

Netfinity Gigabit Ethernet SX Adapter



User's Guide

Note

Before using this information and the product it supports, be sure to read the general information under Appendix C, "Notices" on page C-1.

Second Edition (August 1999)

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Safety Information



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



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



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



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



危險：安裝本產品之前，請先閱讀
"Caution: Safety Information--Read
This First" SD21-0030 手冊中所提
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使用電器設備的纜線及電源的安全程序。



Opasnost: Prije nego što počnete sa instalacijom produkta, pročítajte naputak o pravilima o sigurnom rukovanju u Upozorenje: Pravila o sigurnom rukovanju - Prvo pročítaj ovo, SD21-0030. Ovaj privitak opisuje sigurnosne postupke za priključivanje kabela i priključivanje na električno napajanje.



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



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



Gevaar Voordat u begint met het installeren van dit produkt, dient u eerst de veiligheidsrichtlijnen te lezen die zijn vermeld in de publikatie *Caution: Safety Information - Read This First*, SD21-0030. In dit boekje vindt u veilige procedures voor het aansluiten van elektrische apparatuur.



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



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



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



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



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



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



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Оваа брошура опишува безбедносни процедури за каблирање и вклучување на електрична опрема.



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



Uwaga:
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Zawiera ona warunki bezpieczeństwa przy podłączaniu do sieci elektrycznej i eksploatacji.



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



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Výstraha: Bezpečnostné predpisy - Prečítaj ako prvé,
SD21-0030. V tejto brožúrke sú opísané bezpečnostné postupy pre pripojenie elektrických zariadení.



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



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



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注意：

請先閱讀 - 安全資訊 SD21-0030

此冊子說明插接電器設備之電纜線的安全程序。

About This Manual

This manual explains how to install and service the IBM Netfinity Gigabit Ethernet SX Adapter.

Who Should Read This Manual

This manual is intended for use by installation technicians, network administrators, and service personnel.

How This Manual Is Organized

- Chapter 1, "Installation" describes installation and cabling procedures.
- Chapter 2, "Using IBMSet" describes how to configure your Ethernet Gigabit Adapter using the IBMSet configuration utility.
- Chapter 3, "Problem Determination" provides troubleshooting procedures and how to get information and assistance from IBM.
- Appendix A, "Hot Plug Support" provides information about hot plug support.
- Appendix B, "Adapter Specifications" provides the adapter's physical specifications.
- Appendix C, "Notices" describes product notices and provides warranty information.

Chapter 1. Installation

This chapter describes how to install the Netfinity Gigabit Ethernet SX adapter and test for proper operation.

Introduction

The IBM Netfinity Gigabit Ethernet SX Adapter is designed for a high level of network throughput, scalability, and availability protection for Ethernet network-attached PC servers. The Netfinity Gigabit Ethernet SX adapter can operate with 32-bit and 64-bit servers and efficiently use host CPU resources. You can also pair it with another Netfinity Gigabit Ethernet SX adapter to achieve a high level of communication integrity. If the Netfinity Gigabit Ethernet SX adapter is used with in a hot-plug-capable server, it can be serviced on-line thereby reducing downtime and maintenance costs.

Because the Netfinity Gigabit Ethernet SX adapter is fully compliant with the IEEE 802.3z Gigabit Ethernet standard, you can easily integrate it into your existing Ethernet and Fast Ethernet networks.

System Requirements

Before installing the Netfinity Gigabit Ethernet SX adapter, check your system for the following required or minimum configuration requirements:

- One open 32-bit or 64-bit busmaster PCI slot
- 64 MB of system memory
- The latest BIOS for your server
- Microsoft Windows NT 4.0, Novell NetWare 4.1x or 5.0, or UnixWare
- Windows NT requires Service Pack 4 or Service Pack 3 and the NDIS hotfix for AFT (Service Pack 4 includes the hotfix). NetWare 4.1x requires IntraNetWare support pack 5.0. NetWare 5.0 requires support pack 1.

- Fiber optic cabling and connector that meets 62.5/125um or 50/125um multimode specifications
- An IEEE 802.3z-compliant gigabit switch (such as the Intel Express Gigabit switch), or a buffered repeater

¹ Download the software updates from Microsoft and Novell sites, as listed here:

- **Microsoft Service Pack 4:**

<ftp://ftp.microsoft.com/bussys/winnt/winnt-public/fixes/usa/nt40/ussp4>

- **Microsoft Service Pack 3:**

<ftp://ftp.microsoft.com/bussys/winnt/winnt-public/fixes/usa/nt40/ussp3>

- **Microsoft NDIS Driver Hotfix:**

<ftp://ftp.microsoft.com/bussys/winnt/winnt-public/fixes/usa/nt40/hotfixes-postsp3/ndis-fix/>

- **Novell Support Pack 6 for NetWare 4.11 or Support Pack 1 for NetWare 5.0:**

<http://support.novell.com/misc/patlst.htm>

Install the Adapter

Perform the following steps to install the Netfinity Gigabit Ethernet SX adapter: (See Figure 1-1.)

1. Turn off and unplug your computer if it is not a Hot Plug system. Then remove its cover. For Hot Plug servers, see your server documentation.

Note: In the United Kingdom, you are required by law to disconnect the telephone line cable before disconnecting the ac power cord.

