BladeCenter 2-Port Fibre Channel Switch Module

Installation Guide

IBM @server BladeCenter 2-Port Fibre Channel Switch Module

Installation Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Warranty information", on page 53 and Appendix C, "Notices", on page 67.

First Edition (January 2003)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

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.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

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

Statement 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 100°C (212°F)**
- **Repair or disassemble**

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

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

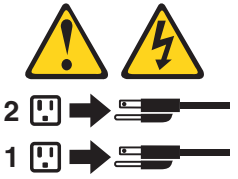
Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 5:

CAUTION:
The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Chapter 1. Introducing the IBM @server BladeCenter 2-Port Fibre Channel Switch Module

This *Installation Guide* contains the following information about the IBM® @server BladeCenter™ 2-Port Fibre Channel Switch Module:

- Setting up and installing your switch module
- Installing the IBM BladeCenter SAN Utility application

For installation details, see Chapter 2, "Installing and replacing a switch module", on page 11 and Chapter 3, "Information panel LEDs and external Fibre Channel ports", on page 21. For additional information, see the instructions in your BladeCenter unit publications. The term IBM @server BladeCenter 2-Port Fibre Channel switch module is referred to as switch module and the term IBM BladeCenter SAN Utility application is referred to as the SAN Utility throughout this publication.

Your switch module is a Fibre Channel component that contains a 16-port switch application specific integrated circuit (ASIC). The ASIC provides two external Fibre Channel user ports with which to connect to external storage devices and 14 internal ports to connect to the BladeCenter blade server bays. You can manage and configure your switch module through either a Telnet connection to the embedded command line interface (CLI), or by using the SAN Utility. The SAN Utility provides an intuitive graphical user interface (GUI) that you can use to configure multiple switch modules through other connected SAN devices from a single interface. You can install up to two switch modules in a BladeCenter unit.

You can obtain up-to-date information about your switch module and other IBM server products at http://www.ibm.com/eserver/xseries/.

The switch module has four labels: a safety certification label, a serial number label, and two MAC address labels. The safety certification label is on the left side of the switch module. The product name and serial number are on the serial number label on the left side of the switch module. The first MAC address label is on the information panel under the switch module external port 1. The second MAC address label is on the right side of the switch module. You will need this information when you register your switch module with IBM. See Figure 1 on page 8 for the location of the switch module labels that contain the MAC address and serial number information.

Record your product information in this table
Product name: IBM @server BladeCenter 2-Port Fibre Channel Switch Module
Model number:
Media access control (MAC) address:

Open the shipping carton of the switch module and carefully unpack its contents. The carton should contain the following items:

- One Fibre Channel switch module
- The IBM *BladeCenter Documentation* CD
- The IBM *BladeCenter SAN Utility* CD
- One diagnostic wrap plug
- The IBM **@server** *BladeCenter 2-Port Fibre Channel Switch Module Installation Guide* (this book)
- Safety information flyer

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

Specifications and features

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

Your switch module has the following features:

- Simple name server implementation

  The simple name server is implemented as described in Fibre Channel Generic Services (FC-GS-3). The simple name server requests and responses are based on the Common Transport Interface (CTI) as described in FC-GS-3. Name server database objects are defined as follows:
  - Native Port Identifier (P_ID)
  - Port Name (PN)
  - Node Name (NN)
  - Class of Service (CoS)
  - Internet protocol (IP) Address (IP_A)
  - Initial Process Associator (IPA)
  - FC-4 Types (Type) and Port Type (PT)
  - Symbolic Port Name (SPN)
  - Symbolic Node Name (SNN)

- Security

  The switch module provides fabric security and interswitch link security. Fabric security controls management access to the fabric. When fabric security is enabled on all switches in the fabric, you must provide a user name and password to access the fabric. Security is disabled by default.
- Firmware installation

  Use the SAN Utility application to install and activate new firmware.
- Registered State Change Notification (RSCN)

  The switch module supports RSCN as described in FC-FLA. RSCN enables an agent to register for change events in the fabric and attached devices.
- Interoperability

  The switch module is interoperable with FC-SW-2 compliant switches.

  For more information, see the IBM @server *BladeCenter Fibre Channel Switch Interoperability Guide*.
- Error detection

  The switch module supports the following error detection methods:
  - Cyclic redundancy check (CRC)
  - 8-byte and 10-byte conversion
  - Parity
  - Long frame and short frame
  - D_ID mismatch
  - S_ID mismatch
- Frame bundling

  The switch module provides the following frame bundling methods:
  - No frame bundling - Intermix frames from different sources at will.
  - Soft lockdown - Soft lockdown causes the switch module to wait for either the sequence to be completed or a gap in the frame traffic to occur before servicing requests from a different port.
- Configurable Fabric Address Notification

  Fabric Address Notification (FAN), as described in FC-FLA, is sent out by the fabric after an initialization event (usually a loop initialization port) to each attached NL_Port. The purpose of the FAN is to inform the attached NL_Ports of the fabric node name, port name, and fabric address.

