabytes. Thus, a value of 100 specifies a base address of 100MB.

Minimum value of N = 4  
Maximum value of N = 255

---

## Adjusting the Aging Timers

To support packet-switching functions, Quad PeerMaster adapters maintain an internal database containing packet-forwarding information. This table can contain 4096 entries. To prevent the overflow of this table, unused entries are purged from the table on a periodic basis. Aging timers define the length of this period. Entries not accessed during the time specified are purged from the database.

Once purged, a destination address is treated as an unlearned address. Packets to unlearned destinations are sent out to all ports to ensure delivery of the data. When the Quad PeerMaster adapter receives a response from the destination, the forwarding information table is updated and subsequent packets to that address are no longer sent out to all ports.

Thus, a long duration for the aging timer reduces traffic caused by unlearned destinations. A duration that is too long, however, results in unused entries remaining in the table for long periods of time. This may result in an overflow of the table. New destinations, which cannot be stored in the data base, are treated as unlearned traffic.

Use the AGE keyword to customize the aging timer to meet the specific needs of your network. This keyword specifies aging timer values as follows:

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=11 AGE=N
:LOAD [PATH]VNET.LAN AGE=N
```

Where N specifies a duration in seconds. Thus, a value of 30 specifies a duration of 30 seconds.

Note that the keyword must be specified on the load command lines for MXMCA4BT.LAN and VNET.LAN. Use the same value on both command lines.

Minimum value of N	=	1
Maximum value of N	=	65535
Default value of N	=	60

NetWare Servers poll idle workstations every 15 minutes. Thus, an aging duration of 30 minutes (N=1800) would safely prevent unlearned traffic due to idle workstations. In very large networks, however, a duration of this length might result in the overflow of the forwarding data base.

---

## Adjusting Transmit and Receive Resources

Various transmit and receive control blocks and buffers exist to support the PeerMaster adapter to the host bus-master interface. The number of transmit and receive packets that can be handled by the interface are controlled by the number of these resources. Increase the number of these resources only if you have determined that packets are being lost due to lack of resources.

The TXCOUNT keyword allows you to customize the number of transmit control blocks used to line up packets to the adapter, as follows:

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=11 TXCOUNT=nnn
:LOAD [PATH]MXMCA4BT.LAN SLOT=12
:LOAD [PATH]MXMCA4BT.LAN SLOT=13
:LOAD [PATH]MXMCA4BT.LAN SLOT=14
:LOAD [PATH]MXMCA4BT.LAN SLOT=21 TXCOUNT=nnn
:LOAD [PATH]MXMCA4BT.LAN SLOT=22
:LOAD [PATH]MXMCA4BT.LAN SLOT=23
:LOAD [PATH]MXMCA4BT.LAN SLOT=24
:LOAD [PATH]VNET.LAN TXCOUNT=nnn
```

The parameter *nnn* is a 3-digit decimal number that specifies the number of control blocks. The first port that is loaded on a PeerMaster adapter sets the TXCOUNT of resources for that adapter. The TXCOUNT keyword for subsequent loads of the same adapter is ignored by the driver. The keyword must be specified on the load command lines for MXMCA4BT.LAN and VNET.LAN. The value of TXCOUNT for VNET.LAN should equal the sum of all adapters included in the VNET. For instance, the value of TXCOUNT for VNET.LAN in the above example is 40 if the values for slots 11 and 21 were each specified as 20.

Minimum value of nnn = 2  
Maximum value of nnn = 80  
Default value of nnn = 10

The maximum value of 80 is a recommended value. The actual maximum might vary as a function of the configured size of the adapter memory window and the amount of available memory on the adapter. If the requested number is greater than the driver can provide, the default value will be used. *Do not set TXCOUNT below the default value of 10.*

The RXCOUNT keyword allows you to customize the number of receive control blocks and host buffers used to receive packets from the adapter, as follows:

```
:LOAD [PATH]MXMCA4BT.LAN SLOT=11 RXCOUNT=nnn  
:LOAD [PATH]MXMCA4BT.LAN SLOT=12  
:LOAD [PATH]MXMCA4BT.LAN SLOT=13  
:LOAD [PATH]MXMCA4BT.LAN SLOT=14
```

The parameter *nnn* is a 3-digit decimal number that specifies the number of control blocks and buffers. Note that the keyword is specified only on the load command line for MXMCA4BT.LAN. The first port that is loaded on a PeerMaster adapter sets the RXCOUNT of resources for that adapter. The RXCOUNT keyword for subsequent loads of the same adapter is ignored by the device driver.

