Emulex 4 Gb Fibre Channel Expansion Card (CFFv) for
IBM BladeCenter

IBM

Installation and User's Guide

Emulex 4 Gb Fibre Channel Expansion Card (CFFv) for
IBM BladeCenter

Installation and User's Guide

Note: Before using this information and the product it supports, read Appendix B, "Warranty," on page 29 and the general information in Appendix C, "Notices," on page 47.

First Edition (July 2007)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information
（安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας
(safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się
z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled "Statement 1," translations for that caution statement are in the *Safety Information* document under "Statement 1."

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open he device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 21:

CAUTION:
Hazardous energy is present when the blade server is connected to the power source. Always replace the blade server-cover before installing the blade server.

Chapter 1. Introduction

This *Installation and User's Guide* contains instructions for and information about:

- Installing the Emulex 4 Gb Fibre Channel Expansion Card (CFFv) for IBM® BladeCenter® in an IBM BladeCenter blade server
- Configuring the Emulex 4 Gb Fibre Channel expansion card
- Updating the firmware and device drivers of the Emulex 4 Gb Fibre Channel expansion card
- Using the Emulex BIOS utility and the x86 BootBIOS function to configure host bus adapters (HBAs) for the expansion card
- Using the Emulex HBAnyware utility to:
  - Perform custom configuration of the expansion card, HBAs, and other Fibre Channel devices
  - Manage networks and other Fibre Channel devices, including local and remote devices, in your system
- Performing basic troubleshooting of the expansion card

To support each Fibre Channel I/O module that you install in the BladeCenter unit, you must also install a compatible Fibre Channel expansion card in each blade server that you want to communicate with the Fibre Channel I/O module. For installation details, see Chapter 2, "Installing an expansion card," on page 7. For additional information about expansion cards and other BladeCenter components, see the BladeCenter documentation that comes with these devices.

The Emulex 4 Gb Fibre Channel expansion card is a compact-form-factor (CFFv) expansion card. A CFFv expansion card provides a connection to I/O-module bays 3 and 4 in all BladeCenter units.

The expansion card is a Fibre Channel device that has two configurable-adapter ports. Communication signals are routed from the Fibre Channel high-speed connector on the Fibre Channel expansion card through the blade server to I/O-module bays 3 and 4 in the BladeCenter unit.

1

The following illustration shows an example of a BladeCenter H unit with the I/O-module bays identified. In this example, these bays are in the rear of the BladeCenter chassis. In a different type of BladeCenter unit, the bays might be in a different location. For a list of the types of supported BladeCenter units, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
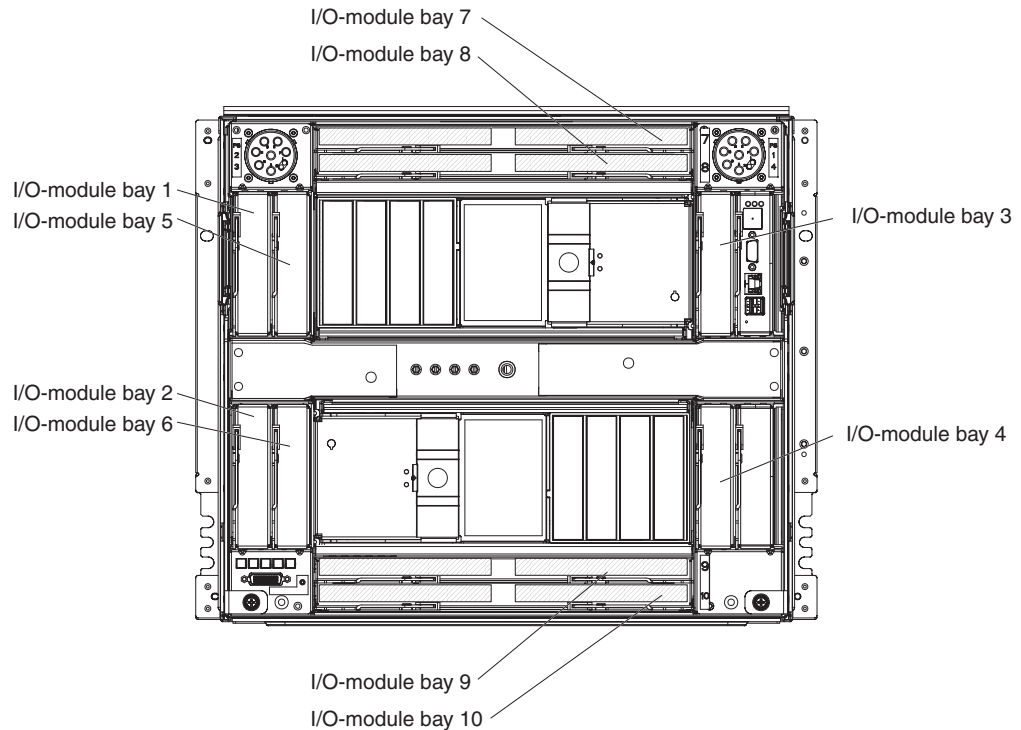
Notes:

1. The illustrations in this document might differ slightly from your hardware.

2. Unless otherwise stated, references to the Emulex 4 Gb Fibre Channel Expansion Card (CFFv) for IBM BladeCenter is also referred to throughout this document as the expansion card or the I/O expansion card.

3. Using the CFFv expansion card in combination with a CFFh expansion card in a high-speed blade server provides simultaneous connections to both the I/O-module bays 3 and 4 in all BladeCenter unit types and the BladeCenter high-speed I/O-module bays (7 through 10).

4. The I/O modules in I/O-module bays 3 and 4 must support Fibre Channel operation.

5. When you are using the expansion card with the Optical Pass Through Module option, the data-rate speed of the expansion card must be set to 1 Gbps or 2 Gbps for Fibre Channel devices. To change the data-rate speed setting of the expansion card, see Chapter 4, "Configuring x86 BootBIOS," on page 13 or Chapter 5, "Using the Emulex HBAnyware utility," on page 17.

6. If you are using the expansion card with the BladeCenter T unit, the ports operate at 2 Gbps when a Fibre Channel I/O module is installed in bay 3 or bay 4.

7. The BladeCenter JS20 and JS21 blade servers do not support the expansion card.

8. Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

9. This document might contain references or links to other companies' Web sites, also known as *non-IBM Web sites*. As of the date of this document, the non-IBM Web sites are correct. However, these sites might be updated after this document has been published. Certain conditions apply to the usage of non-IBM Web sites. For additional information, see Appendix C, "Notices," on page 47.

Your expansion card comes with a one-year limited warranty. For information about your warranty, see Appendix B, "Warranty," on page 29. You can obtain up-to-date information about your expansion card and other IBM server products at http://www.ibm.com/systems/x/.

This *Installation and User's Guide* and the most recent versions of other documents that provide detailed information about your BladeCenter unit, blade server, and available options are provided in Portable Document Format (PDF) at http://www.ibm.com/systems/support/.

For service or assistance, see Appendix A, "Getting help and technical assistance," on page 27.

Fibre Channel technology overview

Fibre Channel technology is outlined in the SCSI-3 Fibre Channel Protocol (SCSI-FCP) standard. Fibre Channel is a high-speed data transport technology used for mass storage and networking.

By adding Fibre Channel expansion cards to the blade servers and Fibre Channel-compatible I/O modules to the BladeCenter unit, you can attach the blade server to an external-storage area network (SAN) through the external 4 Gbps (Gigabits per second) optical ports on the I/O modules. The expansion card provides up to 8 Gb of full-duplex bandwidth per port.

Related documentation

This *Installation and User's Guide* contains instructions for installing and configuring the expansion card. This document is provided on the *Emulex 4 Gb CFFv Fibre Channel Expansion Card Documentation CD Version 1.0* that comes with the expansion card. This CD is also known as the *Documentation* CD. Follow the instructions in this *Installation and User's Guide* after you read the *IBM Getting Started* guide that comes with the expansion card.

Notes:
- The most recent versions of this *Installation and User's Guide* and all other BladeCenter documentation are at http://www.ibm.com/systems/support/.
- Other IBM BladeCenter CDs, such as the IBM *BladeCenter Documentation* CD, might come with other BladeCenter devices that you have purchased. Depending on your blade-server model and BladeCenter unit type, the IBM BladeCenter CDs might contain additional documents and other information. Use the subdirectories to help you find information quickly.
- For more information about documentation requirements, see "Using the documentation" on page 27.

IBM documentation

The following related IBM documentation comes with the expansion card, BladeCenter unit, blade server, or other BladeCenter devices that you have purchased. This documentation contains important, useful information to help you with the setup, installation, configuration, operation, and troubleshooting processes for these devices. This documentation is available at http://www.ibm.com/systems/support/:

- *IBM Getting Started* guide

  This document contains setup instructions for the expansion card, including information about getting started. Read this document before you install the expansion card in the blade server.

- IBM BladeCenter blade server *Installation and User's Guide*

  Each type of blade server has a customized *Installation and User's Guide*.

- IBM *BladeCenter SAN Solutions Guide*

  This document provides a user-oriented discussion about how the BladeCenter Fibre Channel options are used to provide different SAN storage solutions for different application requirements.

