IBM BladeCenter
SAS Connectivity Module

IBM

Installation and User's Guide

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SAS Connectivity Module

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Installation and User's Guide

Note:

Before using this information and the product it supports, read the general information in Appendix D, "IBM Statement of Limited Warranty Z125-4753-09 08/2006," on page 81 and Appendix E, "Notices," on page 103.

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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.

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 the device covers, unless instructed otherwise in the installation and configuration procedures.**

Statement 2:

CAUTION:
When replacing the lithium battery, use only IBM Part Number 33F8354 or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

Do not:

- **Throw or immerse into water**
- **Heat to more than 100º C (212º F)**
- **Repair or disassemble**

Dispose of the battery as required by local ordinances or regulations.

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 installing your SAS Connectivity Module for IBM® BladeCenter® products in a BladeCenter unit. This *Installation and User's Guide* also contains information about configuring and managing the Serial Attached SCSI (small computer system interface) (SAS) connectivity module.

The SAS connectivity module provides a connection to I/O-module bay 3 and I/O-module bay 4 in the BladeCenter units. Each SAS connectivity module (up to two) is supported by a SAS expansion card in the BladeCenter unit. You must install a SAS expansion card for operation with each SAS connectivity module. For more information about the SAS expansion card, see the *SAS Expansion Card Installation and User's Guide* provided in the `Documentation` directory on the *Support* CD or at http://www.ibm.com/systems/support/.

For additional information about other BladeCenter components, see the instructions in your BladeCenter documentation.

Notes:
- Except where specifically stated otherwise in this document, the term connectivity module refers to the SAS connectivity module for IBM BladeCenter products.
- Except where specifically stated otherwise in this document, the IBM BladeCenter unit (for example, the BladeCenter Type 8677) is referred to as the BladeCenter unit.
- Throughout this document, the user name is also known as the login name, user identifier, or user ID for logging into one or more of the following interfaces or programs:
  - Telnet interface
  - Web-browser interface
  - Advanced Management Module Web-interface
  - Storage Configuration Manager application
- You can install up to two connectivity modules in a BladeCenter unit.

You can obtain up-to-date information about the connectivity module and other IBM products at http://www.ibm.com/systems/support/.

The connectivity module has six labels: a safety certification label, a Common Language Equipment Identification (CLEI) label, a product name label, a serial number label, a media access control (MAC) address label, and a SAS ID and MAC address label.

See "Major components of the connectivity module" on page 6 for an illustration that shows the location of the connectivity-module labels. You will need this information when you register the connectivity module with IBM.

Record your product information in this table
Product name: _____ SAS Connectivity Module
Chassis serial number: _____ For example: 11S32R1793ZJ1ZC846H073
Media access control (MAC) address: _____
SAS ID: _____

After you install the connectivity module, you can manage and configure it using any one of the following interfaces:

- A Telnet connection to the embedded command-line interface (CLI)

  For additional information, see Chapter 4, "Managing the connectivity module using the Telnet interface," on page 15.

- A Web-browser interface

  For additional information, see Chapter 5, "Managing the connectivity module using the embedded Web-browser interface," on page 21.

- The Advanced Management Module Web-interface

  For additional information, see Chapter 6, "Managing the connectivity module using the advanced Management Module interface," on page 25.

- The Storage Configuration Manager application

  For additional information, see Chapter 7, "Managing the connectivity module using the Storage Configuration Manager application," on page 31.

Features and specifications

This section provides a summary of the features and specifications for the connectivity module.

The connectivity module supports the following features:

- Serial SCSI Protocol (SSP)
- Serial Management Protocol (SMP) as defined in the SAS specification
- Fourteen internal x1 links to blade servers
- Four external x4 links for storage servers
- Link error detection

Table 1 on page 3 contains a summary of the specifications of the connectivity module.

Table 1. SAS connectivity-module specifications

SAS connectivity-module features:	SAS connectivity-module maintainability:	Dimensions:

• SAS expander
• Vitesse 7157
 	
Environmental:
• Temperature and altitude:
  – Operating:
    - 10°C to 52°C (50°F to 126°F) at an altitude of 0 to 914 m (0 to 2 998 ft)
    - 10°C to 49°C (50°F to 120°F) at an altitude of 0 to 3 000 m (0 to 9 843 ft)
  – Non-operating: -40°C to 65°C (-40°F to 149°F) at an altitude of 0 to 12 000 m (0 to 39 370 ft)
• Humidity:
  – Operating: 8% to 80%, noncondensing
  – Non-operating: 5% to 80%, noncondensing
	• Diagnostics: Power-on self-test (POST) is performed on all functional components. Port operational tests include internal, external, and online tests.
	• User interface: Light-emitting diode (LED) indicators
	
	Fabric management:
	• Management methods:
	  – Telnet and command line interface (CLI)
	  – Web-browser interface
	  – Advanced Management Module Web-interface
	  – Storage Configuration Manager interface
	• SAS connectivity module simple network management protocol (SNMP) agent: Enables a network management workstation to receive configuration values and SAS link data through SNMP and the Ethernet interface.
		• Width: 112 mm (4.41 in.)
		• Height: 29 mm (1.14 in.)
		• Depth: 260 mm (10.25 in.)
		• Weight: 2 lb (.91 kg)
		
		SAS connectivity-module regulatory certifications:
		
		Electrical:
		• Power source loading: 2 amps maximum at 12 V dc
		• Heat output: 20 watts maximum
		• Operating voltage: 12 V dc
		• Circuit protection: Internally fused

Related documentation

This *Installation Guide* contains installation and setup instructions for the connectivity module. This document also provides general information about the connectivity module, including how to configure the connectivity module and how to access and use online help.

This *Installation Guide* is provided in Portable Document Format (PDF) on the *Support* CD that came with your connectivity module. For additional information about the *Support* CD, see "Option package contents" on page 5.

Additional related documentation might be included on the *Support* CD or available on the IBM support Web site, http://www.ibm.com/systems/support/.

The following related documentation is available at http://www.ibm.com/systems/support/:

- IBM BladeCenter *Installation and User's Guide* contains setup and installation instructions for your BladeCenter unit, including information about getting started and how to install a blade server.

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

  Each type of blade server has a customized *Installation and User's Guide* that is provided in PDF on the IBM *BladeCenter Documentation* CD and at http://www.ibm.com/systems/support/.

- *SAS Expansion Card (CFFv) Installation and User's Guide* for IBM BladeCenter products contains installation instructions for the SAS expansion card. It also contains information about using the LSI Logic Configuration Utility program to configure the SAS expansion card.

- *Multilingual Safety Information*

  This multilingual document is provided in PDF on the IBM *BladeCenter Documentation* CD and at http://www.ibm.com/systems/support/. It contains translated versions of the caution and danger statements that appear in the documentation for your blade server. Each caution and danger statement has an assigned number, which you can use to locate the corresponding statement in your native language.

- *Rack Installation Instructions*

  This document contains the instructions to install your BladeCenter unit in a rack.

- IBM BladeCenter *Hardware Maintenance Manual and Troubleshooting Guide* or *Problem Determination and Service Guide*

  Depending on your BladeCenter type, one of these documents is provided in PDF on the IBM *BladeCenter Documentation* CD and at http://www.ibm.com/systems/support/. It contains information to help you solve BladeCenter problems yourself or to provide helpful information to a service technician.

Depending on your blade-server model, additional documents might be included on the IBM *BladeCenter Documentation* CD, with the most recent versions of all BladeCenter documents available at http://www.ibm.com/systems/bladecenter/.

In addition to reviewing the documentation in this library, make sure that you review the IBM *Planning and Installation Guide* for your BladeCenter unit to help you prepare for system installation and configuration. For more information see http://www.ibm.com/systems/support/.

Option package contents

The connectivity-module option package contains the following items:

- One SAS connectivity module
- The *SAS Connectivity Module Getting Started Guide*
- The *Support* CD, which includes:
  - The SAS connectivity module and SAS expansion card *Installation and User's Guide*
  - The SAS connectivity module and SAS expansion card *Getting Started Guide*
  - IBM BladeCenter Storage Configuration Manager *Planning, Installation, and Configuration Guide*
  - SAS expansion card applications
  - MIB files
  - Readme file
  - *Multilingual Safety Information*

For the latest up-to-date Readme file, see http://www.ibm.com/systems/support/.

Note: The *Support* CD might contain additional information. Use the subdirectories to help you find information quickly.

Notices and statements used in this document

The caution and danger statements used in this document are also in the multilingual *Safety Information* document, which is on the *Support* CD. Each statement is numbered for reference to the corresponding statement in the multilingual *Safety Information* document.

The following 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 potential 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 connectivity module

The following illustration shows the major components of the connectivity module. Your hardware might have labels not shown in the following illustration.
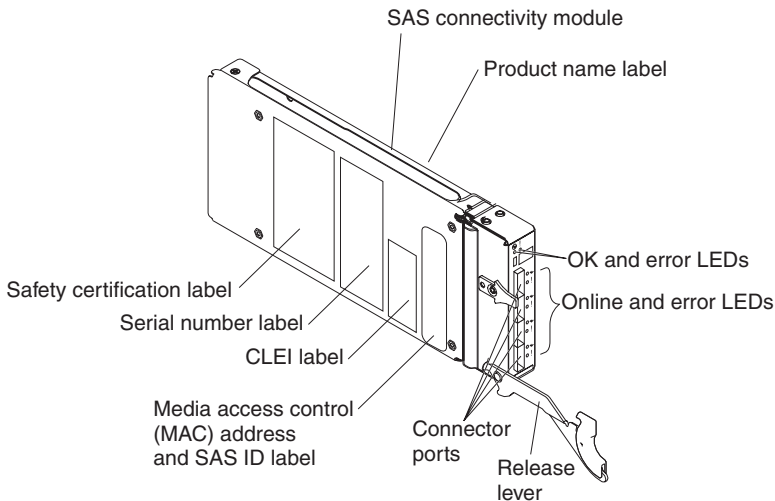
For more information about the components of the information panel, see Chapter 3, "Information panel LEDs and external ports," on page 11.

Chapter 2. Installing a connectivity module

This chapter provides instructions for installing a connectivity module in a BladeCenter unit.

Note: The BladeCenter unit shown in the illustrations in this document might be different from your BladeCenter unit. For additional information, see the documentation that came with your BladeCenter unit.

You must install connectivity modules only in BladeCenter I/O-module bay 3 and I/O-module bay 4 of the following supported BladeCenter units:

- BladeCenter Type 8677
- BladeCenter Types 8720 and 8730
- BladeCenter Type 8750
- BladeCenter Type 8852
- BladeCenter Type 8886

Installing a connectivity module in I/O-module bay 3 or I/O-module bay 4 provides connectivity to the SAS expansion card(s) installed in the blade servers in your BladeCenter unit. Installing two connectivity modules allows you to have two connections to the SAS expansion cards installed in the blade servers.

Important: The connectivity modules in I/O-module bay 3 and I/O-module bay 4 and all expansion cards in the BladeCenter unit must use the same interface type. Therefore, you must install SAS expansion cards before you install connectivity modules in the blade servers in your BladeCenter unit. For more information about the SAS expansion card, see the *Installation and User's Guide* for the SAS expansion card located in the `Documentation` directory on the *Support* CD or at http://www.ibm.com/systems/support/.

The following table summarizes the connectivity-module connections to the SAS expansion card ports.

I/O Module Bay	Connectivity-module function
3	Port 0 connection
4	Port 1 connection

Installation guidelines

Before you install the connectivity module in the BladeCenter unit, read the following information:

- Read the safety information beginning on page vii and the guidelines in "Handling static-sensitive devices" on page 9. This information will help you work safely with the blade server, BladeCenter unit, and options.

- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.

- You do not have to turn off the BladeCenter unit to install or replace any of the hot-swap modules on the rear of the BladeCenter unit.

- 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 open or close a latch.

- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that 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.

- When you are finished working on the BladeCenter unit, reinstall all safety shields, guards, labels, and ground wires.

- For a list of supported options for the BladeCenter unit, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability considerations

Attention: To help ensure proper cooling and system reliability, make sure that:

- Each of the module bays on the rear of the BladeCenter unit has either a module or filler module installed.