2. Remove the cover bracket from a 32-bit or 64-bit PCI busmaster slot. If your computer has a 64-bit PCI slot, use it. In a 32-bit PCI slot, the end of the edge connector will be exposed and not connected. Make sure the exposed end does not contact any conducting part of the motherboard.

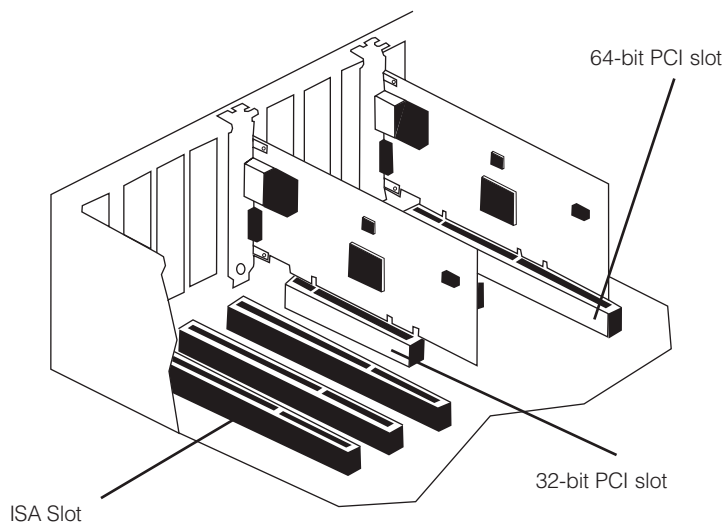


Figure 1-1. PCI Slot Locations

3. Carefully insert the Netfinity Gigabit Ethernet SX adapter into the slot until the adapter is firmly seated. Then secure the adapter bracket with a screw.
4. Repeat steps 2 and 3 for each adapter you want to install.

5. Replace the computer cover and plug in the power cord.
6. Turn the power on. The computer's PCI BIOS automatically assigns resources to the Netfinity Gigabit Ethernet SX adapter(s). If you get a PCI configuration error, see "PCI Configuration Troubleshooting" on page 3-3.

Attach the Network Cable

Remove and save the fiber optic connector cover. Insert a 1000Base-SX duplex type SC fiber optic connector into the ports on the Netfinity Gigabit Ethernet SX adapter bracket, as shown in Figure 1-2. The connector and ports are keyed for proper orientation. For maximum cable lengths, see Appendix B, “Adapter Specifications” on page B-1.

Note: The Netfinity Gigabit Ethernet SX adapter must be connected to an IEEE 802.3z-compliant gigabit switch, such as the Intel Express Gigabit Switch.

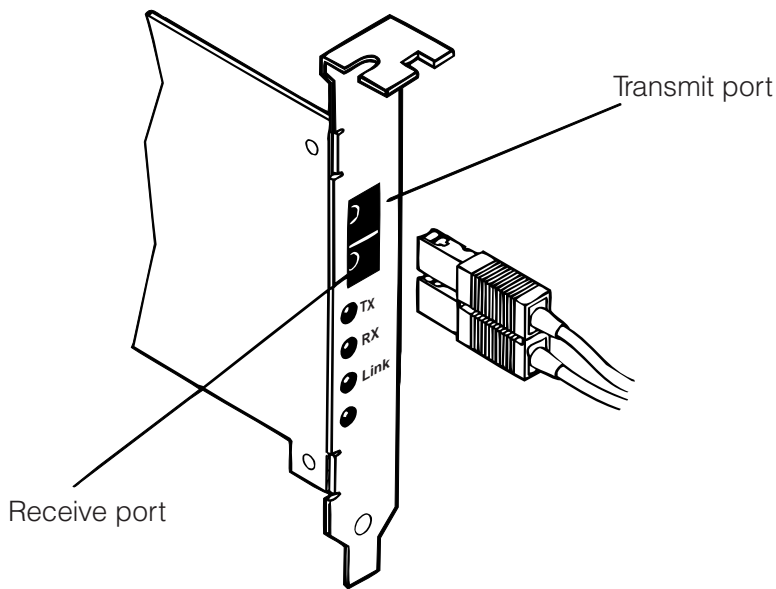


Figure 1-2. Attaching the Network Cable

Install the Network Drivers

Driver installation procedures are included for:

- Windows NT 4.0 servers/workstations
- Novell NetWare 4.1x or 5.0 servers
- UnixWare 2.x and 7.0

You can install drivers directly from the IBM CD or you can create a diskette to install from. See “Making a Diskette” on page 1-9.

Windows NT 4.0 Servers/Workstations

The NDIS 4.0 driver, IBMGEN4.SYS, is a high-performance driver that supports Windows NT 4.0 servers and workstations. This driver does not support Windows 95, 98, NT 3.51 or earlier versions of NT.

Note: Prior to installing, make sure you have upgraded to Service Pack 4 or Service Pack 3 with the NDIS hotfix. See “System Requirements” on page 1-1. If you are also installing NT 4.0 at this time, you must first create a diskette for the driver installation. See “Making a Diskette” on page 1-9.

To install the driver:

1. Select the **Network** icon in the Control Panel.
2. Go to the Adapters tab and select **Add**.
3. **Do not select an IBM adapter from the list.** Instead, click **Have Disk**.
4. Insert the Netfinity Gigabit Ethernet SX adapter CD into your CD-ROM drive.
5. Type the path to your CD-ROM drive in the dialog box and select **OK**. Then follow the instructions to install the drivers. When the adapter is added, it appears in the Network adapters list.
6. Select **OK** and then **Close**. When prompted, restart Windows NT.