- IBM *BladeCenter Fibre Channel I/O Interoperability Guide*

  This document provides detailed Fibre Channel I/O-module configuration data and step-by-step configuration procedures for integrating the BladeCenter unit into other vendor switch fabrics. Each vendor configuration includes an initial integration checklist, configuration limitations, supported I/O module and firmware versions, specific management-application operations, and a successful-integration checklist.

- *Safety Information*

  This multilingual document contains translated versions of the caution and danger statements that appear in the documentation for your server. Each caution and danger statement has an assigned number, which you can use to locate the corresponding statement in your native language.

- *IBM Problem Determination and Service Guide*

  This document contains information to help you solve problems yourself or to provide helpful information to a service technician.

Emulex documentation

You can obtain relevant Emulex documentation for device drivers, the HBAnyware utility, and other tools, by going to http://www.ibm.com/systems/support/, and entering the search term **Emulex** to list and access the applicable Web sites.

Features and specifications

The expansion card has the following features:

- Compliance with U.S. and international safety and emissions standards
- Support for direct memory access (DMA)
- Support for bus mastering
- Support for Fibre Channel protocol SCSI (FCP-SCSI) and Fibre Channel Internet protocol (FCP-IP)
- Support for point-to-point fabric connection (F-port fabric login)
- Support for Fibre Channel service (classes 2 and 3)

The expansion card has the following specifications:

Table 1. Fibre Channel expansion-card specifications

Type	Specification
Fibre Channel specifications	- Bandwidth: 4 Gb per second maximum at full-duplex per port - Support for both FCP-SCSI and IP protocols - Support for point-to-point fabric connection: F-Port Fabric Login - Support for FCAL and FCAL-2 FL-Port Login - Support for Fibre Channel services class 2 and 3 - Support for full-duplex operation
Processor	Single-chip design with two completely independent 4 Gb serial Fibre Channel ports. Each port provides: - Reduced instruction set computer (RISC) processor - Integrated serializer/deserializer - Receive direct memory access (DMA) sequencer - Frame buffer - Processor operation at 100/133 MHz
Host data transfer	Burst data transfers up to 1 Gb per second
Application-specific integrated circuit (ASIC) internal static random-access memory (SRAM)	- Error-correcting code (ECC) protected - 1.5 MB internal high-speed SRAM
Nonvolatile random-access memory (NVRAM)	NVRAM: 4 MB flash memory, 2 MB per port, field programmable
Onboard DMA	DMA controller for each port: transmit and receive
Frame buffer first in, first out (FIFO)	Integrated 63 KB transmit and 32 KB receive frame buffer for each data channel
Connectors (internal only)	200-pin board-to-board for PCI-X interface
Operating power	- Approximately 4.7 watts or 16.04 British thermal units (Btu) per hour, for 100 MHz devices - Approximately 6.7 watts or 22.9 British thermal units (Btu) per hour, for 133 MHz devices

Inventory checklist

The expansion-card option package includes the following items:

- *IBM Getting Started* guide (flyer)
- One Emulex 4 Gb Fibre Channel Expansion Card (CFFv) for IBM BladeCenter
- The *Emulex 4 Gb CFFv Fibre Channel Expansion Card Documentation CD Version 1.0*, that contains this *Emulex 4 Gb Fibre Channel Expansion Card (CFFv) for IBM BladeCenter Installation and User's Guide*
- *Safety Information* document
- *End User License Agreement*

If any of these items are missing or damaged, contact your authorized reseller for replacement.

Notices and statements used in this document

The caution and danger statements used in this document are also in the multilingual *Safety Information* document provided on the IBM *BladeCenter Documentation* CD and at http://www.ibm.com/systems/support/ on the World Wide Web. Each caution and danger statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following types of notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate possible damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Major components of the expansion card

The Emulex I/O controller provides a PCI-X local bus interface and two completely independent 4 Gb serial Fibre Channel ports. Each port has a RISC processor, an integrated serializer/deserializer (SERDES), a receive DMA sequencer, frame buffer, five-channel DMA controller, and 1.5 MB ECC protected SRAM integrated in a single-chip solution.

Chapter 2. Installing an expansion card

This chapter provides information about and instructions for installing an expansion card in a blade server.

To support each Fibre Channel I/O module that you install in the BladeCenter unit, you must also install a compatible Fibre Channel expansion card in each blade server that you want to communicate with the Fibre Channel I/O module. The maximum number of expansion cards that you can install in the BladeCenter unit varies according to the type of BladeCenter unit that you are using. This is because each type of BladeCenter unit supports a different number of blade servers. You can install one expansion card per blade server.

Notes:

- For the locations of the BladeCenter unit I/O-module bays, see Chapter 1, "Introduction," on page 1.
- The blade servers or BladeCenter units that are described or shown in this document might be different from your blade server or BladeCenter unit. For additional information, see the documentation that comes with your blade server or BladeCenter unit.
- Configuration requirements for expansion cards, blade servers, and the BladeCenter unit might vary. You can obtain up-to-date information about these devices at http://www.ibm.com/systems/bladecenter/.
- Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.
- This document might contain references or links to other companies' Web sites, also known as *non-IBM Web sites.* As of the date of this document, the non-IBM Web sites are correct. However, these sites might be updated after this document has been published. Certain conditions apply to the usage of non-IBM Web sites. For additional information, see Appendix C, "Notices," on page 47.

Before you install an expansion card into a blade server, consider the following BladeCenter I/O-module information:

Table 2. Expansion card connections to expansion card ports

BladeCenter I/O-module bays	Expansion card support
3	Fibre Channel
4	Fibre Channel

Note: If I/O modules are installed in both I/O-module bays 3 and 4, both I/O modules must be of the same type. Installing a second I/O module in the BladeCenter unit provides a backup I/O module in case one I/O module fails.

See the following BladeCenter documentation for additional information:

- The *Installation and User's Guide* for your blade server provides server specific expansion card installation requirements.
- The *Installation Guide* for your BladeCenter unit shows I/O-module bay locations.
- The *Installation Guide* for your I/O module has installation and configuration instructions for the I/O module.

Installation guidelines

Before you install the expansion card in the blade server or the blade server in the BladeCenter unit, read the following information:

- Read the safety information that begins on page v, "Handling static-sensitive devices" on page 9, and the safety statements in the BladeCenter unit documentation. This information will help you work safely.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the blade server or BladeCenter unit, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component on the expansion card, blade server, or BladeCenter unit indicates that the component can be hot-swapped, which means that if the BladeCenter unit and operating system support hot-swap capability, you can remove or install the component while the BladeCenter unit is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- You do not have to turn off the BladeCenter unit to install or replace any of the hot-swap modules on the front or rear of the BladeCenter unit.
- When you are finished working on the blade server or BladeCenter unit, reinstall all safety shields, guards, labels, and ground wires.
- Make sure that you are using the latest versions of device drivers, firmware, and BIOS for your blade server, management module, and I/O modules that are used by the I/O expansion card. See http://www.ibm.com/systems/support/ for the latest information about upgrading the device drivers and firmware for BladeCenter components. See the latest instructions in the documentation that comes with the updates.
- For a list of supported optional devices for the BladeCenter unit and other IBM products, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

For additional information, see the following BladeCenter documentation and the Emulex documentation that is discussed in "Emulex documentation" on page 4:

- The *Installation and User's Guide* for your blade server provides server-specific I/O expansion card installation requirements.
- The *Installation Guide* for your BladeCenter unit shows I/O-module bay locations.
- The I/O module *Installation Guide* provides installation and configuration instructions for the I/O module.

System reliability guidelines

To help ensure proper cooling, performance, and system reliability, make sure that the following requirements are met:

- Each of the module bays on the rear of the BladeCenter unit contains either a module or a filler module.
- A removed hot-swap module is replaced with an identical module or filler module within 1 minute of removal.
- A removed hot-swap blade server is replaced with another blade server or filler blade within 1 minute of removal.
- The ventilation areas on the sides of the blade server are not blocked.

- You have followed the reliability guidelines in the documentation that comes with the BladeCenter unit.

Cables are *not* required for the expansion card. If you must install cables for other BladeCenter optional devices, see the IBM *Configuration and Options Guide* at http://www.ibm.com/servers/eserver/xseries/cog/. If you must install cables for BladeCenter components, see the cable-routing information in the documentation that comes with the BladeCenter components and the cables.

Handling static-sensitive devices

Attention: Static electricity can damage the BladeCenter unit and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of electrostatic discharge, observe the following precautions:
- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an *unpainted* metal surface of the BladeCenter unit chassis or an *unpainted* metal surface on any other grounded rack component in the rack that you are installing the device in for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the BladeCenter unit without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the BladeCenter unit or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.
- Some types of BladeCenter units come with electrostatic discharge (ESD) connectors. If the BladeCenter unit is equipped with an ESD connector, see the documentation that comes with the BladeCenter unit for using the ESD connector.

Installing the expansion card on a blade server

Read the safety information that begins on page v and "Installation guidelines" on page 8.