- A removed hot-swap module is replaced with an identical module or filler module as soon as possible.

Handling static-sensitive devices

Attention: Static electricity can damage electronic devices, including your blade server. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

- When you work on a BladeCenter unit that has an electrostatic discharge (ESD) connector, use a wrist strap when you handle modules, optional devices, or blade servers. To work correctly, the wrist strap must have a good contact on both ends (touching your skin at one end and firmly connected to the ESD connector on the front or back of the BladeCenter unit).
- 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 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 any *unpainted* metal surface of the BladeCenter unit or any *unpainted* metal surface on any other grounded component in the rack 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 blade server without setting down the device. If it is necessary to set down the device, place it back into its static-protective package. Do not place the device on your blade server cover or on a metal surface.
- Take additional care when handling devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Installing a connectivity module

For information about installing an I/O module into a BladeCenter unit, see the *Installation and User's Guide* that came with your BladeCenter unit. The following illustration shows a vertical orientation for installing a connectivity module in the BladeCenter unit. The illustrations in this document might differ slightly from your hardware.

Note: For additional information about installing an connectivity module in other types of BladeCenter units, see the documentation that came with your BladeCenter unit.

Figure 1. Installing the connectivity module into a BladeCenter unit
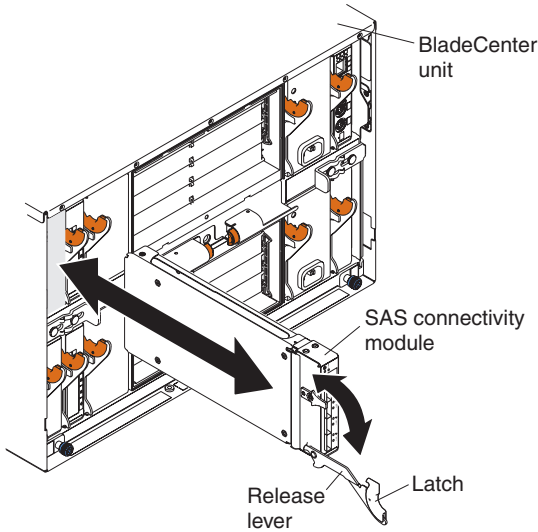
Chapter 3. Information panel LEDs and external ports

This chapter describes the information LEDs (also known as indicators) on the connectivity module and identifies the connectivity module external ports.

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

Information panel

The front panel of the connectivity module contains LEDs and four external ports, as shown in the following illustration. The serial debug port is used only by IBM service representatives.
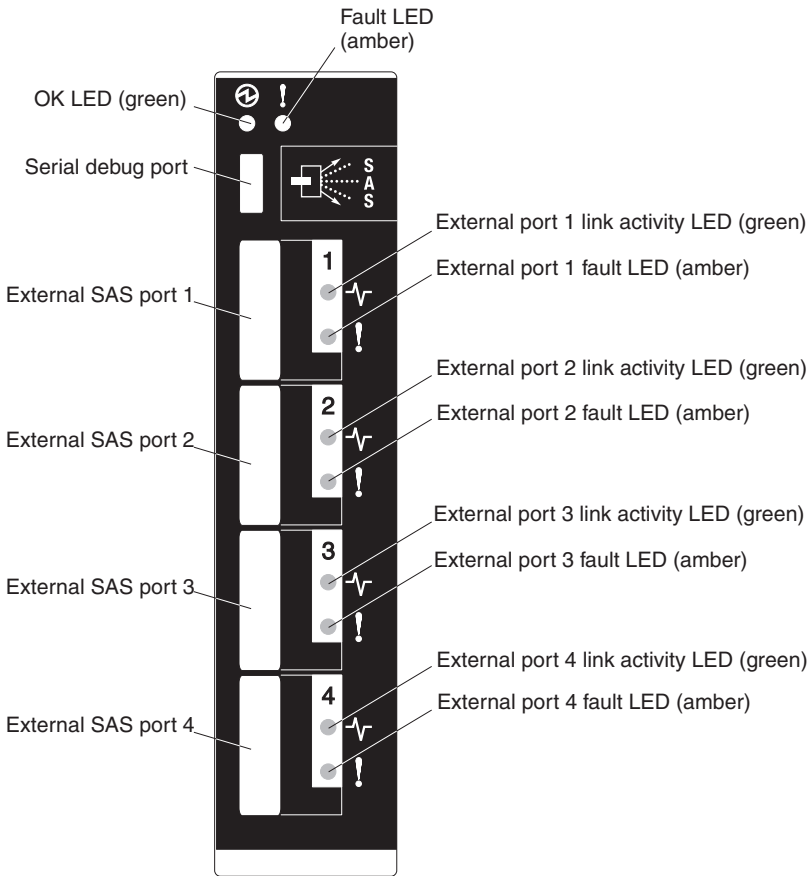
The connectivity module contains:

- LEDs that display the status of the connectivity module and its network connections. For the activity description of each LED, see "Information LEDs").
- Four external SAS ports to connect devices, end devices, and servers. These external ports are identified as ports 1, 2, 3, and 4 in the connectivity-module configuration menus and are labeled 1, 2, 3, and 4 (from top to bottom) on the connectivity module.

Information LEDs

The front panel of the connectivity module has multiple sets of LEDs. The first row of LEDs at the top of the connectivity module represent connectivity module status and include OK and ! (connectivity fault). The remaining sets of LEDs represent status for the external ports. The external port LEDs include port-link activity and port fault.

Notes:

1. An amber LED is lit when a error or event has occurred. To identify the error or event, check the other LEDs on the connectivity module.

2. An LED test occurs whenever the connectivity module is turned on. All LEDs are lit and remain lit for approximately 10 seconds during POST and then return to a normal state.

Table 2. Connectivity module LED diagnostic flash patterns

LED	LED activity
OK	• The LED is off during initialization and POST or when there is a system fault. • The LED is lit during LED test and when the connectivity module is operational. • The LED flashes during POST.
Fault	• The LED is off during initialization or when the connectivity module is in normal operation. • The LED is lit during LED test or to indicate a system fault during a POST failure, thermal fault, or other critical connectivity module fault.
Port x link activity	• The LED is off when external port x is not linked. • The LED is lit when external port x is linked or during LED test. • The LED flashes when external port x activity performs a normal send or receive operation.

Table 2. Connectivity module LED diagnostic flash patterns (continued)

LED	LED activity
Port *x* fault	• The LED is off when port diagnostics starts and is completed without error. • The LED is lit when port diagnostics discover an external port error. • The LED flashes when external port *x* is disabled.

Chapter 4. Managing the connectivity module using the Telnet interface

The connectivity module contains a Telnet server. This server allows a Telnet client to establish a Telnet session with the connectivity module to retrieve information or to configure settings using the CLI interface. You can perform a variety of fabric and connectivity-management tasks through an Ethernet connection using the CLI interface.

You can access the Telnet interface in one of two ways:

- Advanced Management Module Web-interface
- CLI on a network management workstation

Notes:

1. To access a connectivity module from a network management workstation, make sure that it is connected to an external advanced management module-Ethernet port. If you are using a gateway to communicate with the BladeCenter unit, set the gateway IP address for the connectivity module to the IP address of the advanced management module.

2. To access and manage the connectivity module from an external environment, you have to enable external ports, external management over all ports, and set the date and time.

3. The sample screens and windows that appear in this document might differ slightly from the screens and windows that are displayed by your system. Screen and window content varies based on the type of BladeCenter unit that you are using and the options that are installed.

Important: The connectivity module is exclusively supported by the advanced management module. Before you configure the connectivity module, make sure that the advanced management modules in your BladeCenter unit are correctly configured. For more information about the advanced management module, see the *User's Guide* that came with your advanced management module and at http://www.ibm.com/systems/support/.

In addition to reviewing the documentation that is described in "Related documentation" on page 3, make sure that you review the IBM *Planning and Installation Guide* for your BladeCenter unit at http://www.ibm.com/systems/support/ for information to help you prepare for system installation and configuration.

To configure the connectivity module through the Telnet interface, the Internet protocol (IP) address and subnet masks must be compatible, and the following configuration settings for the advanced management module must be enabled:

- External ports
- External management over all ports
- Date and time

Enabling external ports

To enable the external ports on the advanced management module, complete the following steps:

1. In the advanced Management Module Web-interface, click **I/O Module Tasks** > **Admin/Power/Reset**. The I/O Module Power/Restart window opens.
2. In the **I/O Module Advanced Setup** section, select an external port to change its port access setting to **Enabled**, and click **Save**.

Enabling external management over all ports

To enable the external management over all ports setting, complete the following steps:

1. In the advanced Management Module Web-interface, click **I/O Module Tasks** > **Configuration**. The I/O Module Configuration window opens.
2. Click the blade-server bay number whose setting you want to enable. The Current IP Configuration window for the selected blade-server bay opens.
3. Click **Advanced Configuration**. The Advanced Configuration I/O Module *x* window opens. Where *x* is the blade-server bay number.
4. In the **Advanced Setup** section, select the port to change its external management over all ports setting to **Enabled**, and click **Save**.

Configuring the date and time

Change the date and time of the advanced management module using the CLI `time` command. At the CLI prompt, type `time` and press Enter.

For example, the format for June 28, 2004 8:46 P.M. (Monday) is:
```
>time set 6 28 2004 20 46 0 1
```

For detailed information about using `time` and additional CLI commands, see Appendix A, "Using the CLI," on page 45.

Connecting to the connectivity module

To use the Telnet program (in VT100 compatible terminal mode) to access and control the connectivity module, you must know the IP address for the connectivity module and have an existing network connection. If you have to obtain the IP address for the connectivity module or establish a network connection, contact your system or network administrator. Make sure that you use the IP address of the connectivity module (if applicable) in the CLI commands.

Establishing a Telnet session through the advanced management module

To establish a Telnet session through the advanced Management Module Web-interface, complete the following steps:

1. In your browser, in the URL address field, type http://*xxx.xxx.xxx.xxx*, where *xxx.xxx.xxx.xxx* is the IP address of the advanced Management Module interface. Click **GO** or press Enter. The Enter Network Password window opens.

   Note: The default IP address for the advanced management module is 192.168.70.125.

2. In the **User Name** field, type the initial default user ID, **USERID**. The user ID and password are case sensitive. The Password prompt displays.

3. In the **Password** field, type the initial default password, **PASSW0RD** (the sixth character is a zero) and click **OK**. The Welcome window opens.

4. In the **Inactive session timeout value** field, select the timeout value for this Web session and click **Continue**. The Advanced Management Module window opens.

5. Click **I/O Module Tasks > Configuration**. The I/O Module Configuration window opens.

6. Click the link for either the connectivity module in I/O-module bay 3 or in I/O-module bay 4. Make sure that the IP address is the same in the Current IP Configuration and New Static IP Configuration sections.

7. Click **Advanced Configuration**. The Advanced Configuration window opens.

8. To start a Telnet session, click **Start Telnet Session**. The connectivity module Telnet Login screen opens.

9. At the **Login** prompt, type the initial default user ID, **USERID** and press Enter. The user ID and password are case sensitive. The Password prompt displays.

10. At the **Password** prompt, type the initial default password, **PASSW0RD** (the sixth character is a zero) and click **OK**. The Command Line Interface Shell screen opens.

Note: To open online help, type `help` and press Enter.

For more information about using the CLI, see Appendix A, "Using the CLI," on page 45.

Establishing a Telnet session in a command-line screen

You can access the connectivity module using IP-enabled devices that are connected to the advanced management module. An Ethernet connection to the advanced management-module external port on the BladeCenter unit is required. For more information, see the following documents at http://www.ibm.com/systems/support/:

- BladeCenter unit *Installation and User's Guide*
- *IBM BladeCenter Advanced Management Module Installation Guide*
- *IBM BladeCenter Management Module User's Guide*

To establish a Telnet session through the CLI, complete the following steps:

Note: The IP addresses in the following step are the default IP address of the connectivity modules; if new IP addresses have been assigned to the connectivity modules, use these instead.

