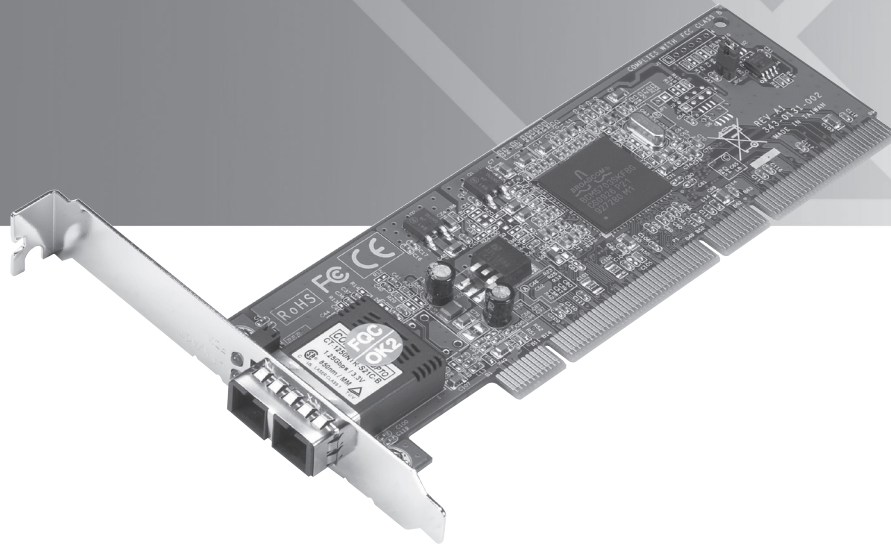# BLACK BOX®
NETWORK SERVICES

Gigabit 1000BASE-SX/LX PCI 64-/32-Bit Fiber NICs

Fully complies with all IEEE 802.3z and 1000BASE-SX/LX standards to provide a reliable Gigabit Ethernet connection.

Includes standard and low-profile brackets.
Features preboot Execution Environment (PXE),
Remote Program Load (RPL), Bootstrap Protocol (BOOTP),
and Multi-Boot Agent (MBA).

Customer Support Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500) •
FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746 •
Mailing address: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018 •
Web site: www.blackbox.com • E-mail: info@blackbox.com

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or go to **blackbox.com** and click on "Talk to Black Box."
You'll be live with one of our technical experts in less than 20 seconds.

Federal Communications Commission and Industry Canada Radio Frequency Interference Statements

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

Instrucciones de Seguridad
(Normas Oficiales Mexicanas Electrical Safety Statement)

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.

2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.

3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.

4. Todas las instrucciones de operación y uso deben ser seguidas.

5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.

6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.

7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.

8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.

9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.

10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:
    A: El cable de poder o el contacto ha sido dañado; u
    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o
    C: El aparato ha sido expuesto a la lluvia; o
    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
    E: El aparato ha sido tirado o su cubierta ha sido dañada.

Table of Contents

1. Specifications

Bus Slot: 64-/32-bit PCI 2.2 Compliant

Data Transfer Mode/Speed: Full-duplex with NWay flow control; 1000-Mbps speed

Diagnostics LEDs on Bracket: LINK/ACT; FDX

Emissions: Complies with EMI Standard; FCC Class A; CE Mark

Fiber Optic Cable: 62.5/125, 50/125m multimode

Software Support: Windows® 2000, Windows 2003, Windows XP. Windows NT 4.0, Windows Vista®, Novell® NetWare 4.x, Linux® driver, Unix®, Solaris™, PXE and RPL Boot ROM

Standards: IEEE 802.3z Gigabit Ethernet 1000BASE-SX/LX; IEEE 802.3x Full-Duplex Flow Control; IEEE 802.3ad Link Aggregation; IEEE 802.1Q VLAN; IEEE 802.1p Quality of Service

Connectors: LH1660C-SC: 850-nm SC multimode;
LH1660C-LC: 850-nm LC multimode

Operating Temperature: 32 to 122° F (0 to 50° C)

Humidity: 5 to 90%

Power Requirement: Max. 10W, +5VDC @ 2A

2. Overview

2.1 Introduction

The LH1660C-SC and LH1660C-LC are Gigabit Ethernet cards that fully comply with all IEEE 802.3z and 1000BASE-SX/LX standards. Two LED indicators (LINK/ACT and FDX) on the bracket monitor the board link, activities and full-duplex status.