See the blade server or storage expansion unit documentation for detailed instructions for installing the I/O expansion card.

Expansion card

Expansion card connectors
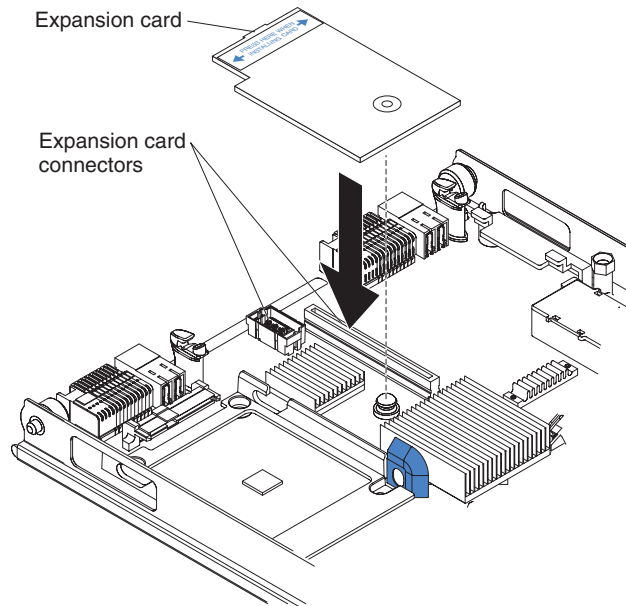
Configuring a command session

After you install the I/O expansion card, turn on the blade server; then, use the following list to determine how to set up a command session:

- If the blade server supports local console connection through the management-module switch control of the keyboard/video/mouse (KVM) to the blade server. See the *Installation and User's Guide* for the blade server for instructions.
- If the blade server does *not* support local console connection, see the *Installation and User's Guide* for the blade server for instructions for setting up a command session with the blade server.

Chapter 3. Updating the boot code and firmware and installing device drivers

After you install the I/O expansion card, make sure that the latest boot code and firmware are installed; then, install the device drivers.

Notes:

1. The supported operating systems vary, depending on:
   - The types of blade servers and other hardware that you are using
   - The software packages that you are using
2. For the latest information about supported operating systems, versions of device drivers, utilities, and documentation, see http://www.ibm.com/systems/support/.
3. Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.
4. This document might contain references or links to other companies' Web sites, also known as *non-IBM Web sites.* As of the date of this document, the non-IBM Web sites are correct. However, these sites might be updated after this document has been published. Certain conditions apply to the usage of non-IBM Web sites. For additional information, see Appendix C, "Notices," on page 47.

Installing the device drivers

The latest device drivers, utilities, documentation, and installation instructions for the following supported operating systems are provided at http://www.ibm.com/systems/support/:

- Microsoft® Windows® 2003 Server
- Microsoft Windows 2003 Enterprise Server
- Microsoft Windows 2003 Web Server
- Microsoft Windows XP
- Red Hat® Enterprise Linux® Version 4 Advanced Server
- Red Hat Enterprise Linux Version 4 Web Server
- Red Hat Enterprise Linux Version 4 Enterprise Server
- Red Hat Enterprise Linux Version 4 Advanced Server 64-bit
- Red Hat Enterprise Linux Version 4 Web Server 64-bit
- Red Hat Enterprise Linux Version 4 Enterprise Server 64-bit
- Red Hat Enterprise Linux Version 5 Advanced Server
- Red Hat Enterprise Linux Version 5 Web Server
- Red Hat Enterprise Linux Version 5 Enterprise Server
- Red Hat Enterprise Linux Version 5 Advanced Server 64-bit
- Red Hat Enterprise Linux Version 5 Web Server 64-bit
- Red Hat Enterprise Linux Version 5 Enterprise Server 64-bit
- SUSE Linux Enterprise Server Version 9 (SLES 9)
- SUSE Linux Enterprise Server Version 9 64-bit (SLES 9)
- SUSE Linux Enterprise Server Version 10 (SLES 10)
- SUSE Linux Enterprise Server Version 10 64-bit (SLES 10)

Customizing the configuration of the expansion card

After you install the device drivers, you can customize the configuration of the expansion card. To customize the configuration of the expansion card, complete the following steps:

1. First, configure the Fibre Channel host bus adapters (HBAs) for the expansion card. To do this, use the Emulex BIOS utility or the Emulex HBAnyware utility. For instructions, see Chapter 4, "Configuring x86 BootBIOS," on page 13 or Chapter 5, "Using the Emulex HBAnyware utility," on page 17.

2. Configure and manage the other Fibre Channel devices, including local and remote devices, in your system. To do this, use the Emulex HBAnyware utility. For instructions, see Chapter 5, "Using the Emulex HBAnyware utility," on page 17.

Chapter 4. Configuring x86 BootBIOS

This chapter provides information about the Emulex BIOS utility and the x86 BootBIOS function that you can use to configure host bus adapters (HBAs) for the expansion card.

Important: If the configuration settings are incorrect, the expansion card might not function correctly.

Before you customize the configuration of the expansion card:
- Make sure that the expansion card is correctly installed in the blade server.
- Make sure that the blade server is correctly installed in the BladeCenter unit.
- Make sure that the blade server, BladeCenter unit, and all other BladeCenter components are correctly configured.
- Make sure that an I/O module that supports Fibre Channel operation is correctly installed in I/O-module bay 3, I/O-module bay 4, or both I/O-module bays 3 and 4 of the BladeCenter unit.
- Make sure that the I/O modules that support Fibre Channel operation are correctly configured.

Notes:
- A host bus adapter is also referred to throughout this document as an *HBA*, a *host adapter*, or an *adapter*.
- For more detailed information about the Emulex BIOS utility and the x86 BootBIOS feature, see the Emulex *x86 BootBIOS User Manual* at http://www.ibm.com/systems/bladecenter/.
- For information about remote boot options, contact your IBM technical-support representative, or review the documentation that comes with your blade server, and is available at http://www.ibm.com/systems/bladecenter/.
- Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.
- This document might contain references or links to other companies' Web sites, also known as *non-IBM Web sites*. As of the date of this document, the non-IBM Web sites are correct. However, these sites might be updated after this document has been published. Certain conditions apply to the usage of non-IBM Web sites. For additional information, see Appendix C, "Notices," on page 47.

Using the BIOS utility

The BIOS utility enables you to change HBA parameters (for example, topology, PLOGI retry timer, and auto-scan setting) and configure startup (boot) devices.

The following requirements apply when you are using the BIOS utility:
- The expansion card settings and default values will vary, based on the version of BIOS code installed for the expansion card.
- Default settings are acceptable for most installations.
- In the BIOS utility:
  - Press **d** to reset the selected adapter to its default values.
  - Press **Esc** to return to the previous menu.

- Press **X** to exit from the menu.
- The default topology is auto topology with loop first. For a Fibre Channel arbitrated loop (FC-AL), each HBA has a default arbitrated loop physical address (AL_PA) of 01 (hexadecimal). If necessary, change this topology setting before you configure boot devices.
- All HBAs or boot drives can be configured to other AL_PAs instead of their default values.
- If the system has more than one HBA with the same PCI bus number, and each has a boot drive attached, the first PCI-scanned HBA will be the boot HBA. The first HBA is usually in the lowest-numbered PCI slot in the system. You can view this information through the BIOS utility.

Starting the BIOS utility

Before you can run the BIOS utility, x86 BootBIOS must be loaded and the boot up message must be enabled on at least one installed HBA in your system.

To start the BIOS utility to configure your HBAs, complete the following steps:

1. Start the blade server. On the blade server control panel, press the keyboard/video/mouse (KVM) select button. (For additional information, see the blade server *Installation and User's Guide*.)
2. Press Alt+E immediately (within 5 seconds) when the BootBIOS prompt appears for starting the BIOS utility. The BIOS utility menu is displayed. This menu contains a list of HBAs.
3. Select the applicable HBA to configure by entering the corresponding number. The main configuration menu is displayed.
4. Press **2** to configure the HBA. The adapter configuration menu is displayed.
5. Select **1** to configure boot devices for remote boot functions or select **2** to configure the HBA parameters.

   If you select to configure the HBA parameters, the adapter configuration menu is displayed. After you change the settings, the BIOS utility restarts the blade server to enable the new parameters.

Important: If the x86 BootBIOS prompt does not appear, you must enable this prompt. For additional information, see the installation section of the Emulex *x86 BootBIOS User Manual* at http://www.ibm.com/systems/bladecenter/.

Enabling x86 BootBIOS on an HBA through the BIOS utility

Before you can use the x86 BootBIOS features, x86 BootBIOS must be enabled on at least one installed HBA in your system.

To enable x86 BootBIOS on an installed HBA, complete the following steps:

1. Start the blade server. On the blade server control panel, press the keyboard/video/mouse (KVM) select button. (For additional information, see the blade server *Installation and User's Guide*.)
2. Press Alt+E immediately (within 5 seconds) when the x86 BootBIOS prompt appears for starting the BIOS utility. The BIOS utility menu is displayed. This menu contains a list of HBAs.
3. Select the applicable HBA by entering the corresponding number. The main configuration menu is displayed.
4. Press **2** to configure the HBA. The adapter configuration menu is displayed.