Novell NetWare 4.1x Servers

Use the NetWare Install program to install the IBM Netfinity Gigabit Ethernet SX adapter driver. The following procedure is a condensed description of the installation process.

Note: Prior to installing, either load DOS or NetWare drivers for your server's CD-ROM drive or create a diskette from the IBM CD on a different computer. See the readme.txt file in the root of the IBM CD for details.

1. From the NetWare console, type **load install** and press **Enter**.
2. From the Installation Options screen, choose **Driver options** and press **Enter**.
3. Choose **Configure network drivers** and press **Enter**. If any drivers are already loaded, a list of them appears.
4. Choose **Select an additional driver** and press **Enter**. A list of drivers appears.
5. Insert the IBM diskette or IBM CD and choose Install an unlisted driver by pressing **Insert**.
6. Specify the correct path to your media if necessary by pressing **F3**. Press **Enter** to search the diskette or the CD-ROM.
7. The driver name is displayed: IBM Netfinity Gigabit Ethernet SX Adapter. Press **Enter** to select it.
8. The next panels ask for frame and protocol types. Use the arrow keys to select specific items or choose the defaults. Select **Save parameters and load driver** to continue.
9. To complete the driver installation process, go back to the Installation Options panel by pressing **Esc** several times.
10. Select **Exit** to return to the server console prompt.

Notes:

1. If the adapter cannot transmit or receive following the installation, you might need to modify the frame type in the AUTOEXEC.NCF file.
2. If you are installing multiple Netfinity Gigabit Ethernet SX adapters, repeat the driver installation process for each new adapter in the server.

Novell NetWare 5.0 Servers

Use the NetWare Install program to install the IBM Netfinity Gigabit SX adapter driver. Although a version of the driver ships with NetWare 5.0 and will be loaded when you install the card, the following steps provide instructions for installing the newer driver that ships on the IBM CD-ROM.

Note: Prior to installing, either load DOS or NetWare drivers for your server's CD-ROM drive or create a diskette from the IBM CD-ROM on a different computer. See the readme.txt file in the root of the IBM CD-ROM for details.

1. From the NetWare console, type **NWCONFIG** and press **Enter**.
2. From the Installation Options panel, select **Driver options** and press **Enter**.
3. Select **Select an additional driver** and press **Enter**. A list of drivers appears.
4. Insert the IBM diskette that you created and select **Install an unlisted driver** by pressing **Insert**.
5. Specify the correct path to your media if necessary by pressing **F3**. Press **Enter** to search the diskette.
6. The driver name is displayed: IBM (R) Netfinity Gigabit Ethernet SX Adapter. Press **Enter** to select it.
7. The next panels ask for frame and protocol types. You don't need to enter this information. To complete the driver installation process, go back to the Installation Options panel by pressing the **Esc** key several times.
8. Select **Exit** to return to the server console prompt.

9. Restart the server.

Notes:

1. If the adapter cannot transmit or receive following the installation, you might need to modify the frame type in the AUTOEXEC.NCF file.
2. If you are installing multiple IBM Netfinity Gigabit Ethernet SX adapters, repeat the driver installation process for each new adapter in the server.

UnixWare 2.x and 7

For the UnixWare 2.x installation procedure, see the readme.txt file in the \Unix\UW2 directory on the IBM CD-ROM.

For the UnixWare 7 installation procedure, see the readme.txt file in the \Unix\UW7 directory on the IBM CD-ROM.

Windows NT 3.51 Servers

The Netfinity Gigabit Ethernet SX adapter supports Windows NT 3.51 in a limited capacity only with the NDIS3 driver. Under Windows NT 3.51, teaming features are not available and TX/RX performance is well below Windows NT 4.0, using the NDIS4 driver. For installation information, see the readme file, MSNT351.TXT in the \info directory on the IBM CD-ROM.

Making a Diskette

To make a diskette of the drivers only for NT, NetWare or Unix, use the MAKEDISK utility. Place a formatted diskette in your drive. At the command line type:

MAKEDISK A: OS

and press **Enter** where A is your diskette drive letter and OS is the operating system vendor.

Test the Adapter (Optional)

IBM's diagnostic software lets you test the adapter to see if there are any problems with the adapter hardware, the cabling, or the network connection. You should run the diagnostic tests every time you install an adapter. You can also use diagnostics to isolate problems during troubleshooting.

Windows NT

1. Double-click the **Network** icon in the Control Panel. Then select the **Adapters** tab and select **Properties** to start the IBMSet utility.
2. In IBMSet, select **Netfinity Gigabit Ethernet SX adapter**.
3. Select the **Diagnostics** tab. A list of available tests is displayed.
4. Select **Run Tests**. You can also select or deselect individual tests with the check boxes. If an error is detected, information about the error is displayed.
5. Repeat steps 2–4 for each Netfinity Gigabit Ethernet SX adapter installed in the computer.