The following information is a summary of the specifications of the switch module:

Table 1. Fibre Channel switch module specifications

Fibre Channel switch module specifications:

- Fibre Channel protocols:

  FC-PH version 4.3, FC-PH-2, FC-PH-3, FC-AL version 4.5, FC-AL-2 Rev 7.0, FC-FLA, FC-GS-3, FC-FG, FC-PLDA, FC-Tape, FC-VI, FC-SW-2, Fibre Channel Element MIB RFC 2837, and Fibre Alliance MIB version 4.0.
- Fibre Channel service classes: Class 2 and class 3
- Operation modes**:** Fibre Channel class 2 and class 3, connectionless.
- External port type: Generic loop port (GL_port)
- Internal port type: fabric port (F_port)
- Port characteristics: External ports are automatically detected and self configuring
- Number of Fibre Channel ports: 2 external ports and 14 internal ports
- Scalability: 239 switches maximum depending on your configuration
- Maximum number of user ports: 475 000 ports depending on your configuration
- Buffer credits: 12 buffer credits per port
- Media type: Small form-factor pluggable (SFP) module
- Fabric port speed: 1.0625 or 2.125 Gbps (gigabits per second)
- Maximum frame size**:** 2148 bytes (2112 byte payload)
- System processor: Geode SC1200
- Fabric latency: Less than 0.5 µsec
- Fabric point-to-point bandwidth: 2 Gbps or 4 Gbps at full duplex
- Fabric aggregate bandwidth: 64 Gbps at full duplex
- Nonblocking architecture to prevent latency

Switch maintainability:

- Diagnosis: Power-on self-test (POST) is performed on all functional components except the SFP module. Port operational tests include internal, external, and online tests.
- User interface: LED indicators

Fabric management:

- Management methods:
  - BladeCenter SAN Utility application
  - Telnet and command line interface (CLI)
- Switch SNMP agent: Enables a network management workstation to receive configuration values, traffic information, and Fibre Channel failure data through SNMP and the Ethernet interface.

Dimensions:

- Width: 112 mm (4.41 in.)
- Height: 29 mm (1.14 in.)
- Depth: 260.3 mm (10.25 in.)
- Weight: 2 lb

Environmental:

- Temperature and altitude:
  - Operating: 5°C to 40°C (41°F to 104°F) at an altitude of 0 to 3048 m (0 to 10 000 ft.)
  - Non-operating: -40°C to 65°C (-40°F to 149°F) at an altitude of 0 to 15 240 m (0 to 50 000 ft.)

Table 1. Fibre Channel switch module specifications (continued)

- Humidity:
  - Operating: 25% to 80%, noncondensing
  - Non-operating: 25% to 90%, noncondensing

Switch regulatory certifications:

Electrical:

- Power source loading: 3.75 amps maximum at 12 V dc
- Heat output: 45 watts maximum
- Operating voltage: 12 V dc
- Circuit protection: Internally fused
- Safety standards:
  - UL 1950 (USA)
  - UL 1950 (Canada)
  - EN60950 (EC)
  - Support for Japan
  - Support for Korea
  - CB scheme - IEC 60950

- Emissions standards: FCC part 15B Class A (USA)
  - VCCI Class A ITE (Japan)
  - ICES-003 issue 3 (Canada)
  - A4EN55022 level A (EC)
  - Voltage fluctuations: EN 61000-3-3
  - Harmonics: EN 61000-3-2
  - Immunity: EN55024: 1998
  - Marking:
    - Fcc part 15
    - UL (United States)
    - cUL (Canada)
    - TUV
    - VCCI
    - CE

Shortwave laser SFP module at 1 Gbps and multi-mode SFP module at 2 Gbps:

- Connector: LC-LC
- Color coding: Beige or black exposed connector surfaces
- Cable: Fibre Channel 100-M6-SN-I (50 µm multimode)
- Wavelength: 830 to 860 nm
- Transmit power: -10 dBm minimum
- Receiver sensitivity: -16 dBm average
- Distance:
  - 500 meters maximum using 50 micron fiber
  - 300 meters maximum using 62.5 micron fiber
- Safety: DHHS 21 CFR(J), IEC 825-1 CENCELEC EN 60825-1, VDE

Longwave laser SFP module at 1 Gbps and 2 Gbps single-mode:

- Connector: LC-LC Fibre Channel cable
- Color coding: Blue exposed connector surfaces
- Cable: Fibre Channel 100SM-LC-L (9 µm single mode)
- Wavelength: 1270 through 13.5 nm
- Transmit power: -10 dBm minimum
- Receiver sensitivity: -20 dBm average
- Distance: 2 meters to 10 kilometers
- Safety: DHHS 21 CFR(J), IEDC 825-1 CENELEC EN 60825-1, VDE

Related publications

This *Installation Guide* contains setup and installation instructions for your switch module. This publication also provides general information about your switch module, including getting started, how to configure your switch module, and how to access and use online help.

In addition to this *Installation Guide*, the following related documentation is provided with your switch module:

- IBM **@server** *BladeCenter Fibre Channel Switch Management User's Guide*

  This publication is provided in Portable Document Format (PDF) on the IBM *BladeCenter Documentation* CD. It describes how to use the SAN Utility application. In addition, it describes how to start the Telnet CLI and lists the CLI commands and their usage.