5. Press **1** to enable or disable x86 BootBIOS. If x86 BootBIOS is not already enabled, you must enable it so that you can use the x86 BootBIOS features.

Important: If the x86 BootBIOS prompt does not appear, you must enable this prompt. For additional information, see the installation section of the Emulex *x86 BootBIOS User Manual* at http://www.ibm.com/systems/bladecenter/.

Descriptions of the options on the adapter configuration menu

This section describes the options on the adapter configuration menu. You can use this menu to view the host adapter parameters for the expansion card. You can change a modifiable value if your system supports the corresponding feature.

- **Enable or Disable BIOS:** This option enables x86 BootBIOS on the selected adapter. Before you can use the x86 BootBIOS features, x86 BootBIOS must be enabled on at least one installed HBA in your system. For additional information, see "Enabling x86 BootBIOS on an HBA through the BIOS utility" on page 14.

- **Change default ALPA of this adapter:** This option applies only to a Fibre Channel arbitrated loop (FC-AL). The factory default value for each HBA is an arbitrated loop physical address (AL_PA) of **01** (hexadecimal).

- **Change PLOGI Retry Timer (+Advanced Option+):** This option sets the interval for the port log-in (PLOGI) retry timer. The factory default value is **NoPLOGI Retry: 0 msec**.

- **Topology Selection (+Advanced Option+):** If it is necessary to change the topology, do so before you configure the boot devices.

- **Enable or Disable Spinup Delay (+Advanced Option+):** This option enables or disables the spin up delay. The factory default value is **Disabled**.

- **Auto Scan Setting (+Advanced Option+):** This option enables the first device in the boot entry list to issue a Name Server Inquiry. The factory default value is **Disabled**.

- **Enable, Disable EDD 3.0 (+Advanced Option+):** This option enables or disables the Enhanced Disk Drive (EDD) option that is available on Intel® Itanium® (IA-64) servers only. Enabling EDD 3.0 displays the path to the boot device. The factory default value is **Disabled**.

- **Enable or Disable Start Unit Command (+Advanced Option+):** This command is used to issue the small computer system interface (SCSI) start unit command for various devices, such as tape backup units that are attached to the SAN. You must know the specific LUN of the applicable device to issue the SCSI start unit command. The factory default value is **Disabled**.

- **Enable or Disable Environment Variable (+Advanced Option+):** This option enables or disables the ability to set the boot controller order, if the system supports the environment variable. The factory default value is **Disabled**.

- **Auto Sector Format Select:** This option automatically defines the boot sector (32-sector or 63-sector) of the target disk. The factory default value is **Enabled**.

To reset a parameter for an adapter to its default value, complete the following steps:

1. Select the applicable adapter.
2. Select the applicable option on the configuration menu.
3. Press **d**.

For more detailed information about the Emulex BIOS utility and the x86 BootBIOS, see the Emulex *x86 BootBIOS User Manual* at http://www.ibm.com/systems/bladecenter/.

Chapter 5. Using the Emulex HBAnyware utility

This chapter provides an overview of the Emulex HBAnyware utility for advanced users who want to customize the configuration of a Fibre Channel expansion card that is installed in any type of blade server that supports the video function. For more detailed information, see the HBAnyware utility online help or the documentation that comes with the HBAnyware utility.

Overview of the Emulex HBAnyware utility

The Emulex HBAnyware utility is used to configure a storage area network (SAN) environment that consists of Fibre Channel host bus adapters (HBAs). It is a network-capable application that can connect to and configure remote systems, enabling centralized management and configuration of HBA components.

To use the Emulex HBAnyware utility, you must have a supported Microsoft Windows or Linux operating system and the applicable device drivers installed in your Fibre Channel network. If the required device drivers for your operating system did not come with the Emulex HBAnyware utility, you can obtain the device drivers from http://www.ibm.com/systems/support/. For additional information about the supported operating systems, see Chapter 3, "Updating the boot code and firmware and installing device drivers," on page 11.

Notes:

1. Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.
2. This document might contain references or links to other companies' Web sites, also known as *non-IBM Web sites*. As of the date of this document, the non-IBM Web sites are correct. However, these sites might be updated after this document has been published. Certain conditions apply to the usage of non-IBM Web sites. For additional information, see Appendix C, "Notices," on page 47.

You can use the HBAnyware utility to manage and control one or more expansion cards that are installed on local or remote systems. The HBAnyware utility is used, along with problem determination procedures (PDPs), on new or existing installations to help diagnose Fibre Channel (FC) subsystem problems in adapters, controllers, and devices that are attached to the FC fabric or loop.

You can also perform the following operations using the HBAnyware utility to configure devices in your system:

Table 3. HBAnyware utility operations for configuring devices

Operation	Description
Discover local/remote hosts	When a device is set as unconfigured, it is not recognized by the HBA and is not accessible to the HBA on that system.
Set HBA driver parameters to a single adapter or multiple adapters	This operation allows you to set driver parameters to optimize driver performance for a particular operating system or application. You can set parameters on a single adapter or multiple adapters simultaneously through batch mode. **Note:** For the Linux operating system, only the following driver parameters can be set on a per-adapter basis through the HBAnyware utility: • log_verbose • nodev-tmo • use_adisc
Update firmware on single or multiple adapters	This operation allows you to update adapter firmware and boot code on a single adapter or multiple adapters simultaneously through batch mode.

Run diagnostics including loopback and echo tests	This operation allows you to run diagnostics on an adapter. Options include the following tests:
	• A quick test
	• A full power-on self-test (POST)
	• More advanced diagnostics:
	  – A peripheral component interconnect (PCI) Loopback (testing the PCI bus)
	  – An internal loopback (on the adapter)
	  – An external loopback (requires an external plug)

To reset a parameter for a host bus adapter to its default value, complete the following steps:

1. Select the applicable adapter.
2. Select the **Driver Parameters** tab on the Adapter Properties window.
3. Click the **default** button.

Installation and system requirements

Make sure that you are using the latest version of the HBAnyware utility for the expansion card. See http://www.ibm.com/systems/bladecenter/ or <http://www.ibm.com/servers/eserver/serverproven/compat/us/ for the latest information about the HBAnyware utility. The latest instructions and system requirements are in the documentation that comes with the HBAnyware utility.

Features

The HBAnyware utility enables you to perform the following tasks:

- Depending on the device driver, set the HBAnyware utility options
- Connect to hosts
- Discover and manage HBAs on the SAN through Fibre Channel and IP discovery
- Diagnostics features:
  - PCI, internal, and external loopback tests
  - User-initiated POST (adapter health check)
  - End-to-end tests (based on the Echo command)
  - Ping and trace route
  - Firmware/device-driver dump
- Use host-to-host SAN configuration policies:
  - Configuration profiles (device-driver parameters saved into and reloaded from a file)
  - Auto persistent binding (Microsoft Windows operating system only)
  - HBA/port alias symbolic name
  - Emulex vital product data (eVPD)
  - Flash/firmware update
  - Boot code update
  - Activate loading of expansion ROM boot code for support of remote boot function
- Configure port devices
- Use logical unit number (LUN) level configuration and target binding (Microsoft Windows operating system only)
- Review host adapter information, including:
  - General information
  - Statistics
  - Information about attached devices
  - Link status for attached device
- Perform adapter functions, including:
  - Configuring the adapter device-driver parameters
  - Running Fibre Channel diagnostics (read/write buffer loopback tests)
  - Performing flash updates on an adapter
- Manage configurations: Configuring a single HBA or multiple adapters
- Confirming security

Chapter 6. Parts listing

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty, see Appendix B, "Warranty," on page 29.

The replaceable component in the following table is a Tier 1 CRU only.

Name of component	CRU/FRU identifier
Emulex 4 Gb Fibre Channel Expansion Card (CFFv) for IBM BladeCenter	43W6862 (Tier 1 CRU)

If other BladeCenter components require replacement, see the following documentation that comes with these devices:

- BladeCenter *Problem Determination and Service Guide* or *Hardware Maintenance Manual and Troubleshooting Guide*
- *Installation and User's Guide* or *Installation Guide*

Notes:

1. The latest versions of these documents are on the IBM Support Web site, http://www.ibm.com/systems/support/.
2. Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

Chapter 7. Solving problems

If you are having a problem with the expansion card, use the following information to help you determine the cause of the problem and the action to take. Additional troubleshooting and debugging procedures are available in the *Problem Determination Service Guide* or *Hardware Maintenance Manual and Troubleshooting Guide* for the blade server.

Make sure that you are using the latest versions of device drivers, firmware code, and BIOS code for your blade server, the management module, and the I/O modules that are used by the I/O expansion card. If these items are obsolete, the BladeCenter unit might not recognize the Fibre Channel expansion card and might not turn it on. To download the most recent device drivers and firmware and BIOS boot code updates, go to http://www.ibm.com/systems/support/ for the latest information about upgrading the device drivers, firmware, and BIOS code for BladeCenter components. The instructions are in the documentation that comes with the updates.

Notes:

1. Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.