NetWare

1. If this computer already has Netfinity Gigabit Ethernet SX network drivers installed, shut down the server and boot to DOS.
2. Insert the IBM CD-ROM, switch to that drive, and at the DOS prompt, type: **DIAG1000**, and press **Enter**.
3. If you have more than one IBM Netfinity Gigabit Ethernet SX adapter in your computer, an Adapter Selection menu appears. From that menu, select the **Netfinity Gigabit Ethernet SX adapter** that you want to test.
4. From the Main menu, select **Test adapter** and then select the type of test that you want to run.
5. Repeat steps 3 and 4 for each Netfinity Gigabit Ethernet SX adapter installed in the computer.

Responder Testing

The Netfinity Gigabit Ethernet SX adapter can send test messages to another Ethernet adapter on the same network. To set up this type of responder test in Windows NT, refer to the IBMSet online help.

For NetWare, follow the online instructions in the diagnostic program.

Chapter 2. Using IBMSet

When you install the Netfinity Gigabit Ethernet SX adapter Windows NT drivers, an advanced configuration utility called IBMSet is also installed. Users running Windows NT 4.0 can easily test hardware, set advanced adapter features, and set standard features with IBMSet.

IBMSet runs when you select **Properties** from the Network control panel. The main IBMSet menu is similar to Figure 2-1. To configure Teaming features (Adapter Fault Tolerance, Adaptive Load Balancing, and Gigabit EtherChannel), advanced driver settings, and other parameters, read the sections in this manual and refer to the IBMSet online Help topics by selecting **Help**.

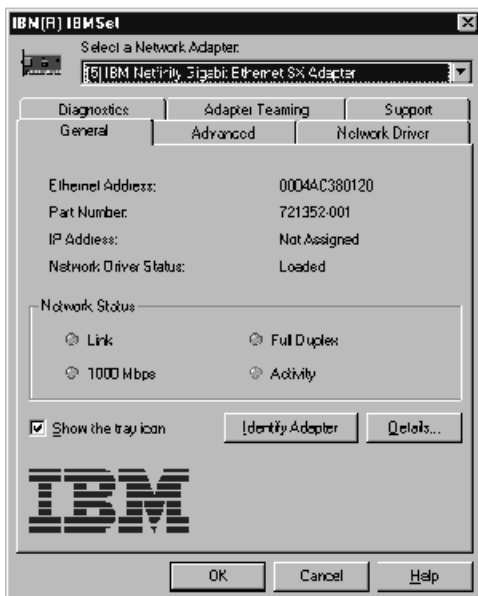


Figure 2-1. Main IBMSet Menu

Join a Virtual LAN

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

VLANs offer the ability to group users and stations together into logical workgroups. This can simplify network administration when connecting clients to servers that are geographically dispersed across the building, campus, or enterprise network.

Normally, VLANs are configured at the switch and any computer can be a member of one VLAN per installed network adapter. The Netfinity Gigabit Ethernet SX adapter supercedes this by communicating directly with a switch, allowing multiple VLANs on a single adapter (up to 64 VLANs).

To set up VLAN membership, your adapter must be attached to a switch with IEEE VLAN capability. You also need to be using Windows NT 4.0 or higher. The Netfinity Gigabit Ethernet SX adapter does not support VLANs in NetWare.

For more information on VLANs, see your switch documentation or the VLAN readme files on the IBM CD-ROM.

General Configuration Notes

- VLANs require NT 4.0 with Service Pack 4 or Service Pack 3.0 and the NDIS driver hotfix from Microsoft.
- In Windows NT, VLANs cannot be implemented on adapters that have been configured for teaming options.

To Join a VLAN from Windows NT 4.0:

1. Create a VLAN on the switch and configure the Netfinity Gigabit Ethernet SX adapter port to send and receive tagged frames. Use the parameters that you assign there to join the VLAN from the server. See your switch documentation for more information.
2. In the Control Panel, double-click the **Network** icon.

3. In the Adapters tab, select the adapter that you want to be on a VLAN and select **Properties**.
4. In IBMSet, select **Join VLAN**. Note that VLANs cannot be assigned to adapters that are already in an Adapter Teaming option.
5. Enter the VLAN ID and VLAN Name. The VLAN ID must match the VLAN ID on the switch. Valid ID range is 0-4095. The VLAN Name is for informational purposes only and does not have to match the name on the switch.
6. Select **Join VLAN**. Repeat steps 3 through 5 for each VLAN that you want the server to join. The VLANs that you add are listed on the Adapters tab.

Choose Adapter Teaming Options

The Netfinity Gigabit Ethernet SX adapter teaming features include fault tolerance, load balancing, and increased throughput options when running Windows NT 4.0 or NetWare 4.1x.

Adapter Fault Tolerance (AFT) provides automatic redundancy for your adapter. If the primary adapter fails, the secondary takes over. Adapter Fault Tolerance supports two to four adapters per team.

Adaptive Load Balancing (ALB) allows balancing the transmission data flow among two to four adapters. Also includes the AFT option. Works with any 1000BASE-SX switch.

Gigabit EtherChannel (GEC) creates a team of two or four adapters to increase transmission and reception throughput. Also includes AFT option. Requires a switch with GEC capability.

General Configuration Notes

- Windows NT versions prior to 4.0 do not support adapter teaming options.
- Adapter Teaming options require NT 4.0 with Service Pack 4 or Service Pack 3.0 and the NDIS driver hotfix from Microsoft.

- In Windows NT, teaming options cannot be implemented on adapters that have been configured for VLANs. NetWare can support teaming options and VLANs on the same adapters.