Minimum value of nnn = 2  
Maximum value of nnn = 80  
Default value of nnn = 10

The maximum value of 80 is a recommended value. The actual maximum might vary as a function of the configured size of the adapter memory window and the amount of available memory on the adapter. If the requested number is greater than the driver can provide, the default value will be used. *Do not set RXCOUNT below the default value of 10.*

---

## Using NetFinity Services with your PeerMaster Adapter

IBM NetFinity Services is a complete network management environment that combines monitoring and management features with intuitive graphical user interfaces. The monitoring services built into NetFinity enable LAN administrators to gather critical server, LAN and PeerMaster adapter information from the NetFinity Manager system.

NetFinity provides the following services:

### System Monitor

Charts and monitors the activity for a variety of server resources, including microprocessor, disks, and memory. Alerts can be sent to the Alert Manager when user-defined thresholds are exceeded. The following operational parameters of PeerMaster adapters and attached LAN segments are continually monitored and can be viewed over time as line graphs, an instantaneous real-time monitors, or text monitors.

- LAN utilization

Displays the utilization of attached LAN segments in KB per second(KBps) or packets per second (pps).

- LAN switch statistics

Displays the number of packets that the switching function forwarded to a specified port for transmission onto its segment as well as the number of packets that were received by a port from its segment that was delivered to the switching function.

- Peer switch statistics

Displays the number of packets that the switching function sent to, or received from, peer PeerMaster adapters across the system bus.



### Alert Manager

Receives and processes application-generated alerts. Alerts are generated when user-defined thresholds are exceeded. The types of alerts that NetFinity can provide are:

- Logging
- Notifying user
- Forwarding alert to another system
- Executing a program
- Taking an application-defined action

NetFinity sends Simple Network Management Protocol (SNMP) messages to management consoles in response to an alert.

### Remote System Manager

Enables you to access and control all NetFinity Services installed on remote systems in your network.

### Remote Session

Enables you to establish a fully active session with a remote system.

### Screen View

Enables you to take a snapshot of any remote system's current screen.

### System Information Tool

Detects and reports detailed information on the hardware and software configuration of your system.

Your Option Diskette includes programs that enable you to use NetFinity, if it is installed on your server, with your PeerMaster adapter.

If you have NetFinity installed on your server:

If you are using OS/2, go to "Installing the NetFinity Software for OS/2" on page 48

If you are using NetWare, go to "Installing the NetFinity Software for NetWare" on page 48.

---

## Installing the NetFinity Software for OS/2

The information for installing the NetFinity programs (for the PeerMaster adapter) on your server is on your Option Diskette. Print and read the following file for installation instructions:

A:\OS2\NDIS.TXT

---

## Installing the NetFinity Software for NetWare

This section provides information for NetWare operating systems.

**Note:** A README file might be present in A:\NETFINTY\NETWARE if more recent installation or operation instructions exist.

The NetFinity program files on your Option Diskette support the following versions of NetWare:

NetWare 3.1x and 4.0x

The following files are included in the NETFINTY\NETWARE directory of the Option Diskette that came with your adapter.

MONMX4BT.NLM

This file is the NetFinity base monitor for MXMCA4BT.LAN.

MONVNET.NLM

This file is the NetFinity base monitor for VNET.LAN.

**Note:** If you are using a Quad-B2 PeerMaster adapter, the base monitor will be MONMX4B2.NLM.

## Installing the NetFinity Program Files for NetWare

The *IBM PeerMaster Server Adapter Option Diskette* contains the NetFinity program files, which monitor the operation of your Quad PeerMaster adapters and make that information available to your NetFinity management console. Two program files are required. MONMX4BT monitors the base operations of your adapter and provides Ethernet use information. MONVNET monitors the switching operations of your adapters.

Before installing these programs, ensure that the installation of NetFinity and your Quad PeerMaster adapters is complete.