1. Open the CLI on the network management workstation, type one of the following commands, and press Enter.
   - For the connectivity module in I/O-module bay 3:
     ```
     >telnet 192.168.70.129
     ```
   - For the connectivity module in I/O-module bay 4:
     ```
     >telnet 192.168.70.130
     ```
   A command prompt screen opens.
2. At the **Login** prompt, type the initial default user ID, `USERID` and press Enter. The user ID and password are case sensitive. The Password prompt displays.
3. At the **Password** prompt, type the initial default password, `PASSW0RD` (the sixth character is a zero) and press Enter. The Command Line Interface Shell screen opens.

CLI command format

The information in this section gives an overview of the CLI-command format.

For detailed information about using CLI commands, see Appendix A, "Using the CLI," on page 45.

Command-line interface guidelines

All commands have the following syntax:

```
command argument -option parameter
```

The CLI-command syntax is as follows:

- keyword
- keyword *<argument>*
- keyword *<argument>*[*options*]

Items in the argument brackets (< >) can be changed by typing a new argument. Items in the optional square brackets ([ ]) can be changed by typing a new option name. You can use the Backspace and Delete keys to erase characters behind and in front of the cursor.

For example,

```
sasport status all
```

The information for each option is returned in the order in which it was entered and is displayed on separate lines.

Chapter 5. Managing the connectivity module using the embedded Web-browser interface

The connectivity module contains an embedded Web-browser interface. This allows a Web-based client to establish a Web-interface session with the connectivity module to retrieve information using a Web browser.

You can access the Web-browser interface in one of two ways:
- Advanced Management Module Web-interface
- Web browser on a network management workstation

The embedded Web-browser interface is a graphical user interface that requires a Web browser to view and manage the connectivity module. For information about system requirements and supported Web browsers, see Appendix B, "Using the embedded Web-browser interface," on page 71.

Important: The connectivity module is exclusively supported by the advanced management module. Before you configure the connectivity module, make sure that the advanced management modules in your BladeCenter unit are correctly configured. For more information about the advanced management module, see the *User's Guide* that came with your advanced management module and at http://www.ibm.com/systems/support/.

In addition to reviewing the documentation that is described in "Related documentation" on page 3, make sure that you review the IBM *Planning and Installation Guide* for your BladeCenter unit at http://www.ibm.com/systems/support/ for information to help you prepare for system installation and configuration.

Note: The sample screens and windows that appear in this document might differ slightly from the screens and windows that are displayed by your system. Screen and window content varies based on the type of BladeCenter unit that you are using and the options that are installed.

Enabling external ports

To configure the connectivity module through the embedded Web-browser interface, the IP address and subnet masks must be compatible, and the following configuration settings in the advanced management module must be enabled:
- External ports
- External management over all ports
- Date and time

Note: To access a connectivity module from a network management workstation, make sure that it is connected to an external advanced management module-Ethernet port. If you are using a gateway to communicate with the BladeCenter unit, set the gateway IP address for the connectivity module to the IP address of the advanced management module.

To enable the external port, complete the following steps:

1. In the advanced Management Module Web-interface, click **I/O Module Tasks** > **Admin/Power/Reset**. The I/O Module Power/Restart window opens.
2. In the **I/O Module Advanced Setup** section, select an external port to change its port access setting to **Enabled**, and click **Save**.

Enabling external management over all ports

To enable the external management over all ports setting, complete the following steps:

1. In the advanced Management Module Web-interface, click **I/O Module Tasks** > **Configuration**. The I/O Module Configuration window opens.
2. Click the blade-server bay number whose setting you want to enable. The Current IP Configuration window for the selected blade-server bay opens.
3. Click **Advanced Configuration**. The Advanced Configuration I/O Module *x* window opens. Where *x* is the blade-server bay number.
4. In the **Advanced Setup** section, select the port to change its external management over all ports setting to **Enabled**, and click **Save**.

Configuring the date and time

Change the date and time of the connectivity module using the CLI `time` command. At the prompt, type `time` and press Enter.

For example, the format for June 28, 2004 8:46 P.M. (Monday) is:

```
>time set 6 28 2004 20 46 0 1
```

For detailed information about using the `time` and additional CLI commands, see Appendix A, "Using the CLI," on page 45.

Connecting to the connectivity module

To use the embedded Web-browser interface to access and control the connectivity module, you must know the IP address for the connectivity module and have an existing network connection. If you have to obtain the IP address for the connectivity module or establish a network connection, contact your system or network administrator.

Establishing a Web-interface session through the advanced management module

To establish a Web-interface session through the advanced management module, complete the following steps:

1. In your browser, in the URL address field, type http://*xxx.xxx.xxx.xxx*, where *xxx.xxx.xxx.xxx* is the IP address of the advanced Management Module interface. Click **GO** or press Enter. The Enter Network Password window opens.

   Note: The default IP address for the advanced management module is 192.168.70.125.

2. In the **User Name** field, type the initial default user name, `USERID`. The user name and password are case sensitive.

3. In the **Password** field, type the initial default password, `PASSW0RD` (the sixth character is a zero) and click **OK**. The Welcome window opens.

4. In the **Inactive session timeout value** field, select the timeout value for this Web session and click **Continue**. The BladeCenter Advanced Management Module window opens.

5. Click **I/O Module Tasks > Configuration**. The I/O Module Configuration window opens.

6. Click the link for either the connectivity module in I/O-module bay 3 or in I/O-module bay 4. Make sure that the IP address is the same in the Current IP Configuration and New Static IP Configuration sections.

7. Click **Advanced Configuration**. The Advanced Configuration I/O Module *x* window opens. Where *x* is the blade-server bay number.

8. In the **Start Telnet/Web Session** section, click **Start Web Session**.

9. In the **Login Name** field, type the initial default user name, `USERID`. The login name and password are case sensitive.

10. In the **Password** field, type the initial default password, `PASSW0RD` (the sixth character is a zero) and click **OK**. The embedded Web browser-interface window opens.

For more information about using the Web-browser interface , see Appendix B, "Using the embedded Web-browser interface," on page 71.

Establishing a Web-interface session through a Web browser

You can access the connectivity module by IP-enabled devices that are connected to the BladeCenter management module. An Ethernet connection to the advanced management-module external ports on the BladeCenter unit is required. For more information, see the following documents on the IBM Support Web site, http://www.ibm.com/systems/support/:

- BladeCenter unit *Installation and User's Guide*
- *IBM BladeCenter Advanced Management Module Installation Guide*
- *IBM BladeCenter Management Module User's Guide*

To establish a Web-interface session through a Web browser, complete the following steps:

1. Open a supported Web browser on the network-management workstation.
2. Type one of the following Web addresses in the URL address field and click **GO** or press Enter. These Web addresses contain default IP addresses.

   For the connectivity module in I/O-module bay 3:

   `http://192.168.70.129`

   For the connectivity module in I/O-module bay 4:

   `http://192.168.70.130`
3. Click **OK**. The embedded Web-browser interface window opens.

For more information about using the embedded Web-browser interface , see Appendix B, "Using the embedded Web-browser interface," on page 71.

Chapter 6. Managing the connectivity module using the advanced Management Module interface

You can use the advanced Management Module interface to access and configure the connectivity modules. This allows you to establish a Web-interface session with the connectivity module to retrieve information using the advanced management module.

For more information about using the advanced Management Module Web-interface, see the *Installation and User's Guide* that comes with the application.

Note: To access a connectivity module from a network management workstation, make sure that it is connected to an external advanced management-module Ethernet port. If you are using a gateway to communicate with the BladeCenter unit, set the gateway IP address for the connectivity module to be the same as the IP address of the advanced management module.

Important: The connectivity module is exclusively supported by the advanced management module. Before you configure the connectivity module, make sure that the advanced management modules in your BladeCenter unit are correctly configured. For more information about the advanced management module, see the *User's Guide* that came with your advanced management module and at http://www.ibm.com/systems/support/.

In addition to reviewing the documentation that is described in "Related documentation" on page 3, make sure that you review the IBM *Planning and Installation Guide* for your BladeCenter unit at http://www.ibm.com/systems/support/ for information to help you prepare for system installation and configuration.

Note: The sample screens and windows that appear in this document might differ slightly from the screens and windows that are displayed by your system. Screen and window content varies based on the type of BladeCenter unit that you are using and the options that are installed.

Enabling external ports

To configure the connectivity module through the embedded Web-browser interface, the IP address and subnet masks must be compatible, and the following configuration settings in the management module must be enabled:

- External ports
- External management over all ports
- Date and time

Note: To access a connectivity module from a network management workstation, make sure that it is connected to an external advanced management module-Ethernet port. If you are using a gateway to communicate with the BladeCenter unit, set the gateway IP address for the connectivity module to the IP address of the advanced management module.

To enable the external port, complete the following steps:

1. In the advanced Management Module Web interface, click **I/O Module Tasks** > **Admin/Power/Reset**. The I/O Module Power/Restart window opens.
2. In the **I/O Module Advanced Setup** section, select an external port to change its port access setting to **Enabled**, and click **Save**.

Enabling external management over all ports

To enable the external management over all ports setting, complete the following steps:

1. In the advanced Management Module Web-interface, click **I/O Module Tasks** > **Configuration**. The I/O Module Configuration window opens.
2. Click the blade-server bay number whose setting you want to enable. The Current IP Configuration window for the selected blade-server bay opens.
3. Click **Advanced Configuration**. The Advanced Configuration I/O Module *x* window opens. Where *x* is the blade-server bay number.
4. In the **Advanced Setup** section, select the port to change its external management over all ports setting to **Enabled**, and click **Save**.

Configuring the date and time

Change the date and time of the connectivity module using the CLI `time` command. At the prompt, type `time` and press Enter.

For example, the format for June 28, 2004 8:46 P.M. (Monday) is:

```
>time set 6 28 2004 20 46 0 1
```

For detailed information about using the `time` and additional CLI commands, see Appendix A, "Using the CLI," on page 45.

Establishing a Web-interface session

To establish a Web-interface session using the advanced management module, complete the following steps:

1. In your browser, in the URL address field, type http://*xxx.xxx.xxx.xxx*, where *xxx.xxx.xxx.xxx* is the IP address of the advanced management module. Click **GO** or press Enter. The Enter Network Password window opens.

   Note: The default IP address for the advanced management module is 192.168.70.125.

2. In the **User Name** field, type the initial default user name, `USERID`. The user name and password are case sensitive.

3. In the **Password** field, type the initial default password, `PASSW0RD` (the sixth character is a zero) and click **OK**. The Welcome window opens.

4. In the **Inactive session timeout value** field, select the timeout value for this Web session, and click **Continue**. The Advanced Management Module window opens.

Activating a zone configuration

To view and activate a zone configuration, complete the following steps:

1. Click **I/O Module Tasks > Configuration**. The I/O Module Configuration window opens.

2. Click the link for either the connectivity module in I/O-module bay 3 or the connectivity module in I/O-module bay 4. The I/O module management window opens.

3. Click **Zone Configuration Management**. The Zone Configuration Management window opens. This window displays the available zone configurations and the current active zones.

192.168.70.205 BladeCenter Management Module - Microsoft Internet Explorer

File   Edit   View   Favorites   Tools   Help

Address http://192.168.70.205/private/main.ssi

IBM   **BladeCenter₍ₕ₎ H Advanced Management Module**

Bay 1: SN#BM
User: USERID

Monitors
 System Status
 Event Log
 LEDs
 Power Management
 Hardware VPD
 Firmware VPD
 Remote Chassis
Blade Tasks
 Power/Restart
 On Demand
 Remote Control
 Firmware Update
 Configuration
 Serial Over LAN
I/O Module Tasks
 Admin/Power/Restart
 Configuration
 Firmware Update
Storage Tasks
 Configuration
MM Control
 General Settings
 Login Profiles
 Alerts
 Serial Port

Zone Configuration Management for I/O Module 3

The table below lists zone configurations stored on this I/O module. You can select a zone configuration from the list below and activate it.