These two Gigabit PCI cards support Preboot Execution Environment (PXE), Remote Program Load (RPL), and Bootstrap Protocol (BOOTP). Multi-Boot Agent (MBA) is a software module that enables your networked system to boot with the images provided by remote systems across the network.

2.2 Features

• High bandwidth 1000-Mbps network speed

• Supports full-duplex mode

• Supports IEEE 802.3x full-duplex flow control

• Supports 32-/64-bit PCI bus

• Complies with PCI 2.2 Interface

• Supports jumbo frame up to 9014 Bytes

• Supports high-level VLAN filtering function and 802.3ad link aggregation (LACP)

• Supports IP headers and TCP/UDP checksums offload

• Supports on-board screening of VLAN tagged Ethernet frames

2.3 What's Included

Your package should include the following items. If anything is missing or damaged, please contact Black Box Technical Support at 724-746-5500 or info@blackbox.com.

• Gigabit 1000BASE-X PCI 64/32-Bit Fiber NIC

• Software driver and user's manual on CD-ROM

2.4 LED Description

Table 2-1. LED indicators.

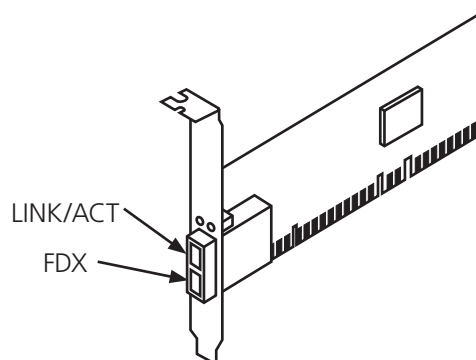| LED	Color	Function
LINK/ACT	Green	Lit when cable connection is good and speed is 1000 Mbps.
		Blinks when any traffic is present.
FDX	Green	Lit when full-duplex mode is active.

Figure 2-1. Diagnostic LEDs and Bracket.

3. Hardware Installation

Use the following instructions to install the Gigabit Ethernet adapter in most systems. Refer to the manuals that were supplied with your system for details about performing these tasks on your particular system.

WARNING: The edges of metal panels can cut skin. Be careful not to slide your finger or hand along any interior metal edge of the computer.

CAUTION: This product contains components that can be damaged by electrostatic discharge (ESD). To reduce the chance of ESD damage, work over a non-carpeted floor, use a static dissipative work surface (such as a conductive foam pad), and wear an ESD wrist strap connected to a grounded surface.

To install the fiber NIC, follow these steps:

1. High voltage inside the system presents a safety hazard. Make sure the power is off before removing the PC cover.

WARNING: Before installing the NIC, make sure the system power is OFF, the PC is unplugged from the power outlet, and that proper electrical grounding procedures have been followed.

2. Remove the PC cover and select any empty PCI 32-/64-bit slot. See Figure 3-1. If you do not know how to identify a PCI 32-/64-bit slot, refer to your PC documentation.
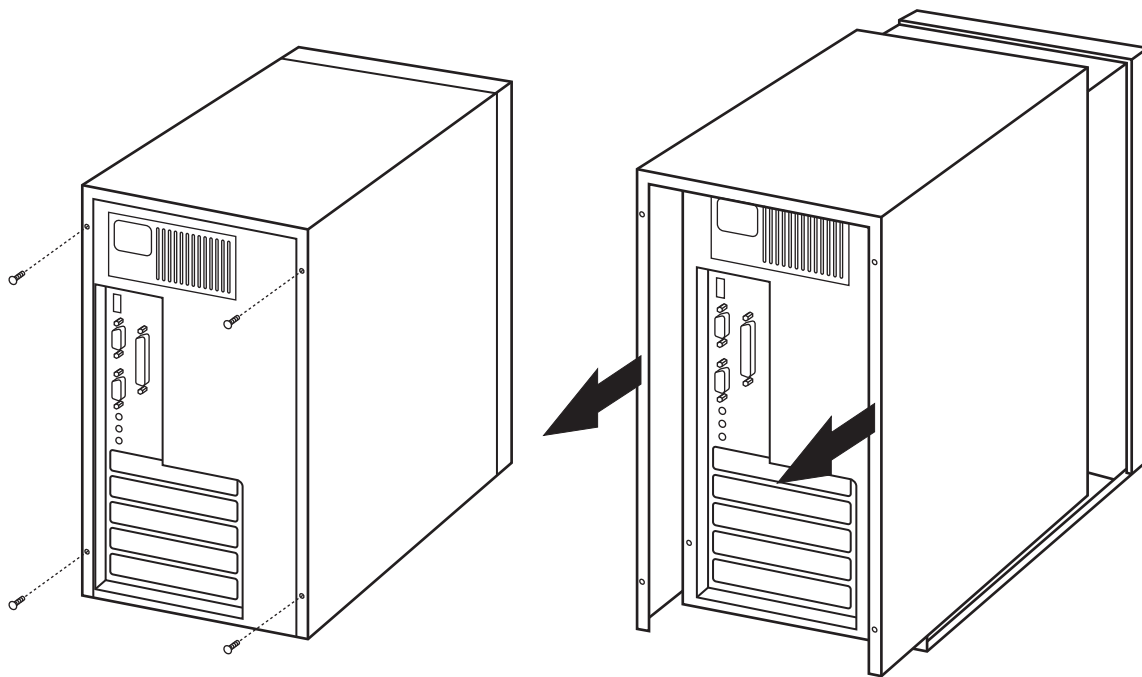