Adapter Fault Tolerance Overview

Adapter Fault Tolerance (AFT) provides the safety of an additional backup link between the server and buffered repeater or switch. In the case of buffered repeater or switch port, cable, or adapter failure, you can maintain uninterrupted network performance through an adapter team.

Adapter Fault Tolerance is implemented with a primary adapter and one or more backup, or secondary, adapters. During normal operation, the backup adapters will have transmit disabled. If the link to the primary adapter fails, the link to the secondary adapter automatically takes over.

To use Adapter Fault Tolerance, you must have at least two Netfinity Gigabit Ethernet SX adapters installed in your server or workstation and linked to the same network.

Setting up AFT in Windows NT 4.0

1. See software requirements for AFT in "System Requirements" on page 1-1.
2. Double-click the **Network** icon in the Control Panel.
3. On the Adapters tab, select a Netfinity Gigabit Ethernet SX adapter that will be in the team and select **Properties**.
4. Select the **Adapter Teaming** tab in the IBMSet window.
5. Select **Add Adapter to a Team**.
6. The Teaming Wizard starts. Follow the wizard steps for assigning adapters to a team. AFT supports up to four Netfinity Gigabit Ethernet SX adapters per team. Note that you can specify a Preferred Primary adapter, which in most cases will be your highest bandwidth adapter. See the IBMSet help for more information.

7. Select **OK** and then select **Close** to finish. When prompted, restart your computer.

Configuring Properties

The default AFT properties are suitable for most applications. To change the properties, use the following procedure:

1. Run IBMSet.
2. Pull down the adapter list and select the desired AFT team.
3. Select the **Advanced Settings** tab.
4. Adjust the parameters as required. Select **Help** for more information.

Deleting a Team

Note: The frame type for each adapter in the team will revert to Auto when a team is deleted.

1. Double-click the **Network** icon in the Control Panel.
2. On the Adapters tab, select the AFT team to delete.
3. Select **Remove**. A confirmation dialog box appears. Select **Yes**.
4. Select **Close**. Restart Windows NT when prompted.

Setting up AFT in NetWare

1. Copy the following lines from the EXAMPLES.TXT file (on the Netfinity Gigabit Ethernet SX adapter CD-ROM) into the appropriate file. These commands assume the IBMAFT.NLM and IBMGE.LAN files are in the system directory (SYS\SYSTEM) of your server. (Files must be copied from the Netfinity Gigabit Ethernet SX adapter CD-ROM to your server hard drive.)

Note: The Adapter Fault Tolerance driver (IBMAFT.NLM) must be loaded before the IBM Netfinity Gigabit Ethernet SX adapter driver, IBMGE.LAN, or any other LAN driver.

Copy these lines into the AUTOEXEC.NCF file.

```
;- Load Adapter Fault Tolerance  
load ibmaft
```

```
;- Load LAN driver on 1st adapter  
load ibmge slot=a frame=ethernet_802.2 name=pri_802.2
```

```
;- Load LAN driver on 2nd adapter  
load ibmge slot=b frame=ethernet_802.2 name=sec_802.2
```

```
;- Bind ipx to 1st adapter. Note: do not bind protocols  
;- to 2nd adapter  
bind ipx pri_802.2 net=2
```

```
;- Set the 2nd adapter to be a Fault Tolerance Partner  
;- to the 1st adapter  
aft bind a b
```

where slot= the slot in which your Netfinity Gigabit Ethernet SX adapter is installed, such as 7. If you do not know the number, load the driver without it. NetWare will prompt you with supported PCI slot numbers.

where a is the primary adapter's slot number.

where b is the secondary adapter's slot number.

where frame= the frame type of the network segment that the server is on. The frame type must be the same for the primary and all secondary adapters.

Note: You can specify a Preferred Primary adapter, which in most cases will be your highest bandwidth adapter. See the NW411.TXT file on the IBM CD-ROM for more information.

2. Modify the lines to match your server's requirements.
3. Save the AUTOEXEC.NCF file and restart your server.

Deleting a Team

To remove a team in AFT or ALB mode, comment out the lines above and restart the server.

Adaptive Load Balancing Overview

Adaptive Load Balancing (ALB) is a simple and efficient way to balance the transmission load of your server among two to four Netfinity Gigabit Ethernet SX adapters. With ALB, you group Netfinity Gigabit Ethernet SX adapters in teams. The ALB software continuously analyzes transmit loading on each adapter and balances the rate across the adapters as needed. Adapter teams

configured for ALB also provide the benefits of AFT. Received data is not load-balanced.

Note: For maximum benefit, ALB should not be used under NetBEUI and some IPX environments. For a list of specific IPX environments supported, see “Teaming Options Supported by OS and Protocol” on page 2-11.

To use ALB, your adapters must be configured as a team in your server and be linked to the same network.

Setting up ALB in Windows NT 4.0

1. Double-click the **Network** icon in the Control Panel.
2. On the Adapters tab, select an adapter that will be in the team and select **Properties**.
3. Select **Adapter Teaming** in the IBMSet window.
4. Select **OK** when prompted. You will see the Adapter Teaming Configuration window.
5. Follow the instructions to assign adapters to a team.
6. Select **Load Balancing** in the Team Function area. ALB supports up to four Netfinity Gigabit Ethernet SX adapters per team.
7. Select **OK** and then select **Close** to finish. When prompted, restart your server.