**Assumptions:**

1. Your Quad PeerMaster adapters are installed and fully operational. *If this is not true, do not proceed.* Before continuing, install your adapters and ensure that they are operational.
2. The NetFinity Services and NetWare Server programs that came with NetFinity are installed and fully operational. You should be able to monitor the basic operations and configuration of your server at this time. *If this is not true, do not proceed.* Before continuing, install the NetFinity Services and Netware Server programs and ensure that they are fully operational.

To Install the programs, follow this procedure:

1. If your NetWare server is not on, turn it on.
2. Insert the adapter Option Diskette into the diskette drive of a workstation attached to your NetWare server.
3. Change the directory on your diskette drive to the directory where the NetFinity programs are located (CD A:\NETFINTY\NETWARE).
4. Change the directory on your network drive to the directory where the programs that came with NetFinity are installed (for example, CD F:\NETFINTY).
5. Copy the programs for your Quad PeerMaster adapters onto your server (for example, type **copy A:\*.NLM F:**).
6. Restart the server to load the programs.

Now, you can monitor the functions of your Quad PeerMaster adapters from your NetFinity console.

## Monitoring your Quad PeerMaster Adapter

The Quad PeerMaster adapter programs expands the capability of the NetFinity Services installed on your server. This section describes these services. For information about the basic operation of NetFinity, refer to the documentation that came with it.

The Remote System Manager on your NetFinity Manager System allows you to monitor the configuration and operation of remote systems that have been discovered by NetFinity. If your Quad PeerMaster server has not been discovered by NetFinity, perform the following steps:

1. From the Remote System Manager screen, select **Add Group**.
2. Select **Discover System**.

After communication with your Quad PeerMaster server is established, an icon (graphic symbol) will appear for your new server.

3. Double-click on the icon for your server.

After adding the System Manager, you may use all the services on your Quad PeerMaster adapter.

To display hardware configuration information about the Quad PeerMaster adapters installed in your server:

1. Select **System Information**.
2. Select **Adapter Information**.

The first time you use this feature, you will be prompted to insert the Quad PeerMaster adapter Option Diskette into the diskette drive of the NetFinity management system. NetFinity will copy the adapter configuration (ADF) file for the Quad PeerMaster adapter onto the local hard disk drive for future reference.

## **Additional System Monitors**

The System Monitor Service allows you to monitor the statistical data gathered by the programs provided with your Quad PeerMaster adapters. Expansion slot numbers are used to select a specific adapter to monitor. Pseudo slot numbers are used to select a specific port to monitor. Pseudo slot numbers are expressed as two-digit, decimal numbers,  $xy$ , where  $x$  is the expansion-slot location of the target adapter and  $y$  is the target port on the adapter. For example, a pseudo slot number of 23 represents port 3 of the adapter in the expansion slot 2.

The following monitor windows are currently provided:

- Slot  $xy$  LAN Utilization (pps)

- Slot  $xy$  LAN Utilization (KBps)

- Slot  $xy$  LAN Switch In (pps)

- Slot  $xy$  LAN Switch Out (pps)

- Slot  $x$  Peer Switch In (pps)

- Slot  $x$  Peer Switch Out (pps)

### **Lan Utilization**

In either VNET Switch or Traditional Adapter mode, each active port on your Quad PeerMaster adapter is attached to a separate LAN segment. The port receives data from the segment in a random manner. Each port can provide information on the actual use of the LAN segment onto which it is attached. This information is provided in packets per second (pps) and Kilobytes per second (KBps).

### **LAN Switch In**

When the switching function on your Quad PeerMaster adapter is active, this counter displays the number of packets forwarded to another LAN segment that the switching function accepted from the specified port.

### **LAN Switch Out**

When the switching function on your Quad PeerMaster adapter is active, this counter displays the number of packets that the switching function forwarded to the specified port for transmission onto its segment.

#### **Peer Switch In**

When the switching function on your Quad PeerMaster adapter is active, this counter displays the number of packets forwarded to local ports for transmission onto their segments that the switching function received from peer PeerMaster adapters.