Figure 3-1. Removing the PC cover.

3. Remove the faceplate from the PCI slot and keep it in a safe place. You may need it for future use. (Also be sure to keep the screws to attach the NIC.) See Figure 3-2.

NOTE: If you cannot locate or know how to find an PCI 32/64-bit slot, refer to the documentation that came with your system.
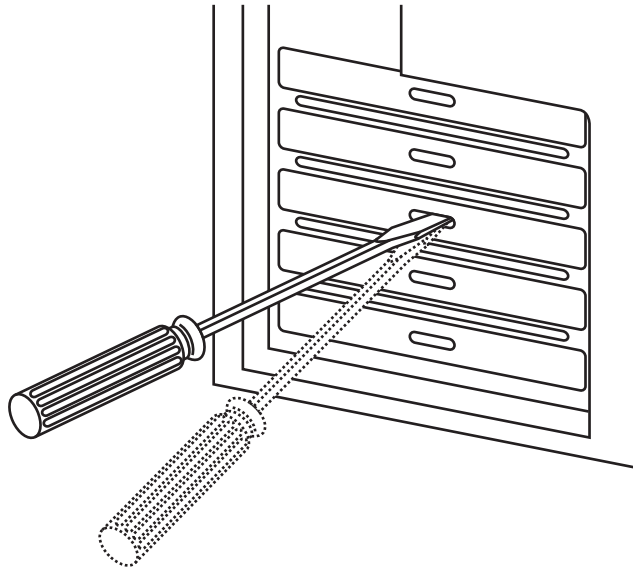
Figure 3-2. Removing the faceplate from the PCI slot.

4. Remove the fiber card from the shipping package and store the packaging material in a safe location.

CAUTION: Wear a grounding device and observe electrostatic discharge precautions when installing the fiber card in a system. Failure to observe this caution could cause damage to the card.

5. Applying even pressure at both corners of the card, push the fiber card until it is firmly seated in the PCI 32-/64-bit slot. Make sure the card is securely seated. See Figure 3-3.
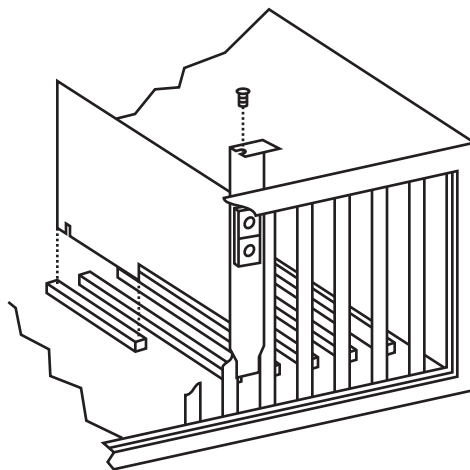
Figure 3-3. Place the NIC into the PCI 32-/64-bit slot.