Deleting a Team

Note: The frame type for each adapter in the team will revert to Auto when a team is deleted.

1. Double-click the **Network** icon in the Control Panel.
2. On the Adapters tab, select the ALB team to delete.
3. Select **Remove**. You will see a confirmation dialog box. Select **Yes**.
4. Select **Close**. Restart when prompted.

Setting up ALB in NetWare

1. Copy the following lines from the EXAMPLES.TXT file (on the Netfinity Gigabit Ethernet SX adapter CD-ROM) into the appropriate file. These commands assume that the IBMAFT.NLM and IBMGE.LAN files are in the system directory (SYS\SYSTEM) of your server. (Files must be copied from the Netfinity Gigabit Ethernet SX adapter CD-ROM to your server hard drive.)

Note: The Adaptive Load Balancing driver (IBMAFT.NLM) must be loaded before the Netfinity Gigabit Ethernet SX adapter driver, IBMGE.LAN, or any other LAN driver.

Copy these lines into the AUTOEXEC.NCF file.

```
;- Load Adaptive Load Balancing  
load ibmaft
```

```
;- Load LAN driver on 1st adapter  
load ibmge slot=a frame=ethernet_802.2 name=pri_802.2
```

```
;- Load LAN driver on 2nd adapter  
load ibmge slot=b frame=ethernet_802.2 name=sec_802.2
```

```
;- Bind ipx to 1st adapter  
bind ipx pri_802.2 net=2
```

```
;- Set the 2nd adapter to be a Load Balancing Partner to  
;- the 1st adapter  
ibmaft balance a b
```

where slot= the slot your Netfinity Gigabit Ethernet SX adapter is installed in. If you don't know the number, load the driver without it. NetWare will prompt you with available PCI device numbers. a is the primary adapter's slot number and b is the secondary adapter's slot number.

where frame= the frame type of the network segment the server is on. Frame type must be the same for the primary and all secondary adapters.

2. Modify the lines to match your server requirements.

3. Save the AUTOEXEC.NCF file and restart your server.

Deleting a Team

To remove a team in AFT or ALB mode, comment out the lines above and restart the server.

Set up Gigabit EtherChannel

Gigabit EtherChannel (GEC) is a performance technology developed by Cisco to increase throughput between switches. IBM has implemented GEC on server adapters to increase your server throughput. Unlike ALB, GEC can be configured to increase both transmission and reception channels between your server and switch. GEC works only with GEC-enabled Cisco switches, such as the Catalyst 5000 series. As you add adapters to your server, you can group them in teams, with a maximum of four Netfinity Gigabit Ethernet SX adapters. The GEC software continuously analyzes loading on each adapter and balances network traffic across the adapters as needed. Adapter teams configured for GEC also provide the benefits of AFT.

To use GEC, you must have two or four Netfinity Gigabit Ethernet SX adapters configured as a GEC team in your server or workstation and linked to the same GEC-enabled Cisco switch.

Setting up GEC in Windows NT 4.0

1. Double-click the **Network** icon in the Control Panel.
2. On the Adapters tab, select a IBM Netfinity Gigabit Ethernet SX Adapter that will be in the team and select **Properties**. Do not use an adapter that is on a VLAN.
3. In the IBMSet window, select the **Adapter Teaming** tab.
4. Select the **Add Adapter to a Team** button.
5. The Teaming Wizard starts. Follow the wizard steps for assigning adapters to a team. Note that you can specify a Preferred Primary adapter, which in most cases will be your highest bandwidth adapter. See the IBMSet Help for more information.
6. Select **OK**, then select **Close** to finish. When prompted, restart your computer.

Deleting a Team

1. Double-click the **Network** icon in the Control Panel.
2. On the Adapters tab, select the GEC team to delete.
3. Select **Remove**. A confirmation dialog box appears. Click **Yes**.
4. Select **Close**. Restart when prompted.

Setting up GEC in NetWare

1. Copy the following lines from the EXAMPLES.TXT file (on the Netfinity Gigabit Ethernet SX adapter CD-ROM) into the appropriate file. These commands assume that the IBMAFT.NLM and IBMGE.LAN files are in the system directory (SYS\SYSTEM) of your server. (Files must be copied from the Netfinity Gigabit Ethernet SX adapter CD-ROM to your server hard drive.)

Note: The Gigabit EtherChannel driver (IBMAFT.NLM) must be loaded before the Netfinity Gigabit Ethernet SX adapter driver, IBMGE.LAN, or any other LAN driver.

Copy these lines into the AUTOEXEC.NCF file.

```
;- Load Gigabit EtherChannel  
load ibmaft
```

```
;- Load LAN driver on 1st adapter  
load ibmge slot=a frame=ethernet_802.2 name=pri_802.2
```

```
;- Load LAN driver on 2nd adapter  
load ibmge slot=b frame=ethernet_802.2 name=sec_802.2
```

```
;- Bind ipx to 1st adapter  
bind ipx pri_802.2 net=2
```

```
;- Set the 2nd adapter to be a Gigabit EtherChannel Partner  
;- to the 1st adapter  
ibmaft fec a b
```

where slot= the slot your Netfinity Gigabit Ethernet SX adapter is installed in. If you don't know the number, load the driver without

it. NetWare will prompt you with available PCI device numbers. a is the primary adapter's slot number, and b is the secondary adapter's slot number.

where frame= the frame type of the network segment that the computer is on.