#### **Peer Switch Out**

When the switching function on your Quad PeerMaster adapter is active, this counter displays the number of packets forwarded to peer PeerMaster adapters for transmission onto segments controlled by those peer adapters that the switching function received from local ports.

---

## Appendix A. Contents of the Option Diskette

See the README files in each directory for information about additional files that might not be listed below.

File Name	Description
<b>A:\</b>	
*.ADF	Your setup program uses these files to install your adapter.
*.DGS	Your diagnostic program uses these files to verify operation of your adapter.
DIAGS.COM	This is an updated version of the system file.
CMD.COM	This is an updated version of the system file.
README	If present, this file contains updates since this book was published.
<b>A:\NETWARE</b>	
MXMCA4BT.LAN	This is the LAN device driver for your adapter.
VNET.LAN	This driver enables Quad PeerMaster adapters to perform switching.
MSM.NLM	This is the latest-released version of this NetWare file.
MSM31X.NLM	This is the latest-released version of this NetWare file.
LSLENH.NLM	This is the latest-released version of this NetWare file.
ETHERTSM.NLM	This is the latest-released version of this NetWare file.
PATCHMAN.NLM	This is the latest-released version of this NetWare file.
MONITOR.NLM	This is the latest-released version of this NetWare file.

<b>File Name</b>	<b>Description</b>
SWITCH.NCF	This is the sample AUTOEXEC.NCF file for Switch mode.
TRADIT.NCF	This is the sample AUTOEXEC.NCF file for Traditional Adapter mode.
COMBO.NCF	This is the sample AUTOEXEC.NCF file for combined modes.
README	If present, this file contains updates since this book was published.
<b>A:\OS2</b>	
NDIS.TXT	This file provides the adapter installation instructions for the OS/2 LAN server.
<Install files>	These files are the operational software needed to use the PeerMaster adapter. See NDIS.TXT for a full description of these files.
README	If present, this file contains updates since this book was published.
<b>A:\NETFINTY\NETWARE</b>	
MONMX4B*.NLM	These files are the NetFinity Base Monitors for MXMCA4B*.LAN (Quad-BT and Quad-B2).
MONVNET.NLM	This file is the NetFinity Base Monitor for VNET.LAN.
README	If present, this file contains updates since this book was published.
<b>A:\NETFINTY\OS2</b>	
<Install files>	These files are described in A:\OS2\NDIS.TXT.
README	If present, this file contains any updates made since this book was published.



---

## Appendix B. Manually Configuring Your Adapter

To manually configure your adapter:

1. At the prompt for Automatic Configuration, type **N**.
2. Select **Set Configuration**, then select **Change Configuration**.
3. Use the arrow keys to select the appropriate adapter and slot.

The configuration parameters will appear. Although default values are selected for you, you may change them. The configuration program will alert you to selections that result in system conflicts. Be sure to resolve any system conflicts before you exit the program.

You must configure the following:

- Device I/O Address
- Interrupt Level
- Primary Arbitration Level
- Streaming Data
- Selected Feedback Return
- Address and Data Parity
- First Shared Storage Window Location

---

### Device I/O Address

The Device I/O Address selects the system bus I/O address of the adapter. The adapter will not operate normally if the selected value results in a system conflict. You may select from the following addresses:

- 1C00H-1C1FH
- 3C00H-3C1FH
- 5C00H-5C1FH
- 7C00H-7C1FH
- 9C00H-9C1FH
- BC00H-BC1FH
- DC00H-DC1FH
- FC00H-FC1FH

---

## **Interrupt Level**

The interrupt level is the prioritized interrupt request line on which the adapter interrupts the system. The highest to lowest interrupt priorities are:

- Level 3
- Level 4
- Level 5

The interrupt level may be shared with another adapter.