6. Replace the system's cover and secure it with the screws you removed in Step 2. See Figure 3-4.
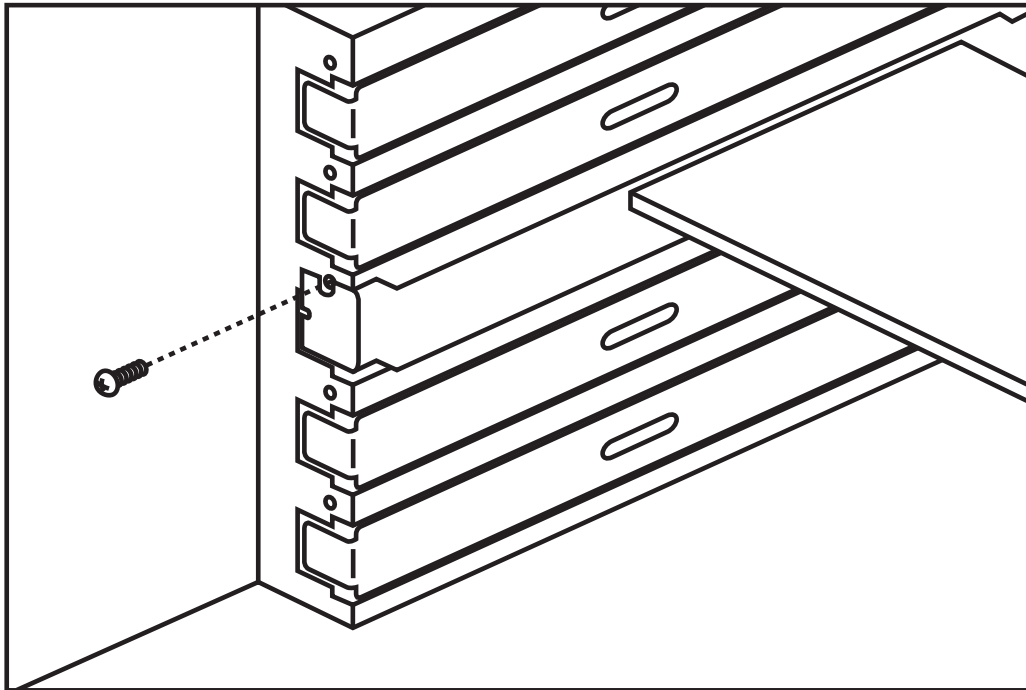

Figure 3-4. Securing the NIC with screws.

7. Disconnect any personal antistatic devices.

8. Power on the system.

4. Driver Installation

4.1 Windows 2000, XP, Server 2003, Windows Vista (32-bit, 64-bit)

1. Start your Windows system and log in. (You must have Administrator privileges to install the driver software.) When you boot up the Windows system after installing the fiber NIC, a series of windows opens.

NOTE: Before beginning this procedure, verify that the Windows system has been upgraded to the latest version with the latest service pack applied.

2. In the Install Found New Hardware window, click "No, not this time" to copy the driver software from the CD-ROM. Click "Next."

Figure 4-1. Welcome to the Found New Hardware Wizard Window.

3. The second Welcome to the Found New Hardware Wizard Window is shown in Figure 4-2. Insert the CD-ROM and click "Install from a list or specific location (Advanced)." Click "Next."

Figure 4-2. Found New Hardware Wizard Window.

4. When prompted, insert the media you want to search into your CD-ROM drive, type the path to the driver, and select "OK."

For example, where "e" is the designation of the CD-ROM drive on your system, enter:

E:\LH1660C-LC_SC-\WinXP\32

5. In the Driver Files Search Results window, verify that the correct path to the driver software is shown, then click "Next." The driver location for each Windows operating system is listed below.

• Windows 2000: CD ROM Root:\LH1660C-LC_SC-\Win2000

• Windows XP (32-bit): CD ROM Root:\LH1660C-LC_SC-\WinXP\32

• Windows XP (64-bit): CD ROM Root:\LH1660C-LC_SC-\WinXP\64

• Windows 2003 (32-bit): CD ROM Root:\LH1660C-LC_SC-\Win2003\32

• Windows 2003 (64-bit): CD ROM Root:\LH1660C-LC_SC-\Win2003\64

• Windows VISTA (32-bit): CD ROM Root:\LH1660C-LC_SC-\VISTA\32

• Windows VISTA (64-bit): CD ROM Root:\LH1660C-LC_SC-\VISTA\64

6. When the driver installation is completed, restart Windows if needed.

NOTE: On some machines, it is possible that some NICs fail to initialize. This might be caused by insufficient memory. Decrease the Tx or Rx buffer number to solve this problem.

The flow control setting "Hardware Default (Auto)" means the flow control ability depends on the autonegotiation result with the link partner. In other settings ("Enable Tx," "Enable Rx," "Enable Tx/Rx"), the driver will set the Tx or Rx flow control ability without autonegotiation.

4.2 Windows NT 4.0

Before installing the software, make sure that the fiber NIC is properly installed and configured.

1. Open "Control Panel" -> "Networks," and choose the "Add Adapter" button. The Add Network Adapter dialog box appears. Select "<other> Requires disk from manufacturer" in the list of Network Adapters and then press <Enter>.