2. Modify the lines to match your server requirements.
3. Save the AUTOEXEC.NCF file and STARTUP.NCF files, and restart your server.

Deleting a Team

To remove a team, comment out the lines above and restart the server.

Teaming Options Supported by OS and Protocol

Table 2-1. Supported Protocols

	Windows NT 4.0	NetWare 4.1x
AFT	IP, NetBEUI, IPX (NCP), IPX (NetBIOS)	IP, IPX (NCP)
ALB	IP, IPX (NCP)	IP, IPX (NCP)
GEC	IP, NetBEUI, IPX (NCP), IPX (NetBIOS)	IP, IPX (NCP)

Note: Only IPX packets type NCP (NetWare Core Protocol) are load balanced.

Chapter 3. Problem Determination

No Link or TX/RX Activity

If you cannot link to your switch, try the following suggestions.

1. Check the LED lights on the adapter

- TX** ON indicates that the adapter is sending data.
- RX** ON indicates that the adapter is receiving data.
- LINK** ON indicates that the adapter is connected to a valid link partner and is receiving link pulses.
- PRO** Programmable LED. Identifies the adapter by blinking. Use the Identify Adapter button in IBMSet to control blinking. See IBMSet help for more information.

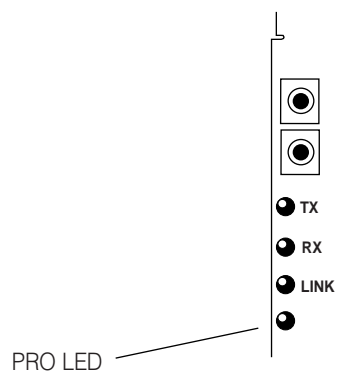


Figure 3-1. LED Panel

If the LINK light is not on, check all connections at the adapter and link partner. Make sure that the link partner is set to 1000 Mbps and full duplex and that the drivers are loaded.

2. Make sure that the cable is installed correctly.

The network cable must be securely attached at all connections. If the cable is attached but the problem persists, try a different cable.

3. Test the adapter.

Run the adapter and network tests described in “Test the Adapter (Optional)” on page 1-10.

4. Check the “Common Problems and Solutions” on page 3-3 table and try the recommended solutions.

If the problem persists, check the latest news in the NEW-INFO.TXT file in the root directory of the CD-ROM or check the IBM Support web site at:

<http://www.ibm.com/networking/support>

Search for IBM Netfinity Gigabit Ethernet SX Adapter.

Common Problems and Solutions

Problem	Solution
Your computer cannot find the Netfinity Gigabit Ethernet SX adapter	<ul style="list-style-type: none">• Make sure the adapter is seated firmly in the slot.• Try a different PCI busmaster slot. Refer to your server documentation to identify busmaster slots.• Try a different Netfinity Gigabit Ethernet SX adapter.
Diagnostics pass but the connection fails.	<ul style="list-style-type: none">• Try running the Sender-Responder diagnostic test.• Make sure the network cable is securely attached.
An adapter stopped working after you installed the IBM Netfinity Gigabit Ethernet SX Adapter	<ul style="list-style-type: none">• Make sure that the cable is connected to the IBM Netfinity Gigabit Ethernet SX Adapter and not to another adapter.• Check for a resource conflict. See "PCI Configuration Troubleshooting."• Make sure both adapters are seated firmly in the slot.• Check all cables.
The adapter stopped working without apparent cause	<ul style="list-style-type: none">• Try reseating the adapter.• The network driver files might be damaged or deleted. Reinstall the drivers.• Try a different IBM Netfinity Gigabit Ethernet SX Adapter.
LINK LED does not light	<ul style="list-style-type: none">• Make sure that you have loaded the adapter driver.• Check all connections at the adapter and the buffered repeater or switch.• Try another port on the buffered repeater or switch.• Make sure that the buffered repeater or switch port is configured for 1000 Mbps and full duplex.• Try changing the auto-negotiation setting on the link partner, if possible.
RX or TX LED does not light	<ul style="list-style-type: none">• Make sure that you have loaded the network drivers.• Network might be idle; try logging in from a workstation.• The adapter is not transmitting or receiving data; try another adapter.

PCI Configuration Troubleshooting

Some PCI computers require additional steps to configure a PCI adapter. Try the following if you are having problems configuring the adapter:

- **Disable PnP in the BIOS.** In some computers, you might need to use the PCI BIOS Setup program to disable Plug and Play (PnP) if resources are not properly assigned to adapters and other add-in cards.

- **Enable the PCI slot.** In some PCI computers, you might need to use the PCI BIOS Setup program to enable the PCI slot. This is especially common in PCI computers with the PhoenixBIOS.
- **Enable the slot for busmaster.** You must install the IBM Netfinity Gigabit Ethernet SX Adapter in a busmaster slot. Some PCI BIOS Setup programs require you to enable the slot for busmaster/master. Check your PCI BIOS Setup program and the computer's documentation to make sure the slot is set for busmaster/master.
- **Configure the slot for level-triggered interrupts.** The PCI slot the adapter is using must be configured for level-triggered interrupts instead of edge-triggered interrupts. Check your PCI BIOS Setup program to make sure triggering is set up.
- **Reserve interrupts and/or memory addresses for ISA adapters.** This prevents PCI cards from trying to use the same settings as ISA cards. Check your PCI BIOS Setup program; there might be IRQ options such as Enable for ISA or Disable for PCI.