---

## **Primary Arbitration Level**

This field is the primary arbitration level for the adapter bus master direct memory access (DMA) transfers. An arbitration level of 1 has the highest priority; increasing levels have corresponding decreased priority. You may select from the following levels:

- Level E
- Level D
- Level C
- Level B
- Level A
- Level 9
- Level 8
- Level 7
- Level 6
- Level 5
- Level 4
- Level 3
- Level 2
- Level 1

---

## Streaming Data

This field enables or disables the Streaming Data feature of the adapter as both a bus master and a slave. The default state of this field is disable, which causes the adapter to use the basic data transfer procedures. When enabled, this field is the streaming data procedure is supported. You may select one of the following:

- Enabled
- Disabled

---

## Selected Feedback Return

This field enables or disables the checking and reporting of loss of selected feedback return by the bus master of the adapter. The default state of this field is disable. You may select one of the following:

- Enabled
- Disabled

---

## Address and Data Parity

This field enables or disables the address and data parity checking and generation by the adapter. The default state of this field is disable. You may select one of the following:

- Enabled
- Disabled

---

## First Shared Storage Window Location

There are two independent windows into the random access memory (RAM) on the adapter. This is the first window that is located in the read-only memory (ROM) or RAM area. The size of this window can be either 8KB or 16KB. You may select from the following windows:

DE000H-DFFFFH:	8KB Window
DC000H-DDFFFFH:	8KB Window
DA000H-DBFFFFH:	8KB Window
D8000H-D9FFFFH:	8KB Window
D6000H-D7FFFFH:	8KB Window
D4000H-D5FFFFH:	8KB Window
D2000H-D3FFFFH:	8KB Window
D0000H-D1FFFFH:	8KB Window
CE000H-CFFFFH:	8KB Window
CC000H-CDFFFFH:	8KB Window
CA000H-CBFFFFH:	8KB Window
C8000H-C9FFFFH:	8KB Window
C6000H-C7FFFFH:	8KB Window
C4000H-C5FFFFH:	8KB Window
C2000H-C3FFFFH:	8KB Window
C0000H-C1FFFFH:	8KB Window
DC000H-DFFFFH:	16KB Window
D8000H-DBFFFFH:	16KB Window
D4000H-D7FFFFH:	16KB Window
D0000H-D3FFFFH:	16KB Window
CC000H-CFFFFH:	16KB Window
C8000H-CBFFFFH:	16KB Window
C4000H-C7FFFFH:	16KB Window
C0000H-C3FFFFH:	16KB Window

**Note:** The second window is used for peer data transfers. The setup program automatically selects this window above the 1MB boundary in Micro Channel address space. For Model 85 setup instructions, see “Special Instructions for Model 85” on page 42.

---

## Appendix C. Quad PeerMaster Adapter Screen Messages

This section lists three types of messages, diagnostic and setup error messages, NetWare load-time messages, and NetWare run-time error messages, that might occur with your adapter. The messages and their description are in **bold** type, and are listed in numeric order for each type of message.

When the Action or Description information tells you to call for service, contact your place of purchase, or in the United States, you can call 1-800-772-2227. In Canada, you can call 1-800-565-3344. Outside of the United States and Canada, contact your place of purchase.

Diagnostic error messages include POST, load-time, and run-time error messages.

---

### Diagnostic and Setup Error Messages

You may request the diagnostic and setup program on your server to run the adapter diagnostics. If the diagnostics complete unsuccessfully, the diagnostic program will display an error message. Error message numbers are expressed as eight-digit decimal numbers, *ZDDDEESZ*, defined as follows.

<i>Z</i>	=	Always zero
<i>DDD</i>	=	The device number assigned to your PeerMaster adapter
<i>EE</i>	=	Diagnostic error number
<i>S</i>	=	Slot number
<i>Z</i>	=	Always zero

For example, an error number of 02762230 represents error number 22 (port 1 loopback failure) of the PeerMaster adapter in expansion slot 3.

---

**0DDD01S0: POST Flash Main Sector Checksum Failure**

**Action:** Call for service.

---

**0DDD02S0: POST was not performed - board restarted**

**Action:** Call for service.

---

**0DDD03S0: POST Test Sequencer Internal Failure**

**Action:** Call for service.

---

**0DDD04S0: POST Flash Boot Sector Checksum Failure**

**Action:** Call for service.

---

**0DDD05S0: POST DRAM Size Detection Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**0DDD06S0: POST DRAM Byte (8-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**0DDD07S0: POST DRAM Short (16-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**0DDD08S0: POST DRAM Word (32-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If error message repeats, call for service.