2. This document might contain references or links to other companies' Web sites, also known as *non-IBM Web sites.* As of the date of this document, the non-IBM Web sites are correct. However, these sites might be updated after this document has been published. Certain conditions apply to the usage of non-IBM Web sites. For additional information, see Appendix C, "Notices," on page 47.

If you cannot locate and correct a problem by using the information in this chapter, see Appendix A, "Getting help and technical assistance," on page 27.

Hardware problems

To determine whether the installation problem is caused by the hardware, perform the following tasks:

- Make sure that the expansion card is correctly installed in the blade server. For additional information, see the *Installation and User's Guide* that comes with the blade server.
- Make sure that the blade server is correctly installed in the BladeCenter unit.
- Make sure that the HBAnyware utility device-driver parameters are correct.
  - If the expansion card is installed in a blade server that supports the video function, see Chapter 5, "Using the Emulex HBAnyware utility," on page 17.
  - If the expansion card is installed in a blade server that *does not* support the video function, you can use the Emulex HBAnyware utility from a remote host through a network connection to a blade server in which the expansion card is installed. You can also configure the expansion card remotely by launching the Emulex HBAnyware utility from an IBM Director console.
- Make sure that an I/O module that supports Fibre Channel operation is correctly installed in I/O-module bay 3, I/O-module bay 4, or both I/O-module bays 3 and 4 of the BladeCenter unit.

- Make sure that all peripheral devices are:
  - Correctly connected to the I/O modules
  - Turned on
  - Operating correctly

  Notes:
  1. For additional information, see the documentation that comes with the peripheral devices.
  2. If the expansion card is installed in a BladeCenter HS21, LS21, or LS41 blade server, see the documentation that comes with the blade server for information about displaying attached Fibre Channel devices.

Software problems

To determine whether the installation problem is caused by the software, perform the following tasks:

- Make sure that the correct device drivers are installed. To download or get information about the latest supported device drivers, utilities, and documentation, see http://www.ibm.com/systems/support/. Also see the *Installation and User's Guide* for the blade server for additional information.
- Make sure that the BIOS functional firmware and boot code in the expansion card are at the latest levels.
- Make sure that you are using the correct expansion-card NVRAM settings for the storage area network (SAN) and operating system.

System-configuration problems

To determine whether the installation problem is caused by the system configuration, perform the following tasks:

- Make sure that the I/O modules that support Fibre Channel operation are correctly configured.
- Make sure that the blade server is correctly configured.
- Make sure that the BladeCenter unit and all other BladeCenter components are correctly configured.

Note: For additional information, see the documentation that comes with the blade server and the BladeCenter unit.

If you still have a system-configuration problem, you need to determine whether the system board in the blade server requires a special configuration. To determine whether the system board requires a special configuration, see the documentation that comes with your BladeCenter unit and blade server, or contact your IBM technical-support representative. For additional information about other configuration requirements, see the documentation that comes with your BladeCenter unit, blade server, and other BladeCenter components.

Fibre Channel device problems

To determine whether your problem is caused by an attached Fibre Channel device, perform the following tasks:

- Make sure that an I/O module that supports Fibre Channel operation is correctly installed in I/O-module bay 3, I/O-module bay 4, or both I/O-module bays 3 and 4 of the BladeCenter unit.
- Make sure that the blade server is turned on.
- Make sure that the BladeCenter expansion-card settings are the correct values:
  - If the expansion card is installed in a blade server that supports the video function, see Chapter 5, "Using the Emulex HBAnyware utility," on page 17 for additional information.
  - If the expansion card is installed in a blade server that *does not* support the video function, you can use the Emulex HBAnyware utility from a remote host through a network connection to the blade server in which the expansion card is installed. You can also configure the expansion card remotely by launching the Emulex HBAnyware utility from an IBM Director console.
  - See the troubleshooting section of the documentation that comes with the applicable Emulex device driver.
  - If you determine that the system is correctly configured, see the diagnostics section of the applicable device driver *Installation Guide* or *User's Guide*.

Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system.
- Go to the IBM support Web site at http://www.ibm.com/systems/support/ to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/systems/support/ and follow the instructions. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, the IBM Web site has up-to-date information about IBM systems, optional devices, services, and support. The address for IBM System x™ and xSeries® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/intellistation/.

27

You can find service information for IBM systems and optional devices at
http://www.ibm.com/systems/support/.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage,
configuration, and software problems with System x and xSeries servers,
BladeCenter products, IntelliStation workstations, and appliances. For information
about which products are supported by Support Line in your country or region, see
http://www.ibm.com/services/sl/products/.

For more information about Support Line and other IBM services, see
http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support
telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV
(1-800-426-7378).

Hardware service and support

You can receive hardware service through IBM Services or through your IBM
reseller, if your reseller is authorized by IBM to provide warranty service. See
http://www.ibm.com/planetwide/ for support telephone numbers, or in the U.S. and
Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day,
7 days a week. In the U.K., these services are available Monday through Friday,
from 9 a.m. to 6 p.m.

IBM Taiwan product service

台灣 IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路 7 號 3 樓
電話：0800-016-888

IBM Taiwan product service contact information:
   IBM Taiwan Corporation
   3F, No 7, Song Ren Rd.
   Taipei, Taiwan
   Telephone: 0800-016-888

Appendix B. Warranty

IBM provides hardware warranty service for this product equivalent to that described in the IBM Statement of Limited Warranty ("SOLW"), a copy of which is included, notwithstanding the section entitled, "What this Warranty Does not Cover" of the SOLW. All references to "Machine" in the SOLW apply to this product (except for its firmware or accompanying software) for purposes of the warranty. References to "IBM's Official Published Specifications" mean the specifications for the product designated by IBM. Any firmware or software included in or which accompanies this product is subject to the terms and conditions of the manufacturer's end user license agreement.

IBM Statement of Limited Warranty Z125-4753-09 08/2006

Part 1 - General Terms

Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms, Part 2 - Country-unique Terms, and Part 3 - Warranty Information. The terms of Part 2 replace or modify those of Part 1.

The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. **NOTHING IN THIS STATEMENT OF LIMITED WARRANTY AFFECTS ANY STATUTORY RIGHTS OF CONSUMERS THAT CANNOT BE WAIVED OR LIMITED BY CONTRACT.**

This Statement of Limited Warranty is available, in multiple languages, at the following IBM Internet website: http://www.ibm.com/servers/support/machine_warranties/.

What this Warranty Covers

IBM warrants that each Machine is free from defects in materials and workmanship and conforms to its Specifications. "Specifications" is information specific to a Machine in a document entitled "Official Published Specifications" which is available upon request.

During the warranty period, IBM provides repair and exchange service for the Machine under the type of warranty service IBM designates for the Machine. The warranty period for the Machine is a fixed period starting on its original Date of Installation. The date on your purchase invoice or sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise. The warranty period, type of warranty, and service level that apply to your Machine are designated in Part 3.

Many features, conversions, or upgrades involve the removal of parts and their return to IBM. An IBM part that replaces a removed part will assume the warranty service status of the removed part. An IBM part that is added to a Machine without replacing a previously-installed part is subject to warranty effective on its Date of

29

Installation. Unless IBM specifies otherwise, the warranty period, type of warranty, and service level of such part is the same as the Machine on which it is installed.

Unless IBM specifies otherwise, these warranties apply only in the country or region in which you purchased the Machine.

THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

What this Warranty Does not Cover

This warranty does not cover the following:

1. failure or damage resulting from misuse (including but not limited to use of any Machine capacity or capability, other than that authorized by IBM in writing), accident, modification, unsuitable physical or operating environment, or improper maintenance by you;
2. failure caused by a product for which IBM is not responsible;
3. any non-IBM products, including those provided with, or installed on, an IBM Machine at your request;
4. accessories, supply items and consumables (e.g. batteries and printer cartridges), and structural parts (e.g. frames and covers);
5. service of Machine alterations; and
6. service of a Machine on which you are using capacity or capability, other than that authorized by IBM in writing.

The warranty is voided by removal or alteration of identification labels on the Machine or its parts.

IBM does not warrant uninterrupted or error-free operation of a Machine.

Any technical or other support provided for a Machine under warranty, such as assistance with "how-to" questions and those regarding Machine set-up and installation, is provided **WITHOUT WARRANTIES OF ANY KIND**.

How to Obtain Warranty Service

If the Machine does not function as warranted during the warranty period, contact IBM or your reseller to obtain warranty service. Contact information for IBM is provided in Part 3. If you do not register the Machine with IBM, you may be required to present proof of purchase as evidence of your entitlement to warranty service.

What IBM Will Do to Correct Problems

IBM will attempt to diagnose and resolve your problem over the telephone or electronically by access to an IBM Internet website. Certain Machines contain remote support capabilities for direct problem reporting, remote problem determination and resolution with IBM. When you contact IBM for service, you must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service is required, a service technician will be scheduled for service at your location.

You are responsible for downloading or obtaining from IBM, and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM Machine) and other software updates in a timely manner from an IBM Internet website or from other electronic media, and following the instructions that IBM provides. You may request IBM to install Machine Code changes, however, you may be charged for that service.