Select	Index	Status	Type	Name	Description	Date
○	1		Configurable	Zone1	Blades 1-7 access to E1, Blades 8-14 access to E2	07/11/2007, 10:48:20
○	2		Configurable	Zone2	Blades 1-4 no access, Blades 5-14 access to all external ports	07/11/2007, 10:54:55
○	3		Configurable	User Defined Config 03	User definable zone configuration. Factory setting is each port belongs to its own zone and no port can access any other port. Can be modified using SCM or CLI.	00/00/0000, 00:00:00
○	4		Configurable	User Defined Config 04	User definable zone configuration. Factory setting is each port belongs to its own zone and no port can access any other port. Can be modified using SCM or CLI.	00/00/0000, 00:00:00
○	5	Active	Predefined	Predefined Config 01	Predefined and default zone configuration for BC1, BCH, BCT and BCHT. Each port belongs to its own zone and each blade bay port can access all external ports. Cannot be modified.	04/24/2007, 02:00:00

Cancel   Activate Selected Configuration

Done   Internet

4. Select a zone and click **Activate Selected Configuration**.

5. To view the active zones on each connectivity module (if applicable), click **Storage Tasks > Configuration**. The Zone Configuration window opens.

192.168.70.205 BladeCenter Management Module - Microsoft Internet Explorer

File   Edit   View   Favorites   Tools   Help

Address http://192.168.70.205/private/main.ssi

IBM   **BladeCenter₍ₕ₎ H Advanced Management Module**

Bay 1: SN#BM
User: USERID

Monitors
 System Status
 Event Log
 LEDs
 Power Management
 Hardware VPD
 Firmware VPD
 Remote Chassis
Blade Tasks
 Power/Restart
 On Demand
 Remote Control
 Firmware Update
 Configuration
 Serial Over LAN
I/O Module Tasks
 Admin/Power/Restart
 Configuration
 Firmware Update
Storage Tasks
 Configuration
MM Control
 General Settings
 Login Profiles
 Alerts
 Serial Port

I/O Modules

Zone Configuration

Follow the links in the "I/O Module Type" column to change the zone configuration on a specific I/O module

Bay	I/O Module Type	Active Zone Configuration	Zone Config. Type	Description	Date
3	Storage SM	Predefined Config 01	Predefined	Predefined and default zone configuration for BC1, BCH, BCT and BCHT. Each port belongs to its own zone and each blade bay port can access all external ports. Cannot be modified.	04/24/2007, 02:00:00
4	Storage SM	Predefined Config 01	Predefined	Predefined and default zone configuration for BC1, BCH, BCT and BCHT. Each port belongs to its own zone and each blade bay port can access all external ports. Cannot be modified.	04/24/2007, 02:00:00

Internet

For more information about zoning, see Chapter 8, "Configuring zones," on page 33.

Chapter 7. Managing the connectivity module using the Storage Configuration Manager application

The IBM Storage Configuration Manager application is a system management application that allows you to manage and configure the connectivity modules for use in BladeCenter units. The Storage Configuration Manager application is standards based and uses Web-based standards.

The Storage Configuration Manager application can be installed to be run as a standalone application or as an application launched from IBM Director 5.20.2 to manage Director storage objects. The Storage Configuration Manager application runs as a Web server that communicates with connectivity modules. You can connect to the Storage Configuration Manager application from any host on the network using a standard Web browser (such as, Internet Explorer or Firefox).

Note: For you to access a connectivity module from a network management workstation, make sure that it is connected to an external advanced management module-Ethernet port. If you are using a gateway to communicate with the BladeCenter unit, set the gateway IP address for the connectivity module to the IP address of the advanced management module.

For more information about using the Storage Configuration Manager application to manage and configure your connectivity module, see the Storage Configuration Manager *Planning, Installation, and Configuration Guide* in the `Documentation` directory on the *Support* CD. You can download the Storage Configuration Manager application from http://www.ibm.com/systems/management/director/.

Chapter 8. Configuring zones

Zoning (integrated storage) allows you to decide how to map the hard disk drives in storage module 1 and storage module 2 to the BladeCenter blade servers, and how to map the blade servers to the external ports on the connectivity module. When you configure the zoning for the BladeCenter unit, you must determine which hard disk drives are accessible by each of the blade servers. In addition, you must determine which external ports on the connectivity module are accessible by each of the blade servers.

There are two types of zones that you can use for storage configuration:

- User-defined - These zones (zone 1 - zone 4) are empty so that you can create your own zone configurations. By default, each external port belongs to its own zone and no external port can access any other external port. These zone configurations can be modified using the Storage Configuration Manager application or CLI. These zones support the connectivity modules in all BladeCenter units.
- Predefined - These zones are predefined zone configurations. Predefined zones support the connectivity modules in the following BladeCenter units:
  - Zone 5 can be used with BladeCenter Type 8677, BladeCenter Type 8852, BladeCenter Types 8720 and 8730, and BladeCenter Type 8750.
  - Zone 6 - Zone 13 can be used with BladeCenter Type 8886.

For more information about using one of the supported configuration applications to configure zones, see one of the following sections:

- Chapter 4, "Managing the connectivity module using the Telnet interface," on page 15
- Chapter 5, "Managing the connectivity module using the embedded Web-browser interface," on page 21
- Chapter 6, "Managing the connectivity module using the advanced Management Module interface," on page 25
- Chapter 7, "Managing the connectivity module using the Storage Configuration Manager application," on page 31

User-defined zones

You can specify up to four separate user-defined zones (zone 1 through zone 4) for the integrated-shared storage installed in the BladeCenter unit. There are two ways to specify your own zoning configuration:

- Using either the Web-based user interface or the command-line interface
- Using the Storage Configuration Manager application

Planning a user-defined zone

To plan for a user-defined zone configuration:

- Determine which hard disk drives in storage module 1 will be mapped to each of the blade servers in the BladeCenter unit.
- Determine which hard disk drives in storage module 2 will be mapped to each of the blade servers in the BladeCenter unit.
- Map each blade server in the BladeCenter unit to the external ports on the connectivity module in I/O-module bay 3.
- Map each blade server in the BladeCenter unit to the external ports on the connectivity module in I/O-module bay 4 (if installed).

Figure 2. BladeCenter blade servers and storage modules
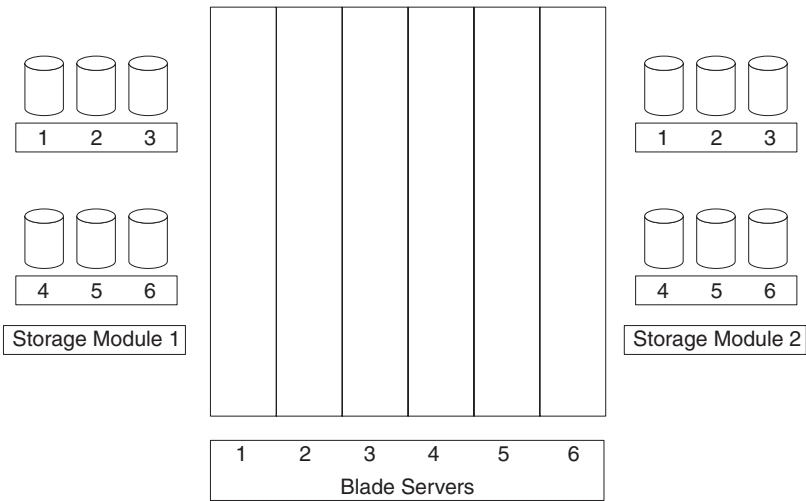
Planning considerations

Consider the following when planning for integrated storage:

- Map a blade server to one or more hard disk drives in each storage module for redundancy.
- Map the blade server to the same hard disk drives in each storage module to reduce management complexity. For example, if you choose to map the blade server in the blade server bay 1 to the hard disk drive in bay 1 of storage module 1, map the same blade server to the hard disk drive in bay 1 of storage module 2.

Note: In addition to mapping the hard disk drives, you will have to use the LSI Configuration Utility provided in the blade server to set up redundancy, such as mirroring. For more information about the LSI Configuration Utility, see the *Installation and User's Guide* that came with your SAS expansion card.

Predefined zones

Zones 5 through 13 are predefined zones that cannot be modified. If you implement a predefined configuration and then change the BladeCenter unit (such as adding an additional blade server), you will have to choose a new predefined configuration that matches the BladeCenter unit setup. Each zone defines a specific zone configuration using various I/O-device configurations. To access or modify a predefined configuration, specify the configuration using the advanced management module configuration wizard or the Storage Configuration Manager application.

Notes:

1. Make sure that you have one connectivity module installed in I/O-module bay 3 in the BladeCenter unit to use single connectivity-module zones (zone 7, zone 9, zone 11, and zone 13). For dual connectivity-module zones (zone 6, zone 8, zone 10, zone 12), install a second module in I/O-module bay 4).

2. When the connectivity module is initially installed into any BladeCenter unit other than the BladeCenter Type 8886, the connectivity module defaults to predefined zone 5 (Predefined Config 01). The last zone activated before removing a connectivity module is the zone that is active when a connectivity module is installed and turned on.

3. When the connectivity module is installed into a BladeCenter Type 8886 unit, you must select and activate a zone after the connectivity module is turned on.

4. If you select a predefined zone, the advanced management module automatically restores that zone whenever the connectivity module is turned on or replaced.

For more information about using the advanced Management Module Web-interface, see Chapter 6, "Managing the connectivity module using the advanced Management Module interface," on page 25.

For more information about using the Storage Configuration Manager application, see Chapter 7, "Managing the connectivity module using the Storage Configuration Manager application," on page 31.

Zone 5 (Predefined Config 01)

Zone 5 supports BladeCenter Type 8677, BladeCenter Type 8852, BladeCenter Types 8720 and 8730, and BladeCenter Type 8750 units. This zone allows all the blade servers to have access to all four external ports of the connectivity module.

Zone 6 (Predefined Config 02)

Zone 6 supports six blade servers, two connectivity modules, and two fully-populated storage modules. Each blade server can access one hard disk drive in each storage module and all external ports on each connectivity module.

This configuration has the following characteristics:

- Each blade server has access to a single hard disk drive in each storage module (for a total of two hard disk drives).
- The connectivity module in the I/O-module bay 3 controls access to the hard disk drives in storage module 1.
- The connectivity module in the I/O-module bay 4 controls access to the hard disk drives in storage module 2.
- The blade servers have access to all external ports on each connectivity module.

Note: This zone configuration maps the hard disk drives to the blade servers and the blade servers to the external ports on the connectivity module. You will have to use the LSI Configuration Utility application on each blade server to set up mirroring. For more information about using the LSI Configuration Utility application, see the *Installation and User's Guide* that came with your SAS expansion card.

Table 3. Zone 6 configuration

Blade-server bay	Maps to...	
	Storage module 1 hard disk drives that use the connectivity module in bay 3	Storage module 2 hard disk drives that use the connectivity module in bay 4
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6

Zone 7 (Predefined Config 03)

Zone 7 supports six blade servers, one connectivity module, and two fully-populated storage modules. Each blade server can access one hard disk drive in each storage module and all external ports on the connectivity module.

This configuration has the following characteristics:

- Each blade server has access to a single hard disk drive in each storage module (for a total of two hard disk drives).
- The connectivity module must be installed in I/O-module bay 3 and controls access to the hard disk drives in each storage module.
- The blade servers have access to all external ports on the connectivity module.

Note: This configuration maps the hard disk drives to the blade servers and the blade servers to the external ports on the connectivity module. You will have to use the LSI Configuration Utility application on each blade server to set up mirroring. For more information about using the LSI Configuration Utility application, see the *Installation and User's Guide* that came with your SAS expansion card.

Table 4. Zone 7 configuration

Blade-server bay	Maps to...	
	Storage module 1 hard disk drives that use the connectivity module in bay 3	Storage module 2 hard disk drives that use the connectivity module in bay 3
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6

Zone 8 (Predefined Config 04)

Zone 8 supports a single blade server, two connectivity modules, and two fully-populated storage modules. The blade server can access all hard disk drives in each storage module and all external ports on each connectivity module.

This configuration has the following characteristics:

- The blade server in blade-server bay 1 has access to all hard disk drives in each storage module (for a total of 12 hard disk drives).