---

**0DDD09S0: POST DRAM Long (64-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**0DDD10S0: POST DRAM Trip (96-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**0DDD11S0: POST DRAM Quad (128-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**0DDD12S0: POST DRAM Addressability Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**0DDD13S0: POST SRAM Size Detection Failure**

**Action:** Call for service.

---

**0DDD14S0: POST SRAM Byte (8-bit) Wide Failure**

**Action:** Call for service.

---

**0DDD15S0: POST SRAM Short (16 bit) Wide Failure**

**Action:** Call for service.

---

**0DDD16S0: POST SRAM Word (32-bit) Wide Failure**

**Action:** Call for service.

---

**0DDD17S0: POST SRAM Long (64 bit) Wide Failure**

**Action:** Call for service.

---

**0DDD18S0: POST SRAM Trip (96-bit) Wide Failure**

**Action:** Call for service.

---

**0DDD19S0: POST SRAM Quad (128-bit) Wide Failure**

**Action:** Call for service.

---

**0DDD20S0: POST SRAM Addressability Failure**

**Action:** Call for service.

---

**0DDD21S0: POST Timer Failure**

**Action:** Call for service.

---

**0DDD22S0: POST Ethernet Port 1 Internal Loopback Failure**

**Action:** Call for service.

---

**0DDD23S0: POST Ethernet Port 2 Internal Loopback Failure**

**Action:** Call for service.

---

**0DDD24S0: POST Ethernet Port 3 Internal Loopback Failure**

**Action:** Call for service.

---

**0DDD25S0: POST Ethernet Port 4 Internal Loopback Failure**

**Action:** Call for service.

---

**0DDD26S0: POST Ethernet Port 1 External Loopback Failure**

**Action:** Verify correct cabling of the port and try again. If error repeats, call for service.

---

**0DDD27S0: POST Ethernet Port 2 External Loopback Failure**

**Action:** Verify correct cabling of the port and try again. If error repeats, call for service.

---

**0DDD28S0: POST Ethernet Port 3 External Loopback Failure**

**Action:** Verify correct cabling of the port and try again. If error repeats, call for service.

---

**0DDD29S0: POST Ethernet Port 4 External Loopback Failure**

**Action:** Verify correct cabling of the port and try again. If error repeats, call for service.

---

**0DDD30S0: POST Ethernet Port 1 Device Verification Failure**

**Action:** Call for service.

---

**0DDD31S0: POST Ethernet Port 2 Device Verification Failure**

**Action:** Call for service.



---

**0DDD32S0: POST Ethernet Port 3 Device Verification Failure**

**Action:** Call for service.

---

**0DDD33S0: POST Ethernet Port 4 Device Verification Failure**

**Action:** Call for service.

---

**0DDD91S0: Communications to the adapter failed. The Diagnostic Program was not run.**

**Action:** Verify the adapter configuration using the Setup program.

---

**0DDD92S0: Communications to the adapter failed. The Diagnostic Program was not run.**

**Action:** Verify the adapter configuration using the Setup program.

---

**0DDD93S0: Communications to the adapter failed. The Diagnostic Program was not run.**

**Action:** Verify the adapter configuration using the Setup program.

---

**0DDD99S0: The adapter is not enabled.**

**Action:** Verify the adapter configuration using the Setup program.

---

## NetWare Load-Time Error Messages

Load-time error messages can occur under two conditions. If POST completed successfully, the driver will attempt to initialize and download the Quad PeerMaster adapter software. If POST completed unsuccessfully, the driver will not attempt to load the adapter software. This section describes the error messages that might be displayed during load time.

---

### **050: The board cannot be found**

**Action:** The driver assumes that your board (adapter) has not been installed. Verify that your adapter is properly installed. If it is, then treat this error in the same manner as "The board has failed."

---

### **058: The board does not respond**

**Action:** The driver is not able to communicate with the adapter. At load-time, this is an irrecoverable error that causes the driver to terminate the load process. It might help to restart the computer or run your system configuration program to check for possible system conflicts. If restarting your computer does not clear the problem, and system conflicts do not exist, call for service.

---

### **070: The board has failed**

**Action:** The driver is not able to communicate with the adapter. At load-time, this is an irrecoverable error that causes the driver to terminate the load process. It might help to restart your computer or run your system configuration program to check for possible system conflicts. If restarting your computer does not clear the problem, and system conflicts do not exist, call for service.