Some parts of IBM Machines are designated as Customer Replaceable Units ("CRUs"). If your problem can be resolved with a CRU (e.g., keyboard, memory, hard disk drive), IBM will ship the CRU to you for you to install.

If the Machine does not function as warranted during the warranty period and your problem cannot be resolved over the telephone or electronically, through your application of Machine Code or software updates, or with a CRU, IBM or its subcontractor or a reseller that has been approved by IBM to provide warranty service, will either, at its discretion, 1) repair it to make it function as warranted, or 2) replace it with one that is at least functionally equivalent. If IBM or its subcontractor or the reseller is unable to do either, you may return the Machine to your place of purchase and your money will be refunded.

IBM or its subcontractor or the reseller will also manage and install selected engineering changes that apply to the Machine.

Exchange of a Machine or Part

When the warranty service involves the exchange of a Machine or part, the item IBM or its subcontractor or the reseller replaces becomes IBM's property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item.

Your Additional Responsibilities

You agree:
1. before IBM or its subcontractor or the reseller exchanges a Machine or part, to remove all features, parts, options, alterations, and attachments not under warranty service and ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;
2. to obtain authorization from the owner to have IBM or its subcontractor or the reseller service a Machine that you do not own;
3. where applicable, before service is provided:
   a. follow the service request procedures that IBM or its subcontractor or its reseller provides;

b. backup and secure all programs, data, and funds contained in the Machine; and
   c. inform IBM or its subcontractor or the reseller of changes in the Machine's location;
4. to provide IBM or its subcontractor or the reseller with sufficient and safe access to your facilities to permit IBM to fulfill its obligations;
5. to allow IBM or its subcontractor or the reseller to install mandatory engineering changes, such as those required for safety;
6. when the type of warranty service requires that you deliver a failing Machine to IBM, you agree to ship it suitably packaged, as IBM specifies, to a location IBM designates. After the Machine has been repaired or exchanged, IBM will return the repaired Machine or provide a replacement Machine to you at its expense, unless IBM specifies otherwise. IBM is responsible for loss of, or damage to, your Machine only while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges; and
7. to securely erase from any Machine you return to IBM for any reason all programs not provided by IBM with the Machine, and data, including without limitation the following: 1) information about identified or identifiable individuals or legal entities ("Personal Data") and 2) your confidential or proprietary information and other data. If removing or deleting Personal Data is not possible, you agree to transform such information (e.g., by making it anonymous or encrypting it) so that it no longer qualifies as Personal Data under applicable law. You also agree to remove all funds from Machines returned to IBM. IBM is not responsible for any funds, programs not provided by IBM with the Machine, or data contained in a Machine that you return to IBM. You acknowledge that, to perform its responsibilities under this Statement of Limited Warranty, IBM may ship all or part of the Machine or its software to other IBM or third party locations around the world, and you authorize IBM to do so.

Limitation of Liability

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than:
1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

This limit also applies to IBM's suppliers, subcontractors, and resellers. It is the maximum for which IBM and its suppliers, subcontractors and resellers are collectively responsible.

UNDER NO CIRCUMSTANCES IS IBM OR ITS SUPPLIERS, SUBCONTRACTORS, OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING EVEN IF INFORMED OF THEIR POSSIBILITY: 1) THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, DATA; 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR 4) LOST PROFITS, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS. SOME STATES OR JURISDICTIONS

DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR
CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION
MAY NOT APPLY TO YOU.

Governing Law

Both you and IBM consent to the application of the laws of the country in which you
acquired the Machine to govern, interpret, and enforce all of your and IBM's rights,
duties, and obligations arising from, or relating in any manner to, the subject matter
of this Statement of Limited Warranty, without regard to conflict of law principles.

THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY
ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE OR
JURISDICTION TO JURISDICTION.

Jurisdiction

All of our rights, duties, and obligations are subject to the courts of the country in
which you acquired the Machine.

Part 2 - Country-unique Terms

AMERICAS

Jurisdiction: *The following sentence is added to this section as it applies to
countries in bold print below:*

Any litigation arising from this Statement of Limited Warranty will be settled
exclusively by 1) in **Argentina**; the Ordinary Commercial Court of the city of Buenos
Aires; 2) in **Bolivia**; the courts of the city of La Paz; 3) in **Brazil**; court of Rio de
Janeiro, RJ; 4) in **Chile**; the Civil Courts of Justice of Santiago; 5) in **Colombia**; the
Judges of the Republic of Colombia; 6) in **Equador**; the civil judges of Quito for
executory or summary proceedings (as applicable); 7) in **Mexico**; the courts located
in Mexico City, Federal District; 8) in **Paraguay**; the courts of the city of Asuncion;
9) in **Peru**; the judges and tribunals of the judicial district of Lima, Cercado; 10) in
Uruguay; the courts of the city of Montevideo; 11) in **Venezuela**; the courts of the
metropolitan area of the city of Caracas.

BRAZIL

Exchange of a Machine or Part: *Delete the last sentence:*

The replacement assumes the warranty service status of the replaced item.

CANADA

What this Warranty Covers: *The following replaces the 2nd paragraph to this
section:*

During the warranty period, IBM provides repair and exchange service for the
Machine under the type of warranty service IBM designates for the Machine. The
warranty period for the Machine is a fixed period starting on its original Date of
Installation. The date on your purchase invoice or sales receipt is the Date of
Installation unless IBM informs you otherwise. The warranty period, type of
warranty, and service level that apply to your Machine are designated in Part 3.

Limitation of Liability: *The following replaces item 1 and item 2 of this section:*

1. damages for bodily injury (including death) or physical harm to real property and tangible personal property caused by IBM's negligence; and

2. the amount of any other actual direct damages, up to the greater of $100,000.00 or the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws in the Province of Ontario.

PERU

Limitation of Liability: *The following is added at the end of this section:*

In accordance with Article 1328 of the Peruvian Civil Code the limitations and exclusions specified in this section will not apply to damages caused by IBM's willful misconduct ("dolo") or gross negligence ("culpa inexcusable").

UNITED STATES

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York

ASIA PACIFIC

AUSTRALIA

What this Warranty Covers: *The following paragraph is added to this section:*

The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

Limitation of Liability: *The following is added to this section:*

Where IBM is in breach of a condition or warranty implied by the Trade Practices Act 1974 or other similar legislation, IBM's liability is limited to the repair or replacement of the goods or the supply of equivalent goods. Where that condition or warranty relates to right to sell, quiet possession or clear title, or the goods are of a kind ordinarily acquired for personal, domestic or household use or consumption, then none of the limitations in this paragraph apply.

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State or Territory

CAMBODIA AND LAOS

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York, United States of America

CAMBODIA, INDONESIA, AND LAOS

Arbitration: *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Singapore in accordance with the Arbitration Rules of Singapore International Arbitration Center ("SIAC Rules") then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the SIAC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

HONG KONG S.A.R.

As applies to transactions initiated and performed in Hong Kong S.A.R., phrases throughout this Agreement containing the word "country" (for example, "country of purchase" and "country of Installation") are replaced with "Hong Kong S.A.R."

INDIA

Limitation of Liability: *The following replaces items 1 and 2 of this section:*
1. liability for bodily injury (including death) or damage to real property and tangible personal property will be limited to that caused by IBM's negligence; and
2. as to any other actual damage arising in any situation involving nonperformance by IBM pursuant to, or in any way related to the subject of this Statement of Limited Warranty, the charge paid by you for the individual Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

Arbitration: *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Bangalore, India in accordance with the laws of India then in effect. The arbitration award shall be final

and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Bar Council of India. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

JAPAN

Governing Law: *The following sentence is added to this section:*

Any doubts concerning this Statement of Limited Warranty will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

MACAU S.A.R.

As applies to transactions initiated and performed in Macau S.A.R., phrases throughout this Agreement containing the word "country" (for example, "country of purchase" and "country of Installation") are replaced with "Macau S.A.R."

MALAYSIA

Limitation of Liability: *The word "**SPECIAL**" in item 3 of the fifth paragraph is deleted.*

NEW ZEALAND

What this Warranty Covers: *The following paragraph is added to this section:*

The warranties specified in this section are in addition to any rights you may have under the Consumer Guarantees Act 1993 or other legislation which cannot be excluded or limited. The Consumer Guarantees Act 1993 will not apply in respect of any goods which IBM provides, if you require the goods for the purposes of a business as defined in that Act.

Limitation of Liability: *The following is added to this section:*

Where Machines are not acquired for the purposes of a business as defined in the Consumer Guarantees Act 1993, the limitations in this Section are subject to the limitations in that Act.

PEOPLE'S REPUBLIC OF CHINA (PRC)

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*

laws of the State of New York, United States of America (except when local law requires otherwise).

PHILIPPINES

Limitation of Liability: *Item 3 in the fifth paragraph is replaced by the following:*

SPECIAL (INCLUDING NOMINAL AND EXEMPLARY DAMAGES), MORAL, INCIDENTAL, OR INDIRECT DAMAGES FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR

Arbitration: *The following is added under this heading:*

Disputes arising out of or in connection with this Statement of Limited Warranty shall be finally settled by arbitration which shall be held in Metro Manila, Philippines in accordance with the laws of the Philippines then in effect. The arbitration award shall be final and binding for the parties without appeal and shall be in writing and set forth the findings of fact and the conclusions of law.