The following are some examples of PCI BIOS Setup program parameters:

PCI slot #:	Slot where the adapter is installed (1-3)
Master:	ENABLED
Slave:	ENABLED
Latency timer:	40–80
Interrupt:	Choose any one of several that the BIOS Setup provides.
Edge-level:	Level

The exact wording of the parameters varies with different computers.

Support

Where to go for more information:

Readme Files

For more information about installing NetWare and Microsoft Windows NT drivers, refer to the help files on the CD-ROM. To view these files, go to the \info folder on the driver's CD-ROM. Open the files with any text editor.

Online Services

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

<http://www.ibm.com/networking/support>

For more information about IBM Netfinity servers, go to

<http://www.pc.ibm.com/us/netfinity>

Latest News

Look for the latest news in NEW-INFO.TXT in the root directory of the CD-ROM. This file provides useful tips and the latest information about the adapter compatibility and installation.

Appendix A. Hot Plug Support

The IBM Netfinity Gigabit Ethernet SX Adapters are enabled for use in selected servers equipped with hot plug capability, including IBM Netfinity Hot Plug-capable servers, running Windows NT 4.0 and NetWare 5.0, 4.2, or 4.1x.

For NetWare Hot Plug, make sure that you have the latest NetWare support pack before setting up hot plug. Refer to your server's documentation for more information on setting up and using NetWare Hot Plug.

For Windows NT 4.0 Hot Plug with IBM Netfinity Hot Plug-capable servers, the IBM Netfinity Gigabit Ethernet SX Adapters, at this time, support the Hot Add and Hot Swap functions.

Hot Add

With the server running, an adapter can be installed to an open hot plug PCI slot without having to shutdown and reboot the server. Multiple adapters can be hot added to multiple open hot plug PCI slots.

Hot Swap

With the server running and with an adapter fault tolerant team in place (also known as a fail-over team), if one of the adapters in the team fails, you can swap the failing adapter with a new adapter without having to shut down or reboot the server.

For details on how to set up and run IBM Hot Plug, follow the Readme and instructions in the Hotplug directory of the Installation and Drivers CD shipped with the adapter.

You can also visit the IBM Support web site at:

<http://www.ibm.com/networking/support>

Notes:

1. If you replace an adapter in a hot plug slot, do not place the removed adapter back into the same network until the server has rebooted. The two adapters might have the same Ethernet address and create a resource conflict.
2. Hot Swap is only for replacing a failing adapter in an existing adapter team in your server. If you form a new adapter team, the server will have to be rebooted for Hot Swap to work with the new adapter team.

Appendix B. Adapter Specifications

PCI Bus Compatibility	PCI 2.1 specification, 32-bit and 64-bit
Connector	SC duplex connector
Power requirements	1.0 A @ +5 V dc (5 watts)
Interrupt	INTA
LEDs	Link, Transmit, Receive, Programmable
Dimensions	6.42 in. x 3.25 in. excluding bracket (16.30 cm x 8.26 cm)
Weight	2.82 oz. (80 grams)
Operating Temperature	32-131 deg. F(0-55 C)
Standards Conformance	IEEE 802.3z IEEE 802.3 IEEE 802.3x IEEE 802.1p IEEE 802.1q PCI 2.1 Specification
Cabling for 1000BASE-SX	850 nanometer fiber: 50 micron multimode=550 meters 62.5 micron multimode=220 meters
Duplex Mode	Full duplex

Appendix C. Notices

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Statement of Compliance with the United Kingdom Telecommunications Act 1984

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connections to the public telecommunications systems in the United Kingdom.

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Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an IBM authorized dealer or service representative for help.

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class B Emission Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

Avis de conformité aux normes d'Industrie Canada

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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Der Aussteller der Konformitätserklärung ist die

IBM Deutschland Informationssysteme GmbH
70548 Stuttgart

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

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取扱説明書に従って正しい取り扱いをして下さい。

Class 1 LED Statement

Class 1 LED Product

LED Klasse 1

LED Klass1

Luokan 1 Ledlaite

Appareil À LED de Classe 1

To IEC 825-1:1993

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Machine IBM Netfinity Gigabit Ethernet SX Adapter

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For a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Some of these transactions (called "Net-Priced" transactions) may include additional parts and associated replacement parts that are provided on an exchange basis. All removed parts become the property of IBM and must be returned to IBM.

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If a Machine does not function as warranted during the warranty period, IBM in its sole discretion will repair, replace it (with a Machine that is at least functionally equivalent), or refund the purchase price. To obtain coverage under the warranty you may be required to present proof of purchase.

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Depending on the Machine, the service may be 1) a "Repair" service at your location (called "On-site") or at one of IBM's or a reseller's service locations (called "Carry-in") or 2) an "Exchange" service, either On-site or Carry-in.

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2. where applicable, before service is provided —
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 - b. secure all programs, data, and funds contained in a Machine,
 - c. inform IBM or your reseller of changes in a Machine's location, and
 - d. for a Machine with exchange service, remove all features, parts, options, alterations, and attachments not under warranty service. Also, the Machine must be free of any legal obligations or restrictions that prevent its exchange; and
3. be responsible for loss of, or damage to, a Machine in transit when you are responsible for the transportation charges.

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