---

### **073: Unable to allocate memory**

**Action:** The driver was not able to allocate sufficient memory to perform its functions. Unload the driver and unnecessary NLMs and try again. If this does not help, exit and reload the server and try again. If the problem persists, you must install additional memory into your server.

---

**110: Unable to download the firmware**

**Action:** The driver is not able to communicate with the adapter. At load-time, this is an irrecoverable error that causes the driver to terminate the load process. It might help to restart your computer or run your system configuration program to check for possible system conflicts. If restarting your computer does not clear the problem, and system conflicts do not exist, call for service.

---

**203: Board diags failed to complete**

**Action:** The driver is not able to communicate with the adapter. At load-time, this is an irrecoverable error that causes the driver to terminate the load process. It might help to restart your computer or run your system configuration program to check for possible system conflicts. If restarting your computer does not clear the problem, and system conflicts do not exist, call for service.

---

**301: POST Flash Main Sector Checksum Failure**

**Action:** Call for service.

---

**302: POST was not performed - board restarted**

**Action:** Call for service.

---

**303: POST Test Sequencer Internal Failure**

**Action:** Call for service.

---

**304: POST Flash Boot Sector Checksum Failure**

**Action:** Call for service.

---

**305: POST DRAM Size Detection Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**306: POST DRAM Byte (8-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**307: POST DRAM Short (16-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**308: POST DRAM Word (32-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If error message repeats, call for service.

---

**309: POST DRAM Long (64-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**310: POST DRAM Trip (96-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**311: POST DRAM Quad (128-bit) Wide Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**312: POST DRAM Addressability Failure**

**Action:** The power unit is down. Verify proper seating of the DRAM SIMM on the adapter and try again. If the error message repeats, call for service.

---

**313: POST SRAM Size Detection Failure**

**Action:** Call for service.

---

**314: POST SRAM Byte (8-bit) Wide Failure**

**Action:** Call for service.

---

**315: POST SRAM Short (16 bit) Wide Failure**

**Action:** Call for service.

---

**316: POST SRAM Word (32-bit) Wide Failure**

**Action:** Call for service.

---

**317: POST SRAM Long (64 bit) Wide Failure**

**Action:** Call for service.

---

**318: POST SRAM Trip (96-bit) Wide Failure**

**Action:** Call for service.

---

**319: POST SRAM Quad (128-bit) Wide Failure**

**Action:** Call for service.

---

**320: POST SRAM Addressability Failure**

**Action:** Call for service.

---

**321: POST Timer Failure**

**Action:** Call for service.

---

**322: POST Ethernet Port 1 Internal Loopback Failure**

**Action:** Call for service.

---

**323: POST Ethernet Port 2 Internal Loopback Failure**

**Action:** Call for service.

---

**324: POST Ethernet Port 3 Internal Loopback Failure**

**Action:** Call for service.

---

**325: POST Ethernet Port 4 Internal Loopback Failure**

**Action:** Call for service.

---

**326: POST Ethernet Port 1 External Loopback Failure**

**Action:** Verify correct cabling of the port and try again. If error repeats, call for service.

---

**327: POST Ethernet Port 2 External Loopback Failure**

**Action:** Verify correct cabling of the port and try again. If error repeats, call for service.

---

**328: POST Ethernet Port 3 External Loopback Failure**

**Action:** Verify correct cabling of the port and try again. If error repeats, call for service.

---

**329: POST Ethernet Port 4 External Loopback Failure**

**Action:** Verify correct cabling of the port and try again. If error repeats, call for service.

---

**330: POST Ethernet Port 1 Device Verification Failure**

**Action:** Call for service.

---

**331: POST Ethernet Port 2 Device Verification Failure**

**Action:** Call for service.

---

**332: POST Ethernet Port 3 Device Verification Failure**

**Action:** Call for service.

---

**333: POST Ethernet Port 4 Device Verification Failure**

**Action:** Call for service.

---

## NetWare Run-Time Messages

It is possible that an irrecoverable, or recoverable, error might occur during normal operation of the adapter. The following table describes the run-time errors that might be displayed.