- The connectivity module in I/O-module bay 3 controls access to the hard disk drives in storage module 1.
- The connectivity module in I/O-module bay 4 controls access to the hard disk drives in storage module 2.
- The blade server has access to all external ports on each connectivity module.

Note: This configuration maps the hard disk drives to the blade server and the blade server to the external ports on the connectivity modules. You will have to use the LSI Configuration Utility application on the blade server to set up mirroring. For more information about using the LSI Configuration Utility application, see the *Installation and User's Guide* that came with your SAS expansion card.

Table 5. Zone 8 configuration

Blade-server bay	Maps to...	
	Storage module 1 hard disk drives that use the connectivity module in bay 3	Storage module 2 hard disk drives that use the connectivity module in bay 4
1	1, 2, 3, 4, 5, 6	1,2, 3, 4, 5, 6

Zone 9 (Predefined Config 05)

Zone 9 supports a single blade server, one connectivity module, and two fully-populated storage modules. The blade server can access all hard disk drives in each storage module and all external ports on the connectivity module.

This configuration has the following characteristics:

- The blade server in blade-server bay 1 has access to all hard disk drives in each storage module (for a total of 12 hard disk drives).
- The connectivity module must be installed in I/O-module bay 3 and controls access to the hard disk drives in each storage module.
- The blade server has access to all external ports on the connectivity module.

Note: This configuration maps the hard disk drives to the blade server and the blade server to the external ports on the connectivity module. You will have to use the LSI Configuration Utility application on the blade server to set up mirroring. For more information about using the LSI Configuration Utility application, see the *Installation and User's Guide* that came with your SAS expansion card.

Table 6. Zone 9 configuration

Blade-server bay	Maps to...	
	Storage module 1 hard disk drives that use the connectivity module in bay 3	Storage module 2 hard disk drives that use the connectivity module in bay 3
1	1, 2, 3, 4, 5, 6	1,2, 3, 4, 5, 6

Zone 10 (Predefined Config 06)

Zone 10 supports three blade servers, two connectivity modules, and two fully-populated storage modules. Each blade server can access two hard disk drives in each storage module and all external ports on each connectivity module.

Important: If you are going to use this configuration, the proper placement of the blade servers in the BladeCenter unit is important. Blade servers must be installed in blade-server bays 1, 3, and 5. Blade servers installed in any other bay will not be able to access this zone.

Note: If you use a blade server that requires a 2 blade-server bay position, make sure that the SAS expansion card is installed on the base blade server.

This configuration has the following characteristics:

- Each blade server has access to two hard disk drives in each storage module (for a total of four hard disk drives).
- The connectivity module in I/O-module bay 3 controls access to the hard disk drives in storage module 1.
- The connectivity module in I/O-module bay 4 controls access to the hard disk drives in storage module 2.
- The blade servers have access to all external ports on each connectivity module.

Note: This configuration maps the hard disk drives to the blade server and the blade server to the external ports on the connectivity module. You will have to use the LSI Configuration Utility application on the blade server to set up mirroring. For more information about using the LSI Configuration Utility application, see the *Installation and User's Guide* that came with your SAS expansion card.

Table 7. Zone 10 configuration

Blade-server bay	Maps to...	
	Storage module 1 hard disk drives that use the connectivity module in bay 3	Storage module 2 hard disk drives that use the connectivity module in bay 4
1	1, 4	1, 4
3	2, 5	2, 5
5	3, 6	3, 6

Zone 11 (Predefined Config 07)

Zone 11 supports three blade servers, one connectivity module, and two fully-populated storage modules. Each blade server can access two hard disk drives in each storage module and all external ports on the connectivity module.

Important: If you are going to use this configuration, the proper placement of the blade servers in the BladeCenter unit is important. Blade servers must be installed in blade server bays 1, 3, and 5. Blade servers installed in any other bay will not be able to access this zone.

Note: If you use a blade server that requires a 2 blade-server bay position, make sure that the SAS expansion card is installed on the base blade server.

This configuration has the following characteristics:

- Each blade server has access to two hard disk drives in each storage module (for a total of four hard disk drives).
- The connectivity module must be installed in blade server bay 3 and controls access to the hard disk drives in each storage module.
- All blade servers have access to all external ports on the connectivity module.

Note: This configuration maps the hard disk drives to the blade server and the blade server to the external ports on the connectivity module. You will have to use the LSI Configuration Utility application on the blade server to set up mirroring. For more information about using the LSI Configuration Utility application, see the *Installation and User's Guide* that came with your SAS expansion card.

Table 8. Zone 11 configuration

Blade-server bay	Maps to...	
	Storage module 1 hard disk drives that use the connectivity module in bay 3	Storage module 2 hard disk drives that use the connectivity module in bay 3
1	1, 4	1, 4
3	2, 5	2, 5
5	3, 6	3, 6

Zone 12 (Predefined Config 08)

Zone 12 supports two blade servers, two connectivity modules, and two fully-populated storage modules. Each blade server can access three hard disk drives in each storage module and all external ports on each connectivity module.

Important: If you are going to use this configuration, the proper placement of the blade servers in the BladeCenter unit is important. Blade servers must be installed in blade-server slots 1 and 4. Blade servers installed in any other bay will not be able to access this zone.

Note: If you use a blade server that requires a 3 blade-server bay position, make sure that the SAS expansion card is installed on the base blade server.

This configuration has the following characteristics:

- Each blade server has access to three hard disk drives in each storage module (for a total of six hard disk drives).
- The connectivity module in I/O-module bay 3 controls access to the hard disk drives in storage module 1.
- The connectivity module in I/O-module bay 4 controls access to the hard disk drives in storage module 2.
- The blade servers have access to all external ports on each connectivity module.

Note: This configuration maps the hard disk drives to the blade server and the blade server to the external ports on the connectivity module. You will have to use the LSI Configuration Utility application on the blade server to set up mirroring. For more information about using the LSI Configuration Utility application, see the *Installation and User's Guide* that came with your SAS expansion card.

Table 9. Zone 12 configuration

Blade-server bay	Maps to...	
	Storage module 1 hard disk drives that use the connectivity module in bay 3	Storage module 2 hard disk drives that use the connectivity module in bay 4
1	1, 3, 5	1, 3, 5
4	2, 4, 6	2, 4, 6

Zone 13 (Predefined Config 09)

Zone 13 supports two blade servers, one connectivity module, and two fully-populated storage modules. Each blade server can access three hard disk drives in each storage module and all external ports on the connectivity module.

Important: If you are going to use this configuration, the proper placement of the blade servers in the BladeCenter unit is important. Blade servers must be installed in blade-server bays 1 and 4. Blade servers installed in any other bay will not be able to access this zone.

Note: If you use a blade server that requires a 3 blade-server bay position, make sure that the SAS expansion card is installed on the base blade server.

This configuration has the following characteristics:

- Each blade server has access to three hard disk drives in each storage module (for a total of six hard disk drives).
- The connectivity module must be installed in blade-server bay 3 controls access to the hard disk drives in each storage module.
- The blade servers have access to all external ports on the connectivity module.

Note: This configuration maps the hard disk drives to the blade server and the blade server to the external ports on the connectivity module. You will have to use the LSI Configuration Utility application on the blade server to set up mirroring. For more information about using the LSI Configuration Utility application, see the *Installation and User's Guide* that came with your SAS expansion card.

Table 10. Zone 13 configuration

Blade-server bay	Maps to...	
	Storage module 1 hard disk drives that use the connectivity module in bay 3	**Storage module 2 hard disk drives that use the connectivity module in bay 3**
1	1, 3, 5	1, 3, 5
4	2, 4, 6	2, 4, 6

Zoning configuration worksheet

Use this worksheet to plan your zoning configuration by assigning the hard disk drives (HDD) in storage module 1 and storage module 2 to blade servers and blade servers to external ports on the connectivity modules.

Table 11. Zone configuration worksheet

Resource	Blade-server bays					
	1	2	3	4	5	6
Storage module 1						
HDD 1						
HDD 2						
HDD 3						
HDD 4						
HDD 5						
HDD 6						
Storage module 2						
HDD 1						
HDD 2						
HDD 3						
HDD 4						
HDD 5						
HDD 6						
SAS connectivity module - BladeCenter I/O-module bay 3						
External port 1						
External port 2						
External port 3						

Table 11. Zone configuration worksheet (continued)

Resource	Blade-server bays					
	1	2	3	4	5	6
SAS connectivity module - BladeCenter I/O-module bay 3 (continued)						
External port 4						
SAS connectivity module - BladeCenter I/O-module bay 4						
External port 1						
External port 2						
External port 3						
External port 4						

Appendix A. Using the CLI

The command-line interface (CLI) provides a convenient method for entering commands that manage and monitor the connectivity module.

Command-line interface guidelines

All commands have the following syntax:

```
command argument -option parameter
```

The CLI-command syntax is as follows:

- `keyword`
- `keyword <argument>`
- `keyword <argument>[options]`

Items in the argument brackets (< >) can be changed by typing a new argument. Items in the optional square brackets ([ ]) can be changed by typing a new option name. You can use the Backspace and Delete keys to erase characters behind and in front of the cursor.

For example:

```
sasport status all
```

The information for each option is returned in the order in which it was entered and is displayed on separate lines.

Observe the following general guidelines when using the command-line interface:

- Case sensitivity

    All commands, command options, and predefined command option parameters are case sensitive.

    Note: If you receive an `Illegal command. Type ? or for a list` message, make sure that you are typing the commands in the correct case; they are case sensitive. For a list of valid commands, type help or ?.

- Delimiters
    - Required parameters (arguments) are designated in the < > brackets.
    - Optional parameters are designated in the [ ] brackets.
    - Optional parameters designated with a separating bracket [*abc* | *def*] allow you to change either *abc* or *def*.

- In a command that requires parameters, a single space is expected between the option and the parameter. Any additional spaces are ignored.
- Output format
  - Failed commands generate failure messages.
  - Successful commands are indicated by the message OK.
- Strings
  - Strings containing spaces should contain an underscore character (_). For example:

    `snmpsyslocation IBM_lab`
  - String parameters can be mixed case.
- The help command lists all commands and a brief description of each command. You can also issue the help command by typing ? .
- You can use the up arrow (↑) and down arrow (↓) keys in the command line interface to access the last five commands that were entered.

CLI management commands

This section describes the CLI management commands available for the connectivity module.

allregisters

Displays all registers on PHY phynum (in hex).

Command arguments: - *<phynum>* - The number of a specific register. When this command is issued with *phynum* specified, the *phynum* defines what register is reported. If the *phynum* parameter is not specified, then all registers are reported.

Example:
`>allregisters 1`

clearlog

Clears the current connectivity module event log.

Command arguments: None

Example:

`>clearlog`

clrerrorlog

Clears the PHY Error Log on phynum (in hex).

Command arguments: *<phynum>* - The number of a specific PHY. When this command is issued with *phynum* specified, the *phynum* defines the PHY whose errors are to be cleared from the error log file. If the *phynum* parameter is not defined then all PHY errors are cleared.

Example:
```
>clrerrorlog 01
SMP_PARERR        : 00000000
Cleared PHY Error Log: 01
```

comport

Displays or allows you to configure the Storage Configuration Manager base-port number (decimal).

Command arguments: *<portnumber>*

Where:
- *portnumber* - The port number that the Storage Configuration Manager is changing to. If no port is defined, the current configuration is returned.
- *SCM Request Port* - Displays the port number.
- *SCM Event Port* - Displays the port number + 1.
- *FW Update Port* - Updates the port number + 2.

Example:
```
>comport
SCM Request Port  :6641
SCM Event Port    :6642
SCM FW Update Port :6643
MM Request Port   :6654
MM Event Port     :6655
```

Note: Do not use 6652 through 6655 as the port number because it will interfere with the management module ports.

daemon

Enables or disables a specific TCP/IP daemon.

Command arguments: *<type>* [*on* | *off*]

Where:
- *type* - Defines the available daemon; such as telnet, snmp, http, sntp, or fwupdate.
- *on* - Enables the daemon.
- *off* - Disables the daemon.