2. Insert the driver CD into your CD-ROM and specify the path of the driver in the CD (i.e. D:\WINNT) if necessary.

3. Select the correct Adapter and start to copy the driver files to your system.

4. After you copy all the driver files to your system, a property dialog box appears in the screen. You can enable the special properties if you want to.

5. When the driver installation is completed, restart your PC.

4.3 Linux

The instructions listed below are for Linux driver installation. You must compile the source code to generate the module velocityget.o (velocity.ko in 2.6.x kernel; please remember to replace velocityget.o with velocityget.ko in the following sentences if you are using 2.6.x kernel) and use insmod command to insert it.

This driver supports Linux kernel version 2.4.x and 2.6.x now. For 2.6 kernel, it supports up to version 2.6.18.

This driver supports x86 based Linux system.

Enter the following commands building driver from the TAR file.

1. Create a directory and extract the files:

    tar xvzf tg3-<version>.tar.gz

2. Build the driver tg3.o (or tg3.ko) as a loadable module for the running kernel:

3. Test the driver by loading it:

    cd src

    make

4. Install the driver:

    make install

5. To configure network protocol and address, refer to various Linux documents.

4.4 NetWare
4.4.1 Novell 32-Bit ODI Driver for Client32 in DOS

Before starting the installation, make sure that the fiber NIC is properly installed and configured.

Install Driver While setting up your Client32:

While you are installing Client32 programs, keep the fiber NIC's driver diskette near you.

1. When the installation program asks you to specify a LAN driver, select "OTHER DRIVERS," "User Supplied Driver," or "USER SPECIFIED 32 BIT DRIVER" to install a driver from the CD that you received with the fiber NIC.

2. Insert the driver diskette into your CD-ROM drive, and specify the path of the driver in the CD to copy the driver files to your system.

3. A STARTNET.BAT file will be generated in the Client32 directory. (\NOVELL\CLIENT32 or other if you change the default path)

4. When all the Client32 program installations are completed, reboot your PC.

System with existing NetWare client programs:

If there are Client32 programs installed in your system already, you can use the following procedures to set up your driver.

1. Add a Load driver command line to your STARTNET.BAT file in your Client32 directory. For example:

      LOAD C:\NOVELL\CLIENT32\GETNWSC.LAN FRAME=Ethernet_802.2

The following is a sample of the STARTNET.BAT file:

      SET NWLANGUAGE=ENGLISH

      C:\NOVELL\CLIENT32\NIOS.EXE

      LOAD C:\NOVELL\CLIENT32\LSLC32.NLM

      LOAD C:\NOVELL\CLIENT32\CMSM.NLM

      LOAD C:\NOVELL\CLIENT32\ETHERTSM.NLM

      LOAD C:\NOVELL\CLIENT32\GETNWSC.LAN FRAME=Ethernet_802.2

      LOAD C:\NOVELL\CLIENT32\GETNWSC.LAN FRAME=Ethernet_802.3

      LOAD C:\NOVELL\CLIENT32\IPX.NLM

      LOAD C:\NOVELL\CLIENT32\CLIENT32.NLM

2. Execute STARTNET.BAT to connect to Server.

NOTE: If you want to use VID & TAG (HCHECKSUM for CHSM) keywords supported by management adapter, be aware of the string length limitation in DOS prompt. The driver can't be loaded if you are using Client32 for DOS Installer v2.01. Use Installer v2.71 and later for CHSM Spec v1.11 driver.

4.4.2 Novell ODI 16-Bit DOS Client Driver

Before starting the installation, make sure that the NIC is properly installed and configured.

Installation using NetWare ODI Client Install utility:

1. Enter the destination directory for the NetWare client:

(The default directory is C:\NWCLIENT)

2. Install will modify your AUTOEXEC.BAT and CONFIG.SYS files.

      Allow changes? (Y/N)

3. Do you want to install support for MS Windows? (Y/N)

4. Select the driver for your network card:

• Scroll through the list to choose "OTHER DRIVERS."

• Press <Enter>, and the "Insert The Driver Disk" dialog box will be prompted. Type the path to the directory that contains the driver and information file.

      (A:\NETWARE\DOSODI)

• Press <Enter> and select the target ODI driver.

• Select optional settings.

• Press "F10" to save.

5. Press <Enter> to install.

System with existing NetWare client programs:

If there are NetWare client programs such as LSL.COM, IPXODI, and NETX.EXE in your system already, you can use the following procedures to set up your system.