### Recoverable Errors and Warnings

---

#### 58: The board does not respond

**Description:** To clear a detected run-time error, the driver has attempted to reset, reload, and reinitialize the adapter. These messages indicate that errors have occurred during the recovery process. This message does not indicate that the driver has terminated the recovery process. The driver will attempt to recover control of the adapter at periodic intervals. The driver will not redisplay the error message each time it attempts to recover from the error. If the driver is not able to recover from any of these errors after several minutes, call for service.

---

#### 110: Unable to download the firmware

**Description:** To clear a detected run-time error, the driver has attempted to reset, reload, and reinitialize the adapter. These messages indicate that errors have occurred during the recovery process. This message does not indicate that the driver has terminated the recovery process. The driver will attempt to recover control of the adapter at periodic intervals. The driver will not redisplay the error message each time it attempts to recover from the error. If the driver is not able to recover from any of these errors after several minutes, call for service.

---

#### 111: Invalid Pipe Command

**Description:** To clear a detected run-time error, the driver has attempted to reset, reload, and reinitialize the adapter. These messages indicate that errors have occurred during the recovery process. This message does not indicate that the driver has terminated the recovery process. The driver will attempt to recover control of the adapter at periodic intervals. The driver will not redisplay the error message each time it attempts to recover from the error. If the driver is not able to recover from any of these errors after several minutes, call for service.

---

**112: The board watchdog failed**

**Description:** To clear a detected run-time error, the driver has attempted to reset, reload, and reinitialize the adapter. These messages indicate that errors have occurred during the recovery process. This message does not indicate that the driver has terminated the recovery process. The driver will attempt to recover control of the adapter at periodic intervals. The driver will not redisplay the error message each time it attempts to recover from the error. If the driver is not able to recover from any of these errors after several minutes, call for service.

---

**113: Adapter resetting... please wait**

**Description:** To clear a detected run-time error, the driver has attempted to reset, reload, and reinitialize the adapter. These messages indicate that errors have occurred during the recovery process. This message does not indicate that the driver has terminated the recovery process. The driver will attempt to recover control of the adapter at periodic intervals. The driver will not redisplay the error message each time it attempts to recover from the error. If the driver is not able to recover from any of these errors after several minutes, call for service.

---

**229: The adapter alert condition has been corrected**

**Description:** This message indicates the successful recovery from one of the above run-time error conditions.

---

**388: Ethernet Media Port 1 Tx Carrier Sense Errors, check your cable**

**Description:** Check your cables, adapter cables, or concentrator.

---

**389: Ethernet Media Port 2 Tx Carrier Sense Errors, check your cable**

**Description:** Check your cables, adapter cables, or concentrator.

---

**390: Ethernet Media Port 3 Tx Carrier Sense Errors, check your cable**

**Description:** Check your cables, adapter cables, or concentrator.

---

**391: Ethernet Media Port 4 Tx Carrier Sense Errors, check your cable**

**Description:** Check your cables, adapter cables, or concentrator.



---

**395: Ethernet Media Port 1 Tx Carrier Sense Errors corrected**

**Description:** Problem is solved.

---

**396: Ethernet Media Port 2 Tx Carrier Sense Errors corrected**

**Description:** Problem is solved.

---

**397: Ethernet Media Port 3 Tx Carrier Sense Errors corrected**

**Description:** Problem is solved.

---

**398: Ethernet Media Port 4 Tx Carrier Sense Errors corrected**

**Description:** Problem is solved.

---

**Irrecoverable Errors**

If you receive an error that is not described in the preceding error-message lists, you might have an irrecoverable (fatal) error. The error message indicates that the adapter has experienced an irrecoverable run-time error.

To make the adapter functional, unload the drivers, then reload them. If unloading and reloading the drivers does not make the adapter functional, restart the computer and try again.

If the above procedures do not work, or if the message occurs again, record the error number and message string and call for service.

---

## Appendix D. Product Warranties, Licenses, and Notices

International Business Machines Corporation

Armonk, New York, 10504

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**Warranty Period\*:** Three Years

*\*Elements and accessories are warranted for three months. Contact your place of purchase for warranty service information.*

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  - c. inform IBM or your reseller of changes in a Machine's location, and
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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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