The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator. The two arbitrators appointed by the parties shall appoint a third arbitrator who shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the Philippine Dispute Resolution Center, Inc. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

If one of the parties refuses or otherwise fails to appoint an arbitrator within 30 days of the date the other party appoints its, the first appointed arbitrator shall be the sole arbitrator, provided that the arbitrator was validly and properly appointed.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The English language version of this Statement of Limited Warranty prevails over any other language version.

SINGAPORE

Limitation of Liability: *The words "**SPECIAL**" and "**ECONOMIC**" in item 3 in the fifth paragraph are deleted.*

EUROPE, MIDDLE EAST, AFRICA (EMEA)

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:

The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

How to Obtain Warranty Service:

*Add the following paragraph in **Western Europe** (Andorra, Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, Vatican State, and any country subsequently added to the European Union, as from the date of accession):*

The warranty for Machines acquired in Western Europe shall be valid and applicable in all Western Europe countries provided the Machines have been announced and made available in such countries.

If you purchase a Machine in one of the Western European countries, as defined above, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM, provided the Machine has been announced and made available by IBM in the country in which you wish to obtain service.

If you purchase a Machine in a Middle East or African country, you may obtain warranty service for that Machine from the IBM entity within the country of purchase, if that IBM entity provides warranty service in that country, or from an IBM reseller, approved by IBM to perform warranty service on that Machine in that country. Warranty service in Africa is available within 50 kilometers of an IBM approved service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM approved service provider.

Governing Law: *The phrase "the laws of the country in which you acquired the Machine" is replaced by:*

1) "the laws of Austria" **in Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, FYR Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan;** 2) "the laws of France" **in Algeria, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Libya, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna;** 3) "the laws of Finland" **in Estonia, Latvia, and Lithuania;** 4) "the laws of England" **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, the United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe;** and 5) "the laws of South Africa" **in South Africa, Namibia, Lesotho and Swaziland.**

Jurisdiction: *The following exceptions are added to this section:*

1) **In Austria** the choice of jurisdiction for all disputes arising out of this Statement of Limited Warranty and relating thereto, including its existence, will be the competent court of law in Vienna, Austria (Inner-City); 2) **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe** all disputes arising out of this Statement of Limited Warranty or related to its execution, including summary proceedings, will be submitted to the exclusive jurisdiction of the English courts; 3) **in Belgium and Luxembourg**, all disputes arising out of this Statement of Limited Warranty or related to its interpretation or its execution, the law, and the courts of the capital city, of the country of your registered office and/or commercial site location only are competent; 4) **in France, Algeria, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo,**

Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Libya, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna all disputes arising out of this Statement of Limited Warranty or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 5) **in South Africa, Namibia, Lesotho and Swaziland**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the High Court in Johannesburg; 6) **in Turkey** all disputes arising out of or in connection with this Statement of Limited Warranty shall be resolved by the Istanbul Central (Sultanahmet) Courts and Execution Directorates of Istanbul, the Republic of Turkey; 8) in each of the following specified countries, any legal claim arising out of this Statement of Limited Warranty will be brought before, and settled exclusively by, the competent court of a) Athens for **Greece**, b) Tel Aviv-Jaffa for **Israel**, c) Milan for **Italy**, d) Lisbon for **Portugal**, and e) Madrid for **Spain**; and 8) **in the United Kingdom**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the English courts.

Arbitration: *The following is added under this heading:*

In Albania, Armenia, Azerbaijan, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Libya, FYR Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan all disputes arising out of this Statement of Limited Warranty or related to its violation, termination or nullity will be finally settled under the Rules of Arbitration and Conciliation of the International Arbitral Center of the Federal Economic Chamber in Vienna (Vienna Rules) by three arbitrators appointed in accordance with these rules. The arbitration will be held in Vienna, Austria, and the official language of the proceedings will be English. The decision of the arbitrators will be final and binding upon both parties. Therefore, pursuant to paragraph 598 (2) of the Austrian Code of Civil Procedure, the parties expressly waive the application of paragraph 595 (1) figure 7 of the Code. IBM may, however, institute proceedings in a competent court in the country of installation.

In Estonia, Latvia and Lithuania all disputes arising in connection with this Statement of Limited Warranty will be finally settled in arbitration that will be held in Helsinki, Finland in accordance with the arbitration laws of Finland then in effect. Each party will appoint one arbitrator. The arbitrators will then jointly appoint the chairman. If arbitrators cannot agree on the chairman, then the Central Chamber of Commerce in Helsinki will appoint the chairman.

EUROPEAN UNION (EU)

THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:

The warranty for Machines acquired in EU countries is valid and applicable in all EU countries provided the Machines have been announced and made available in such countries.

DENMARK, FINLAND, GREECE, ITALY, NETHERLANDS, NORWAY, PORTUGAL, SPAIN, SWEDEN AND SWITZERLAND

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:

1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty or due to any other cause related to this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault) or of such cause, for a maximum amount equal to the charges you paid for the Machine. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

   The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, OR ITS SUPPLIERS, SUBCONTRACTORS, OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

FRANCE AND BELGIUM

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

Except as otherwise provided by mandatory law:
1. IBM's liability for any damages and losses that may arise as a consequence of the fulfillment of its obligations under or in connection with this Statement of Limited Warranty is limited to the compensation of only those damages and losses proved and actually arising as an immediate and direct consequence of the non-fulfillment of such obligations (if IBM is at fault), for a maximum amount equal to the charges you paid for the Machine that has caused the damages. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code ("LIC").

   The above limitation shall not apply to damages for bodily injuries (including death) and damages to real property and tangible personal property for which IBM is legally liable.

2. **UNDER NO CIRCUMSTANCES IS IBM, OR ITS SUPPLIERS, SUBCONTRACTORS, OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING, EVEN IF INFORMED OF THEIR POSSIBILITY: 1) LOSS OF, OR DAMAGE TO, DATA; 2) INCIDENTAL OR INDIRECT DAMAGES, OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; 3) LOST PROFITS, EVEN IF THEY ARISE AS AN IMMEDIATE CONSEQUENCE OF THE EVENT THAT GENERATED THE DAMAGES; OR 4) LOSS OF BUSINESS, REVENUE, GOODWILL, OR ANTICIPATED SAVINGS.**

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA AND GERMANY

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section:*

The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The minimum warranty period for Machines is twelve months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a price reduction as far as justified by the reduced value of the unrepaired Machine or ask for a cancellation of the respective agreement for such Machine and get your money refunded.

The second paragraph does not apply.

What IBM Will Do to Correct Problems: *The following is added to this section:*

During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

Limitation of Liability: *The following paragraph is added to this section:*

The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

The following sentence is added to the end of item 2:

IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

IRELAND

What this Warranty Covers: *The following is added to this section:*

Except as expressly provided in these terms and conditions or Section 12 of the Sale of Goods Act 1893 as amended by the Sale of Goods and Supply of Services Act, 1980 ("the 1980 Act"), all conditions or warranties (express or implied, statutory or otherwise) are hereby excluded including, without limitation, any warranties implied by the Sale of Goods Act 1893 as amended by the 1980 Act (including, for the avoidance of doubt, section 39 of the 1980 Act).

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default occurring on the date of occurrence of the last such Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for death or personal injury caused by the negligence of IBM.

2. Subject always to the **Items for Which IBM is Not Liable** below, IBM will accept unlimited liability for physical damage to your tangible property resulting from the negligence of IBM.
3. Except as provided in items 1 and 2 above, IBM's entire liability for actual damages for any one Default will not in any event exceed the greater of 1) EUR 125,000, or 2) 125% of the amount you paid for the Machine directly relating to the Default.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM, its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:
1. loss of, or damage to, data;
2. special, indirect, or consequential loss; or
3. loss of profits, business, revenue, goodwill, or anticipated savings.

SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND

Limitation of Liability: *The following is added to this section:*

IBM's entire liability to you for actual damages arising in all situations involving nonperformance by IBM in respect of the subject matter of this Statement of Warranty will be limited to the charge paid by you for the individual Machine that is the subject of your claim from IBM.

SWITZERLAND

Your Additional Responsibilities: *The following sentence is added to this section:*

Personal Data also includes information about you as a legal entity.

TURKEY

What this Warranty Covers: *The following is added to this section:*

The minimum warranty period for Machines is 2 years.

UNITED KINGDOM

Limitation of Liability: *The following replaces the terms of this section in its entirety:*

For the purposes of this section, a "Default" means any act, statement, omission, or negligence on the part of IBM in connection with, or in relation to, the subject matter of this Statement of Limited Warranty in respect of which IBM is legally liable to you, whether in contract or tort. A number of Defaults which together result in, or contribute to, substantially the same loss or damage will be treated as one Default.

Circumstances may arise where, because of a Default, you are entitled to recover damages from IBM.

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for:
   a. death or personal injury caused by the negligence of IBM; and

      b. any breach of its obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982, or any statutory modification or re-enactment of either such Section.