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- If no action is defined the current daemon status (on/off) is displayed.

   Note: Changing the daemon status will restart the TCP/IP stack.

Example:
```
>daemon telnet  off
```

ecmregisters

Displays ECM registers.

Command arguments: *<phynum>* - The ECM register phynum.

Note: When this command is issued the ECM Registers defined by *phynum* are displayed. If *phynum* is not defined, all ECM registers are displayed.

Example:
```
>ecmregisters 01
```

exit

Ends the current telnet session.

Command arguments: None

Example:
```
>exit
```

fwcheck

Checks the status of the background Flash erase process.

Command arguments: None

Example:
```
>fwcheck
```

fwdownload

Downloads the current connectivity-module firmware from a TFTP server.

Command arguments: *<ipaddress> <filename> [silent] <status>*

Where:
- *ipaddress* - Defines the IP address of the TFTP server.
- *filename* - Defines the file name to download or file path from which to download.

- *silent* - Disables the display of the download status.
- *status* - Displays the download status.

Example:
```
>fwdownload 192.168.70.238 fw303.fuf silent
```

fwerase

Starts the background flash erase process.

Command arguments: None

Example:
```
>fwerase
```

fwerasebackup

Deletes the backup firmware in the Flash ROM.

Command arguments: None

Example:
```
>fwerasebackup
```

fwrollback

Installs the prior firmware image. For externally controlled schemes, the rollback can be toggled between two images. For boot-loader schemes, the rollback invalidates the current firmware images and can not be undone.

Command arguments: None

Example:
```
>fwrollback
```

fwstoragedownload

Allows you to download storage-module firmware from a TFTP Server.

Command arguments: *<ipaddress> <filename> <sm> [silent]*

Where:
- *ipaddress* - Defines the IP address of the TFTP server.
- *filename* - Defines the file name to download or file path from which to download.

- *sm* - Defines the target storage module (storage module 1 or storage module 2).
- *silent* - Suppresses displaying the download progress.

Example:
```
>fwstoragedownload 192.168.70.1 updatefw.fwfile 1
```

get_sensor

Displays the current temperature of the connectivity module and displays the current voltage levels for the 1.2 v, 1.8v, 3.3v, 5v, 12v, and 3.3v AUX power supplies on the connectivity module.

Command arguments: None

Example:
```
>get_sensor
Status Table

ITEM VALUE STATUS PRE STATUS
-----------------------
TEMP 002 34degC 00 OK
VOL 1.2V 049F 10183V 00 OK
```

getsupport

Reports the internal status of the connectivity module for the IBM service representative.

Command arguments: None

Example:
```
>getsupport
```

ipconfig

Displays the IP configuration.

Command arguments: None

Example:
```
>ipconfig
MAC Address..00:14:5E:C3:11:02
IP Address..192.168.70.210
Subnet Mask..255.255.255.0
Gateway..0.0.0.0
DHCP..Off
```

linkerrorlog

Displays link errors on PHY phynum (in hex). If *phynum* is not defined then errors on all PHYs are displayed.

Command arguments: *<phynum>* - Defines the PHY phynum to be displayed.

Example:
```
>linkerrorlog 1
--------------------
Phy Number: 01
PHY_CTR_CFG..000000FE
PHY_CTR_MATCH..7CAA9595
PHY_COUNTER0..00000000
PHY_COUNTER1..00000000
```

ntp

Allows you to display or modify the Simple Network Time Protocol (SNTP) Client settings.

Command arguments: *<get|set> [<polling> [<frequency> <timeZone> <PriServer> [SecServer]]]*

Where:
- *get* - Displays the current SNTP settings. Defines the IP address of the TFTP server.
- *set* - Modifies the SNTP settings polling.
- *polling* - Allows you to change the polling setting to on to restart SNTP polling or to off to stop SNTP.
- *frequency* - Displays the SNTP polling frequency in seconds
- *timeZone* - Displays the time difference from GMT (Hours:Minutes).
- *PriServer* - Displays the IP address of the primary SNTP server.
- *SecServer* - Displays the IP address of the secondary SNTP server.

Examples:
```
>ntp get
>ntp set off
>ntp set on 86400 -4 192.168.1.1 192.168.1.11
>ntp set on 3600 9:30 192.168.1.11
```

pcmerrorlog

Displays the PCM error log for PHY phynum. If no *phynum* is specified, then errors on all ports are displayed.

Command arguments: *<phynum>* - Defines the specific *phynum* on which errors were generated.

Example:
```
>pcmerrorlog 1
--------------------
Phy Number: 01
PCM Counter Configuration:00000000
PCM Counter:00000000
PCM _BAD_OPEN_CNT:00000000
```

phy

Allows you to toggle PHY debug on and off.

Command arguments: *[on|off]* - Allows you to turn on or turn off the debug of a specific PHY.

Example:
```
>phy on
PHY debug is on
```

phyattribute

Allows you to display, configure, or clear the phy attributes of PHY

Command arguments: [*set|clear|get*] *<phy>* [*routing method*] [*txinvert*] [*rxinvert*]

Where:
- *set* - Allows you to configure the PHY attributes.
- *clear* - Erases all phy attributes.
- *get* - Displays the attributes of all PHYs.
- *phy* - Defines all the PHYs or a particular PHY. The *phy* options are all/ 0/ 1,...
- *routing method* - Defines the routing method as a direct, subtractive, or table method.
- *txinvert* - Allows you to invert (inverted) or normalize (not inverted) the transmit signal.
- *rxinvert* - Allows you to invert (inverted) or normalize (not inverted) the receive signal.

Examples:

```
>phyattribute clr all
>phyattribute get all
>phyattribute clr 0
>phyattribute get 0
>phyattribute set 0 1
>phyattribute set 0 1 0 1 - sets phy 0 attributes:Subtractive routing, Rx not inverted, 1
```

phyerrorlog

Displays the error log on PHY phynum (in hex). If no *phynum* is defined then
all PHY errors are displayed.

Command arguments: *<phynum>* - Defines the specific PHY phynum error log.

Example:

```
>phyerrorlog 1
```

phyregisters

Displays the PHY register on PHY phynum (in hex).

Command arguments: *<phynum>* - Defines the specific PHY register.

Example:

```
>phyregisters 20
```

post_results

Displays the result of the initial power-on-self-test (POST). Three POST choices
are available from the advanced memory module; standard, extended, and
extended with full memory.

Command arguments: None

Example:

```
>post_results

POST results:
PD1 Devices        passed
EEPROM             passed
WatchDog function  passed
...
```

printphystat

Displays the statistics for PHY phynum. If no *phynum* is defined, then the
status of all PHY are displayed.

Command arguments: *<phynum>* - Defines the specific PHY *phynum* (in hex).

Example:

```
>printphystat 1

Phy Number: 01
Phy_stat.Phy_Stat:...1
Phy_stat.Disable_Cause:...0
Phy_stat.Time_Phy_State:...010DB32E
Phy_stat.Enabled_notify:....00
Phy_stat.Notify_sent:....0
Phy_stat.LastHBTime:....00000000
```

reset

Resets the connectivity module.

Command arguments: None

Example:

```
>reset
```

restoremfgdef

Restores the manufacturing default configuration.

Command arguments: None

Example:

```
>restoremfgdef
```

sasaddr

Displays the SAS ID for the connectivity module.

Command arguments: *<get>* - Allows you to display the SAS ID from NVRAM.

Example:

```
>sasaddr get
SASAddress:50050764100077C0
```

sasport

Allows you to control and query the SAS port.

Command arguments: *<cmd> [<arg>]* - Allows you to change the SAS port configuration. The *cmd* options are:

sasport clrerrcnt

Clears the sasport error counters of SAS port PHY(s).

Command arguments: *[all | blade | Bn | En | external]*

Where:
- *all* - Clears error counters for all SAS ports.
- *blade* - Clears error counters all blade server ports.
- *Bn* - Clears error counters for a specific blade server port.
- *En* - Clears error counters for a specific external port.
- *external* - Clears error counters for all external ports.

Example:

```
>sasport clrerrcnt E1
SAS ID    Port Name        Inv.Dword      Disparity     dwordsLost    Reset  Cnt
_____  +  _____  +  _____ +  _____ +  _____ +  _____
E1        External Port 1
PHY 1C                     0x00000000000 0x00000000000 0x00000000000 0x00000000000
PHY 1D                     0x00000000000 0x00000000000 0x00000000000 0x00000000000
PHY 1E                     0x00000000000 0x00000000000 0x00000000000 0x00000000000
PHY 1F                     0x00000000000 0x00000000000 0x00000000000 0x00000000000
```

sasport disable

Disables ports on a connectivity module.

Command arguments: *[all | blade | Bn | En | external]*

Where:
- *all* - Disable all SAS ports.
- *blade* - Disable all blade server ports.
- *Bn* - Disable a specific blade server port.
- *En* - Disable a specific external port.
- *external* - Disable all external ports.

Example:
```
>sasport disable E1
E1  External Port 1   OK
```

sasport enable

Enables the ports on a connectivity module.

Command arguments: *[all | blade | Bn | En | external]*

Where:
- *all* - Enable all SAS ports.
- *blade* - Enable all blade server ports.
- *Bn* - Enable a specific blade server port.
- *En* - Enable a specific external port.
- *external* - Enable all external ports.

Example:
```
>sasport enable E1
E1  External Port 1   is already enable. Request ignored.
```

sasport geterrcnt

Displays the PHY error counters for each PHY of the SAS port.

Command arguments: *[all | blade | Bn | En | external]*

Where:
- *all* - Display the PHY Error Counters for all SAS ports.
- *blade* - Display the PHY Error Counters for all external ports.
- *Bn* - Display the PHY Error Counters for all blade server ports.
- *En* - Display the PHY Error Counters for external port *n*.

- *external* - Display the PHY Error Counters for blade server port *n*.

Example:
```
>sasport geterrcnt all
```

sasport reset
Resets the SAS link through all PHYs belonging to the SAS port defined by the argument.

Command arguments: *[all | blade | Bn | En | external]*

Where:
- *all* - Resets all SAS ports.
- *blade* - Resets all blade server ports.
- *Bn* - Resets a specific blade server port.
- *En* - Resets a specific external port.
- *external* - Resets all external ports.

Examples:
```
>sasport reset all
>sasport reset E1
>sasport reset B14
```

sasport status
Displays the SAS port status.

Command arguments: *[all | blade | Bn | En | external]*

Where:
- *all* - Displays SAS port status for all SAS ports.
- *blade* - Displays SAS port status for all blade server ports.
- *Bn* - Displays SAS port status for a specific blade server port.
- *En* - Displays SAS port status for a specific external port.
- *external* - Displays SAS port status for all external ports.

Example:
```
>sasport status E1
ID  SAS Port Name   SAS Address  Enable  Act  Flt  Status
  +              +            +       +    +    +
E1  External Port 1              True    Off  Off  NoCable
    PHY 1C          000000000000 True    Off  Off  NoCable
    PHY 1D          000000000000 True    Off  Off  NoCable
    PHY 1E          000000000000 True    Off  Off  NoCable
    PHY 1F          000000000000 True    Off  Off  NoCable
```

sasport startlb

Starts the external loop back test on an external SAS port.

Command arguments: *<test port>* - Defines the loop back test port.

Example:
```
>sasport startlb E1
SAS PHY Internal Loopback (Port=E1 PHY=1)........FAIL-=not in sync
SAS PHY Internal Loopback (Port=E1 PHY=2)........FAIL-=not in sync
SAS PHY Internal Loopback (Port=E1 PHY=3)........FAIL-=not in sync
SAS PHY Internal Loopback (Port=E1 PHY=4)........FAIL-=not in sync
```

sasport startsnoop

Starts SAS port-snooping which mirrors the SAS traffic transmit and receive data from the internal SAS port (traffic port) to the external SAS port (listen port).

Command arguments: *<traffic port> <listen port> <phy>*

Where:
- *traffic port* - Defines the internal SAS port.
- *external* - Defines the external SAS port.
- *phy* - Defines the SAS PHY.