1. Copy the GETODI.COM file to the Netware client directory, which contains NET.CFG, LSL.COM, IPXODI.COM, and NETX.COM files.

2. Update the NET.CFG file. You can refer to the above sample.

3. Make sure to add LASTDRIVE=E in your CONFIG.SYS file if your want the first network drive to be F.

4. Enter the following commands to connect to your Novell server:

        LSL

        GETODI

        IPXODI

        NETX

        F:

        LOGIN <user_name>

4.4.3 NetWare 4.x Server Driver

Before starting the installation, make sure that the adapter is properly installed and configured.

Using the Server Install utility:

1. On the server console, execute the INSTALL program:

        LOAD INSTALL <Enter>

2. Choose "Driver Option/Configure network drivers/Select a driver."

3. Press the <Ins> key to install a driver that's not on the list.

4. Press <F3> to specify a different path and press <Enter>.

5. The GETNWSC.LAN should appear on the selection list. Press <Enter> to choose it.

6. You can "Select/Modify driver parameters and protocols," and then "Save parameters and load driver."

7. You can add the LOAD and BIND command lines to the AUTOEXEC.NCF file so that the LAN driver will be loaded automatically while the server is starting up.

Loading Driver Manually:

1. On the server console, load the driver directly, for example:

        LOAD A:\NETWARE\NWSERVER\GETNWSC FRAME=Ethernet_802.2

2. Bind with IPX:

        BIND IPX GETNWSC

3. You can log into the server from a workstation and then copy GETNWSC.LAN to the directory SYS:\SYSTEM on server. Add the LOAD and BIND command lines to AUTOEXEC.NCF file so that the LAN driver will be loaded automatically while the server starts up next time.

4.5 Solaris

The following procedures describe the Solaris Release 8 driver for LH1660C-SC and LH1660C-LC Gigabit 1000BASE-X PCI 64-/32-Bit Fiber NICs. The driver is released in three formats:

BRCMbcme.pkg: Datastream format.

BRCMbcme.tar.Z: Compressed and TAR file system format.

cmedu.img: Driver Update (DU) binary image, which is used to create DU diskette.

1. Change directory to where BRCMbcme.pkg resides.

pkgadd -d BRCMbcme.pkg

Copy BRCMbcme.tar.Z to /tmp. cd /tmp

uncompress BRCMbcme.tar.Z

tar xvf BRCMbcme.tar

pkgadd -d /tmp

2. Execute prtconf to determine instance number of the NIC.

3. ifconfig bcme[instance_number] plumb

4. ifconfig bcme[instance_number] ip_address netmask ….

To make these changes permanent, follow these steps:

1. Use your favorite text editor (eg. vi) and create a file named hostname.bcme[instance_number] in /etc directory. Add the IP address of the interface to this file, save and exit.

2. Add a proper subnet mask to the file /etc/netmasks.

In Solaris 7.0 (Intel® platform), the operating system only allocates 36 pages of 4K to physically contiguous memory. The driver needs about 130K of physically contiguous memory per NIC. To use more than one NIC, the O/S has to allocate more memory. This can be done by setting an O/S system variable "lomempages" in /etc/system. For instance, if 4 NICs are installed in Solaris 7 system, then physically contiguous memory is calculated as follows:

4 NICs * 130K = 520 K==> 130 pages of 4K is required.

Since this memory might be used by other drivers in the system, 200 of 4K of memory is allocated. Add the following line in file/etc/system:

set lomempages=200

5. Configuration

5.1 Network Remote Boot Configuration

1. Select Remote Boot Type. To enter the "MBA Configuration Menu" to select Remote Boot Type (PXE, RPL), press "Shift" + "Tab" within 3 seconds after you power on your PC; otherwise, the system will go to Windows OS.

2. Set Network Remote Boot. To set Network Remote Boot, enter PC BIOS first, then select "Boot" tab, after that, choose "MBA" as the priority first boot device.

3. Cancel Network Remote Boot. To cancel Network Remote Boot, change the "Boot" setting in PC BIOS from "MBA" to "Hard Drive" or other devices.

5.2 Fiber Cable and Bandwidth

Table 5-1. Fiber Cable and Modal Bandwidth using multimode (850 nm) 62.5-/125-µm fiber cable.

Modal Bandwidth	Distance	Modal Bandwidth	Distance
160 MHz-Km	704 feet (220 meters)	400 MHz-Km	1600 feet (500 meters)
200 MHz-km	880 feet (275 meters)	500 MHz-Km	1760 feet (550 meters)