2. IBM will accept unlimited liability, subject always to the **Items for Which IBM is Not Liable** below, for physical damage to your tangible property resulting from the negligence of IBM.

3. IBM's entire liability for actual damages for any one Default will not in any event, except as provided in items 1 and 2 above, exceed the greater of 1) Pounds Sterling 75,000, or 2) 125% of the total purchase price payable or the charges for the Machine directly relating to the Default.

These limits also apply to IBM's suppliers and resellers. They state the maximum for which IBM and such suppliers and resellers are collectively responsible.

Items for Which IBM is Not Liable

Save with respect to any liability referred to in item 1 above, under no circumstances is IBM or any of its suppliers or resellers liable for any of the following, even if IBM or they were informed of the possibility of such losses:
1. loss of, or damage to, data;
2. special, indirect, or consequential loss;
3. loss of profits, business, revenue, goodwill, or anticipated savings; or
4. third party claims against you for damages.

Part 3 - Warranty Information

Machine - Emulex 4 Gb Fibre Channel Expansion Card (CFFv) for IBM BladeCenter

Country or Region of Purchase	Warranty Period	Type of Warranty Service*
Worldwide	1 year	1
* See "Types of Warranty Service" for the legend and explanations of warranty-service types.		

Scheduling of a warranty service will depend upon the following: 1) the time your request for service is received, 2) Machine technology, and 3) availability of parts. Contact your local IBM representative or the subcontractor or reseller performing services on behalf of IBM for country and location specific information.

Types of Warranty Service

1. **Customer Replaceable Unit ("CRU") Service**

   IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your Machine and are available from IBM at any time on your request. CRUs are designated as being either Tier 1 or a Tier 2 CRU. Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation. You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service designated for your Machine. IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

2. **On-site Service**

   IBM or your reseller will either repair or exchange the failing Machine at your location and verify its operation. You must provide suitable working area to allow disassembly and reassembly of the IBM Machine. The area must be clean, well lit and suitable for the purpose. For some Machines, certain repairs may require sending the Machine to an IBM service center.

3. **Courier or Depot Service**

   You will disconnect the failing Machine for collection arranged by IBM. IBM will provide you with a shipping container for you to return your Machine to a designated service center. A courier will pick up your Machine and deliver it to the designated service center. Following its repair or exchange, IBM will arrange the return delivery of the Machine to your location. You are responsible for its installation and verification.

4. **Customer Carry-In or Mail-In Service**

   You will deliver or mail as IBM specifies (prepaid unless IBM specifies otherwise) the failing Machine suitably packaged to a location IBM designates. After IBM has repaired or exchanged the Machine, IBM will make it available for your collection or, for Mail-in Service, IBM will return it to you at IBM's expense, unless IBM specifies otherwise. You are responsible for the subsequent installation of the Machine and verification of its operation.

5. **CRU and On-site Service***

   This type of Warranty Service is a combination of Type 1 and Type 2 (see above).

6. **CRU and Courier or Depot Service***

   This type of Warranty Service is a combination of Type 1 and Type 3 (see above).

7. **CRU and Customer Carry-In or Mail-In Service***

   This type of Warranty Service is a combination of Type 1 and Type 4 (see above).

8. **Machine Exchange Service**

   IBM will initiate shipment of a replacement Machine to your location. You are responsible for its installation and verification of its operation. You must pack the failing Machine into the shipping container that contained the replacement Machine and return the failing Machine to IBM. Transportation charges, both ways, are paid by IBM. You may be charged for the replacement Machine if IBM does not receive the failing Machine within 15 days of your receipt of the replacement Machine.

(*) When a 5, 6, or 7 type of warranty service is listed, IBM will determine which type of warranty service is appropriate for the repair.

Service Levels

Service levels specified below are response-time objectives only and are not guarantees. The specified service level may not be available in all worldwide locations. Charges may apply outside IBM's normal service area. Certain Machines with a Same Day On-site response-time objective may require the installation and use of remote connectivity tools and equipment for direct problem reporting, remote problem determination and resolution.

1. **Next Business Day (NBD), 9X5**

   After we receive your call, following problem determination, if IBM determines on-site service is required, a service technician will be scheduled to arrive at your location on the next business day. Service will be provided from 8:00 a.m. to 5:00 p.m. in your local time zone, Monday through Friday, excluding holidays.

2. **Same Business Day (SBD), 9X5**

   After we receive your call, following problem determination, if IBM determines on-site service is required, a service technician will be scheduled to arrive at your location within four hours. Service will be provided from 8:00 a.m. to 5:00 p.m. in your local time zone, Monday through Friday, excluding local IBM holidays. If after 1:00 p.m. it is determined that on-site service is required, a service technician will be scheduled to arrive the morning of the following business day.

3. **Same Day (SD), 24X7**

   After we receive your call, following problem determination, if IBM determines on-site service is required, a service technician will be scheduled to arrive at your location within four hours. This type of service will be provided 24 hours a day, every day, including holidays.

IBM Contact Information

For IBM in Canada or the United States, call 1-800-IBM-SERV (or 1-800-426-7378). For IBM in the European Union (EU), Asia Pacific, and Latin America countries, contact IBM in that country or visit the following IBM Internet website: http://www.ibm.com/servers/support/machine_warranties/.

Appendix C. Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product, and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

IBM	FlashCopy	TechConnect
IBM (logo)	i5/OS	Tivoli
Active Memory	IntelliStation	Tivoli Enterprise
Active PCI	NetBAY	Update Connector
Active PCI-X	Netfinity	Wake on LAN

47

AIX	Predictive Failure Analysis	XA-32
Alert on LAN	ServeRAID	XA-64
BladeCenter	ServerGuide	X-Architecture
Chipkill	ServerProven	XpandOnDemand
e-business logo	System x	xSeries
@server		

Intel, Intel Xeon, Itanium, and Pentium are trademarks of Intel Corporation in the United States, other countries, or both.

Microsoft, Windows, and Windows NT are trademarks of Microsoft Corporation in the United States, other countries, or both.

Adobe and PostScript are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Adaptec and HostRAID are trademarks of Adaptec, Inc., in the United States, other countries, or both.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Red Hat, the Red Hat "Shadow Man" logo, and all Red Hat-based trademarks and logos are trademarks or registered trademarks of Red Hat, Inc., in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

Important notes

Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

CD drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives available from IBM.

Maximum memory might require replacement of the standard memory with an optional memory module.

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven®, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

Some software may differ from its retail version (if available), and may not include user manuals or all program functionality.

Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at http://www.ibm.com/ibm/environment/products/prp.shtml.

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. IBM recomienda a los propietarios de equipos de tecnología de la información (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean útiles. IBM dispone de una serie de programas y servicios de devolución de productos en varios países, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar información sobre las ofertas de reciclado de productos de IBM en el sitio web de IBM http://www.ibm.com/ibm/environment/products/prp.shtml.
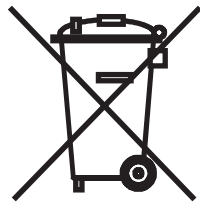
Notice: This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'etiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

Battery return program

This product may contain a sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, go to http://www.ibm.com/ibm/environment/products/batteryrecycle.shtml or contact your local waste disposal facility.

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and battery packs from IBM equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Have the IBM part number listed on the battery available prior to your call.

For Taiwan: Please recycle batteries.

廢電池請回收

For the European Union:
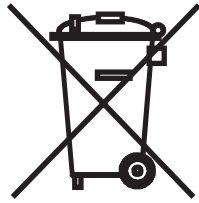
Notice: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

バッテリーあるいはバッテリー用のパッケージには、EU 諸国に対する廃電気電子機器指令 2006/66/EC のラベルが貼られています。この指令は、バッテリーと蓄電池、および廃棄バッテリーと蓄電池に関するものです。この指令は、使用済みバッテリーと蓄電池の回収とリサイクルの骨子を定めているもので、EU 諸国にわたって適用されます。このラベルは、使用済みになったときに指令に従って適正な処理をする必要があることを知らせるために種々のバッテリーに貼られています。

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, contact your local IBM representative.

For California:

Perchlorate material – special handling may apply. See http://www.dtsc.ca.gov/ hazardouswaste/perchlorate/.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

Electronic emission notices

Federal Communications Commission (FCC) statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a nonrecommended modification of the product, including the fitting of non-IBM option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN

55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Attention: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

European Community contact:
    IBM Technical Regulations
    Pascalstr. 100, Stuttgart, Germany 70569
    Telephone: 0049 (0)711 785 1176
    Fax: 0049 (0)711 785 1283
    E-mail: tjahn@de.ibm.com

Taiwanese Class A warning statement

警告使用者：
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Chinese Class A warning statement

声　　明
此为 A 级产品。在生活环境中，
该产品可能会造成无线电干扰。
在这种情况下，可能需要用户对其
干扰采取切实可行的措施。

Japanese Voluntary Control Council for Interference (VCCI) statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に
基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を
引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求
されることがあります。

Index

IBM.®

Part Number: 43W7820

Printed in USA