Example:
```
>sasport startsnoop B1 E1 1
Starting SAS Port snooping was successful.
Traffic Port: B1
Listening Port: E1
Mirrors Rx to B1 MAIN> E1 PHY 1, TX FROM B1 MAIN> E1 PHY 2
```

sasport stoplb

Stops the remote loop back test on the external SAS port.

Command arguments: *<test port>* - Defines the loop back test port.

Example:
```
>sasport stopLB E1
```

sasport stopsnoop

Stops snooping on a port that mirrors the SAS traffic transmit and receive from the internal SAS port and the external SAS port.

Command arguments: *<traffic port>* - Defines the snooping on the traffic port.

Example:

```
>sasport stopsnoop B1
```

setadminpassword

Allows you to change the administrator password.

Command arguments: *<user> <password>*

Where:

- *user* - The user name for of the connectivity module whose password is changing. The connectivity module has four user names:
  - USERID
  - USERID1
  - USERID2
  - USERID3
- *password* - The password for the connectivity module. The password must conform to the following rules:
  - The password must be 8 to 16 characters long
  - The characters must contain at least one numeric character and at least one alphabetic character

Example:

```
>setadminpassword USERID PASSW0RD
Password changed successfully
```

smpregisters

Displays the SMP registers.

Command arguments: None

Example:

```
>smpregisters
SMP_TXCNTL:   00000001
SMP_STAT:      00000040
SMP_IRSTAT:   00000000
SMP_IREN:      00000001
SMP_TXSTART:    00000000
SMP_TXLEN:   00000038
...
```

snmpcommunity

Allows you to display or define the SNMP community strings. The maximum number of community characters allowed is 24. There are no spaces allowed in the string and you must use the underscore character to enter a space.

Command arguments: *<rd | rw> [public | private]*

Where:
- *rd* - Displays the SNMP READ community.
- *rw* - Displays the SNMP WRITE community.
- *public* - Configures the SNMP community to public.
- *private* - Configures the SNMP community to private.

Example:
```
>smpcommunity rd
SNMP READ Community String = public
```

snmpsyscontact

Allows you to display or define the SNMP MIB-2 system contact-display information. The maximum number of contact-information characters allowed is 64. There are no spaces allowed in the string and you must use the underscore character to enter a space.

Command arguments: *<sysContact>* - Defines the SNMP MIB-2 system contact information.

Example:
```
>snmpsyscontact Contact_Me
```

snmpsysdescr

Allows you to display or define the SNMP MIB-2 system description-display information. The maximum number of system-description characters allowed is 64. There are no spaces allowed in the string and you must use the underscore character to enter a space.

Command arguments: *<sysdescr>* - Defines the SNMP MIB-2 system description. If no *sysdescr* is defined the current information is displayed.

Example:
```
>snmpsysdescr IBM BladeCenter SAS Connectivity Module
IBM Bladecenter SAS Connectivity Module
```

snmpsyslocation

Allows you to display or define the SNMP MIB-2 system-location information.
The maximum number of location characters allowed is 64. There are no
spaces allowed in the string and you must use the underscore character to
enter a space.

Command arguments: *<sysLocation>* - Defines the SNMP MIB-2 system
location. If no *sysLocation* is defined the current location is displayed.

Example:
```
>snmpsyslocation IBM@IBMUS
>snmpsyslocation
IBM@IBMUS
```

snmptrapdest

Allows you to display or define the SNMP IP address and port information for
the trap destination. If no *ipaddress* and *port* is defined the current information
is displayed.

Command arguments: *<ipaddress:port>*

Where:
- *snmptrapdest* - Displays the SNMP IP address and port information of the
  trap destination.
- *snmptrapdest ipaddress* - Defines the SNMP IP address.
- *snmptrapdest port* - Defines the port.

Example:
```
>snmptrapdest 192.168.0.2:162
>snmptrapdest
192.168.0.2:162
```

stat

Reports the current firmware version and status.

Command arguments: None

Example:
```
>stat
Vitesse Semiconductor VSC7157
GNU Build
By use of this software, you accept the terms and conditions
of the license agreement in license.txt.
Firmware Version: 02.22

Status: Status OK
```

```
CRC D737
Versions:
Module  Vers        Description                    Date      Time
-------- ----- -------------------------------------------- --------
TARAN_PM 02.22 PM SAS Connectivity Module      Apr 18 2007 03:41:19
libvos   05.04 Vitesse Operating System        Apr 18 2007 03:42:41
libsyssv 05.04 System Services Library         Apr 18 2007 03:42:10
libdev   03.03 GTWS Device Library             Apr 18 2007 03:41:57
sspSes   03.04 SSP SES Diagnostic Library      Apr 18 2007 03:44:24
tcp      03.04 TCP Diagnostic Library          Apr 18 2007 03:43:52
libSMP   03.04 SMP Transport Library           Apr 18 2007 03:42:56
libSSP   03.04 SSP Transport Library           Apr 18 2007 03:43:06
libPHY   03.04 PHY Transport Library           Apr 18 2007 03:43:21
libGUI   03.04 GUI Transport Library           Apr 18 2007 03:43:24
libTCP   e3.04 TCP Transport module        Apr 18 2007 03:43:29

Transport Configuration
Name     Base     Int  Diag
-------- -------- --- --------
libSMP   ONBOARD   i
libSSP   ONBOARD   i   sspSes
libPHY   ONBOARD   i
libGUI   ONBOARD   i
libTCP   ONBOARD   i   tcp

-------------------------------------
```

target

Allows you to select the CLI target module.

Command arguments: *<main\sm1\sm2>*

Where:

- *main* - The SAS connectivity module.
- *sm1* - The storage module in storage-module bay 1.
- *sm2* - The storage module in storage-module bay 2.

Example:
```
>target sm1

sm1
```

time

Allows you to display or define the current date and time settings.

Command arguments: *[<set|get>]<month> <day> <year> <hour> <min> <sec> <W>*

Where:
- *set* - Sets the time.
- *get* - Displays the current time.
- *month* - Displays the month using the MM format.
- *day* - Displays the day using the DD format.
- *year* - Displays the year using the YYYY format.
- *hour* - Displays the hour using the HH format.
- *minute* - Displays the minutes in MM format.
- *seconds* - Displays the seconds in SS format.
- *W* - Displays the day of the week.

Examples:
```
>time set 6 19 2007 8 37 05 2

MM/DD/YYYY HH:MM:SS (www)
06/19/2007 08:37:05 (TUE) 170/365
Seconds since 01/01/1970 = 0x467795B1

>time get

MM/DD/YYYY HH:MM:SS (www)
06/19/2007 08:38:02 (TUE) 170/365
Seconds since 01/01/1970 = 0x467795EA
```

version

Displays the hardware, firmware, and CPU version of the connectivity module.

Command arguments: None

Example:
```
>version

Vitesse Semiconductor VSC7157
Chip Version    : 02
Firmware Version: 02.03
CPU Version     : 0000AC13
```

xmlconnections

Displays all of the current XML connections.

Command arguments: None

Example:

```
>xmlconnections

Main Port Connection 0
        activePCB      : BFB1294C
        loggedIn       : True
        inactivityTime : 47331
        localPort      : 6641
        remotePort     : 3994
        state          : Established

Event Port Connection 0
        activePCB      : BFB129F0
        localPort      : 6642
        remotePort     : 3995
        state          : Established
```

xmlevents

Displays all of the XML event queues.

Command arguments: None

Example:

```
>xmlevents
Event Port Connection 0
        activePCB  : BFB129F0
        eventCount : 0000

Event Port Connection 1
        activePCB  : 00000000
        eventCount : 0000

Event Port Connection 2
        activePCB  : 00000000
        eventCount : 0000

Event Port Connection 3
        activePCB  : 00000000
        eventCount : 0000

Event Port Connection 4
        activePCB  : 00000000
        eventCount : 0000
```

zoneconfig

Displays and allows you to change the SAS zone configuration.

Command arguments: *<cmd> [<arg>]* - Allows you to change the SAS zone configuration. The *cmd* options are:

- *"zoneconfig apply" on page 65*
- *"zoneconfig compare"*
- *"zoneconfig copy" on page 66*
- *"zoneconfig deny" on page 66*
- *"zoneconfig disable" on page 66*
- *"zoneconfig erase" on page 67*
- *"zoneconfig get" on page 67*
- *"zoneconfig groupassign" on page 67*
- *"zoneconfig permit" on page 68*
- *"zoneconfig setdesc" on page 68*
- *"zoneconfig setname" on page 68*
- *"zoneconfig stat" on page 69*

zoneconfig apply

Applies a stored zone to hardware zone table.

Command arguments: *<zone#>* - Defines the zone number to be applied. Numbers 1 through 4 are the stored zones and the numbers 5 through 13 are the predefined zones.

Example:
```
>zoneconfig apply 1
Zone #01 has applied to hardware zone table.
```

zoneconfig compare

Compare two zone configurations.

Command arguments: *<SourceZone#> <DestZone#>*

Where:

- *SourceZone#* - Defines the source-zone number to be compared. The numbers 1 through 4 define the stored-zone locations and the numbers 5 through 13 define the predefined-zone locations.
- *DestZone#* - Defines the destination-zone number to be compared. The numbers 1 through 4 define the stored-zone locations and the numbers 5 through 13 define the predefined-zone locations.

Example:
```
>zoneconfig compare 5 1
```

zoneconfig copy

Copies the zone configurations.

Command arguments: *<SourceZone#> <DestZone#>*

Where:

- *SourceZone#* - Defines the source-zone number to be copied from. The numbers 1 through 4 define the stored-zone locations, the numbers 5 through 13 define the predefined-zone locations, and hw defines the hardware table.
- *DestZone#* - Defines the source-zone number to be copied into. The numbers 1 through 4 define the stored-zone locations, the numbers 5 through 13 define the predefined-zone locations, and hw defines the hardware table.

Example:

```
>zoneconfig copy 5 1
Zone Configuration has copied from Zone #05 to Zone #01 successfully.
```

zoneconfig deny

This command modifies the zone permission table of a stored zone. The command denies the SAS connection between two specific groups.

Command arguments: *<StoredZone> <Group1> <Group2>*

Where:

- *StoredZone#* - Defines the stored zone number to be modified. (zone 1 through zone 4)
- *Group1* - The first group ID for which a connection is denied.
- *Group2* - The second group ID for which a connection is denied.

Example:

```
>zoneconfig deny StoredZone #01
Stored Zone #01 has been modified successfully.
zoneconfig deny 1 10 11
```

zoneconfig disable

This command disables the Zoning function on the SAS connectivity module. This command will assign the Group ID of 0 for each PHY and will clear the permission table. All PHYs are disabled if the *disablephy* option is set. In this case, the *SasPort Enable* command must be used to re-enable PHYs because the *apply* subcommand does not enable the PHYs.

Command arguments: *[<disablephy>]* - Disables all zone configuration phys.

Example:
```
>zoneconfig disable
Zoning disabled
```

zoneconfig erase

Erases the zone configuration located in a stored zone

Command arguments: *<StoredZone#>* - The number of the zone configuration to erase. The numbers 1 through 4 specify the stored zone and the numbers 5 through 13 specify the predefined zone.

Example:
```
>zoneconfig erase 2
```

zoneconfig get

Displays the zone configuration located in a stored zone.

Command arguments: *<zone#>* - Defines the zone number to be displayed. The numbers 1 through 4 define the stored zone, the numbers 5 through 13 define the predefined zone, and the hw defines the HW table.

Example:
```
>zoneconfig get 1
```

zoneconfig groupassign

This command modifies the PHY zone configuration of a stored zone This command also assigns a Group ID to all PHYs belonging to the SAS port.

Command arguments: *<StoredZone#> <SasPortId> <ZoneGroupId>*

Where:
- *StoredZone#* - Defines the zone to be modified.
- *SasPortId* - Defines the SAS port ID.
  - *all* - Defines all SAS ports.
  - *blade* - Defines all blade server ports.
  - *Bn* - Defines a specific blade server port.
  - *En* - Defines a specific external port.
  - *external* - Defines all external ports.
- *ZoneGroupID* - Defines the zone group ID to be assigned to the SAS port.

Example:
```
>zoneconfig groupassign 1 b1 10
Zone Group of 10 is assigned to SAS Port B1  (Blade bay Connection 1 )
Stored Zone #01 has been modified successfully.
```

zoneconfig permit

This command modifies the zone permission table of a stored zone. This command also permits the SAS connection between two groups.

Command arguments: *<StoredZone#> <Group1> <Group2>*

Where:
- *StoredZone#* - Defines the stored zone number to be modified (1- 4).
- *Group1* - The first group ID for which a connection is permitted.
- *Group2* - The second group ID for which a connection is permitted.

Example:
```
>zoneconfig permit 1 10 11
Stored Zone #01 has been modified successfully.
```

zoneconfig setdesc

Allows you to display or define the stored-zone description. There are no spaces allowed in the string and you must use the underscore character to enter a space.

Command arguments: *<StoredZone#> <description>*

Where:
- *StoredZone#* - Defines the stored-zone number to be modified (zone 1 through zone 4).
- *description* - Defines the stored-zone description. If no description is defined, this argument displays the current information.

Example:
```
>zoneconfig setdesc 1 A_zone_with_blade_1_seeing_only_external_port_1
```

zoneconfig setname

Allows you to display or define the `zoneconfig` stored-zone name. There are no spaces allowed in the string and you must use the underscore character to enter a space.

Command arguments: *<StoredZone#> <zonename>*

Where:
- *StoredZone#* - Defines the stored-zone number to be modified (zone 1 through zone 4).
- *zonename* - Defines the name of the stored zone.

Example:

```
>zoneconfig setname 1 My_Zone
```

zoneconfig stat

Displays the current zone configuration.

Command arguments: None

Example:

```
>zoneconfig stat
Zone Configuration Status.
Zoning Function:  Enabled
Current Zone:     Predefined Config 02
Default Zone:     Undefined Configuration
Zone Apply for MAIN: Applied
Zone Apply for SM1: Applied
Zone Apply for SM2: Applied
```

Appendix B. Using the embedded Web-browser interface

This appendix provides information about using the embedded Web-browser interface to configure your connectivity module.

Web-browser interface requirements

The embedded Web-browser interface works with Web browsers which support Extensible Stylesheet Language Transformation (XSLT) version 1.0 and application/xml MIME types. The supported Web browsers for the connectivity module is Internet Explorer versions 6.0 and 7.0.

Notes:

1. To configure the connectivity module through the embedded Web-browser interface, the IP address and subnet masks must be compatible and all external ports must be enabled. For more information about enabling external ports, see "Enabling external ports" on page 21.

2. To access a connectivity module from a network management workstation, make sure that it is connected to an external management-module Ethernet port.

Logging into the Web-browser interface

To login to the Web-browser interface, complete the following steps:

1. In your browser, in the URL address field, type http://*xxx.xxx.xxx.xxx*, where *xxx.xxx.xxx.xxx* is the IP address of the connectivity module. Click **GO** or press Enter. For example, http://sas_switch_ip_address. The Web-browser interface Login window opens.

2. In the **User ID** field, enter your user ID. The user name and password are case sensitive.

3. In the **Password** field, enter your password and click **Login**. The Welcome window opens.

Monitoring the connectivity module

The Web-browser interface allows you to monitor the connectivity module, external ports, and blade-server bay connections; and to configure connectivity-module zoning. You can access each window in two ways:

- Selecting the specific link in a Web-browser interface window. For example, clicking the **View Logs** link in a Web-browser interface window.

- Selecting a specific action from the Monitor Module window. For example, in **Monitor Module**, click the specific component to view and click **Choose an Action > View Logs**.

In this appendix, one method of accessing the various Web-browser interface windows is documented although both methods result in the same connectivity module information and options.

To view connectivity module information, complete the following steps:

1. In the Welcome window, click **Monitor Module**. The Monitor Module window opens.
2. Select a specific blader-server bay connection or external port and from the **Choose an Action** menu, select one of the following actions:
   - **View logs** - displays up to 256 log entries for the connectivity module.
   - **View properties** - displays connectivity module properties such as:
     - SAS Product Identifier
     - SAS Address
     - IP Address
     - Firmware Revision
     - Last Firmware Revision
     - TCP Port
     - Date and Time
     - Chassis Identifier
     - Bay Number
   - **View error counters** - Displays the connectivity-module error counters and the status for the internal and external ports.
   - **View alarms** - Displays the connectivity-module alarm information such as:
     - **Type** - Lists the alarm category, such as Voltage or Temperature
     - **Status** - Lists the condition type, such as Alarm or OK
   - **Configure zoning** - Allows you to configure the connectivity-module zoning.
3. Click **OK**.

Updating firmware

To update the connectivity-module firmware to the latest version, complete the following steps:

1. In the Monitor Module window, click **Update Firmware**. The Update Firmware window opens.
2. In the **Firmware File** field, enter the new firmware file name.

   Or

   click **Browse** and locate the firmware file.
3. Click **Install** to install the new file. An installation confirmation window opens.
4. Click **OK** or **Cancel**. If the installation of the new firmware file is successful, an installation confirmation window opens. If there are errors during the installation, an error-message window opens.

For the latest firmware update, see http://www.ibm.com/systems/support/.

Changing the password

To change the connectivity-module password, complete the following steps:

1. In the **Monitor Module** window, click **Administer Users**. The User Administration window opens.
2. Select a User ID and click **Modify Password**. The Modify Password window opens.
3. In the **Old Password** field, enter the current password.
4. In the **New Password** field, enter the new password. Passwords must be 8-16 characters long and must contain at least one number and one letter.
5. In the **Confirm New Password** field, enter the new password again.
6. Click **OK**. The new password is saved and updated.

Configuring zoning

You can use the Web-browser interface to display, activate, and modify current active-zone configurations and current working-zone configurations for the connectivity module.

Activating a zone working configuration

To activate a connectivity-module zone, complete the following steps:

1. In the Web-browser interface window, click **Configuration > Zoning**. The Manage Fabric window opens and displays the current active configuration and working configuration.
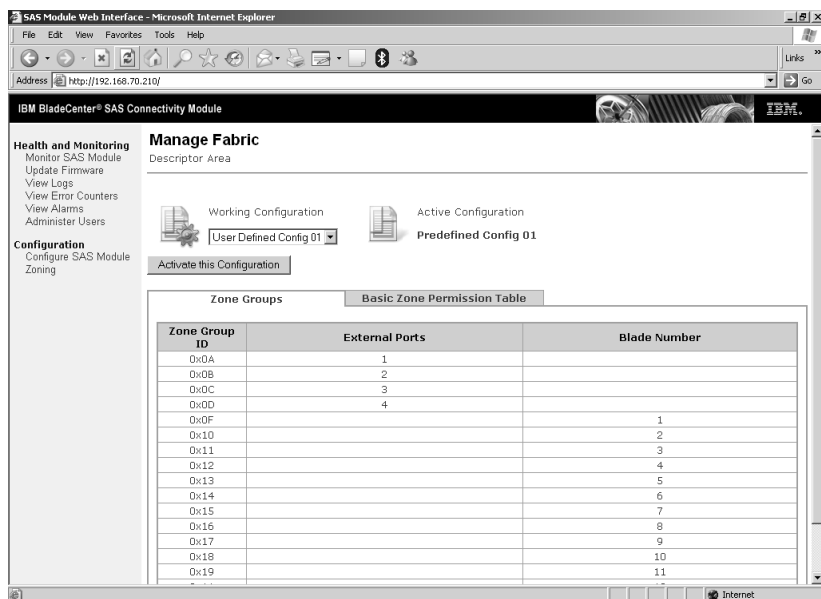
2. From the **Working Configuration** menu, select a working configuration and click **Activate this Configuration**. The selected zone is activated.

Viewing a zone working configuration

To view a zone working configuration, in the **Manage Fabric** window, from the **Working Configuration** menu, select a working configuration. The Zone Groups tab opens and displays the zone group ID for each external port.

Note: Predefined zones cannot be modified.

Modifying a zone working configuration

Each external port of the connectivity module is assigned a specific zone group ID. You can add or remove access permission for which ports are zoned together in zone group IDs. You can also copy a predefined zone and use it as a user-defined zone for editing purposes. To copy a predefined zone, use the `zoneconfig copy` command in the CLI interface. For more information on the `zoneconfig copy` command, see "zoneconfig copy" on page 66.

To modify a working zone configuration:

1. In the Web-browser interface window, click **Configuration > Zoning**. The Manage Fabric window opens and displays the current active configuration and working configuration.

2. From the **Working Configuration** menu, select a working zone configuration to modify and click the **Basic Zone Permission Table** tab. The Basic Zone Permission Table tab opens.

3. In the **View by** menu, select the zone group ID to remove or add zoned ports.

4. To add ports to a zone group ID, in the **Not Mapped To** table, click to select each external port to be added; then, click **Add to Permission Table**. The selected ports are permitted access to the zone group ID.

5. To remove ports from a zone group ID, in the **Mapped to** table, click to select each external port to be removed and click **Remove from Permission Table**. The selected ports are denied access to the zone group ID.
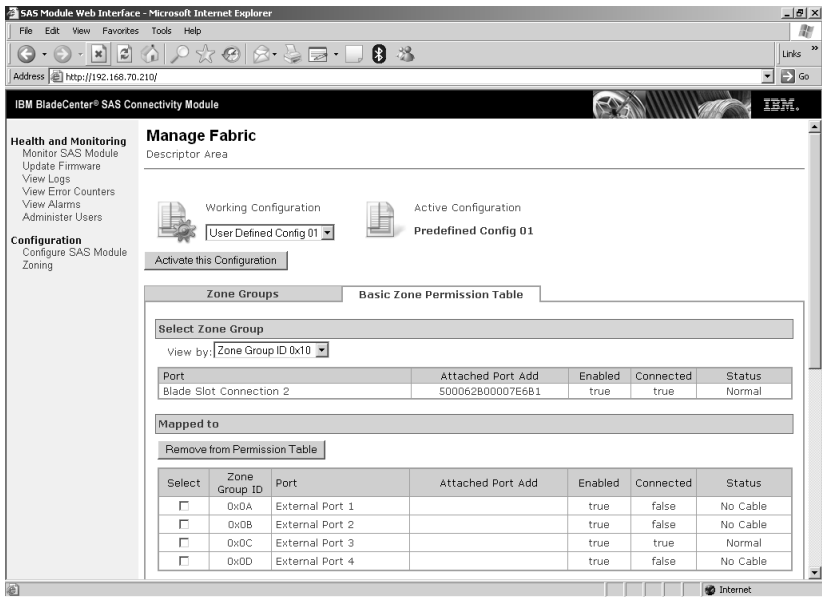
6. After you complete the modifications, click **Activate this Configuration** to save your changes.

Appendix C. 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 connectivity modules 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 *Hardware Maintenance Manual and Troubleshooting Guide* or *Problem Determination and Service Guide* on the IBM *Documentation* CD that comes with your system. For specific troubleshooting information about the connectivity module, including SAS and Ethernet-connection issues, see the latest Readme file at http://www.ibm.com/systems/support/. The readme contains the latest information and updates for the connectivity module firmware.

  Note: For some IntelliStation models, the *Hardware Maintenance Manual and Troubleshooting Guide* is available only from the IBM support Web site.

- 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/.

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 D. 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 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

<u>AMERICAS</u>

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

SAS Connectivity Module

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

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 E. Notices

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i5/OS		

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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 may require replacement of the standard memory with an optional memory module.

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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/index.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/index.shtml.
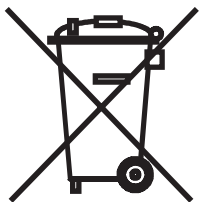
Notice: This mark applies only to countries within the European Union (EU) and Norway.

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/index.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.

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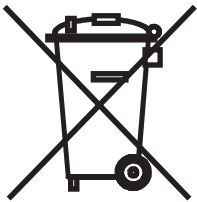
Notice: This mark applies only to countries within the European Union (EU).

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
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