- IBM **@server** *BladeCenter Type 8677 Installation and User's Guide*

  This publication is provided in PDF on the IBM *BladeCenter Documentation* CD. It provides general information about your BladeCenter unit, including:

  - Information about features
  - How to set up, cable, and start your BladeCenter™ unit
  - How to install options in your BladeCenter unit
  - How to configure your BladeCenter unit
  - How to perform basic troubleshooting of your BladeCenter unit
  - How to get help

- IBM **@server** *BladeCenter HS20 Type 8678 Installation and User's Guide*

  This publication is provided in PDF on the IBM *BladeCenter Documentation* CD. It contains general information about your blade server, including:

  - Information about features
  - How to set up and start your blade server
  - How to install options in your blade server
  - How to configure your blade server
  - How to install an operating system on your blade server
  - How to perform basic troubleshooting of your blade server
  - How to get help

- IBM **@server** *HS20 Fibre Channel Expansion Card Installation and User's Guide*

  This Installation and User's Guide contains instructions for installing the IBM HS20 Fibre Channel Expansion Card in an IBM BladeCenter HS20 blade server. This publication contains information about:

  - Installing and configuring the HS20 expansion card
  - Updating the BIOS and device drivers of the HS20 expansion card

- IBM **@server** *BladeCenter SAN Solutions Guide*

  This publication is provided in PDF on the IBM *BladeCenter Documentation* CD. It provides a user-oriented discussion of how BladeCenter Fibre Channel options are used to provide different SAN storage solutions for various application requirements. This document also provides an overview and description for backup and restore, business continuance and high availability, and storage consolidation and data sharing solutions.

- IBM @server *BladeCenter Fibre Channel Switch Interoperability Guide*

  This publication is provided in PDF on the IBM *BladeCenter Documentation* CD. It provides detailed Fibre Channel switch configuration data and step-by-step configuration procedures for integrating the BladeCenter unit into other vendor switch fabrics. Each vendor configuration includes an initial integration checklist, configuration limitations, supported switch and firmware versions, specific management application operations, and a successful-integration checklist.
- *Rack Installation Instructions*

  This publication contains the instructions to install your BladeCenter unit in a rack.
- *Safety Information*

  This multilingual publication is provided in PDF on the IBM *BladeCenter Documentation* CD. It contains translated versions of the caution and danger statements that appear in the documentation. Each caution and danger statement has an assigned number, which you can use to locate the corresponding statement in your native language.
- IBM *Hardware Maintenance Manual and Troubleshooting Guide*

  This publication is provided in PDF on the IBM *BladeCenter Documentation* CD. It contains information to help you solve the problem yourself or to provide helpful information to a service technician.
- IBM *Configuration Options Guide*

  This publication contains information about which small form-factor pluggable (SFP) module and cable is required to connect your switch module to other storage devices. This publication is at http://www.ibm.com/eserver/bladecenter/ on the World Wide Web.

Depending on your blade server model, additional publications might be included on the IBM *BladeCenter Documentation* CD.

In addition to reviewing the publications in this library, be sure to review the IBM @server *BladeCenter Planning and Installation Guide* at http://www.ibm.com/eserver/bladecenter/ on the World Wide Web for information to help you prepare for system installation and configuration.

Notices and statements used in this book

The caution and danger statements that appear in this book are also in the multilingual *Safety Information* book, which is on the IBM *BladeCenter Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* book.

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

- **Notes:** These notices provide important tips, guidance, or advice.

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

Major components of the switch module

The orange color on components and labels on your switch module and BladeCenter unit identifies hot-swap or hot-plug components. You can install or remove these components while the BladeCenter unit is running, provided that it is configured to support this function.

The blue color on components and labels indicates touch points where a component can be gripped, a latch moved, and so on.

Figure 1 shows the major components of your switch module.

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

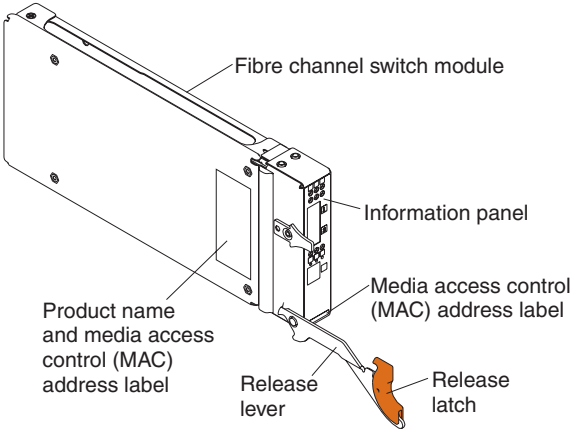


Figure 1. Fibre Channel switch module major components

For more information about the components of the information panel, see Chapter 3, "Information panel LEDs and external Fibre Channel ports", on page 21. For more information about the MAC address, see the IBM *@server BladeCenter Fibre Channel Switch Management User's Guide* provided on the IBM *BladeCenter Documentation* CD.

Chapter 2. Installing and replacing a switch module

Figure 2 shows the switch-module bay locations in the BladeCenter unit.

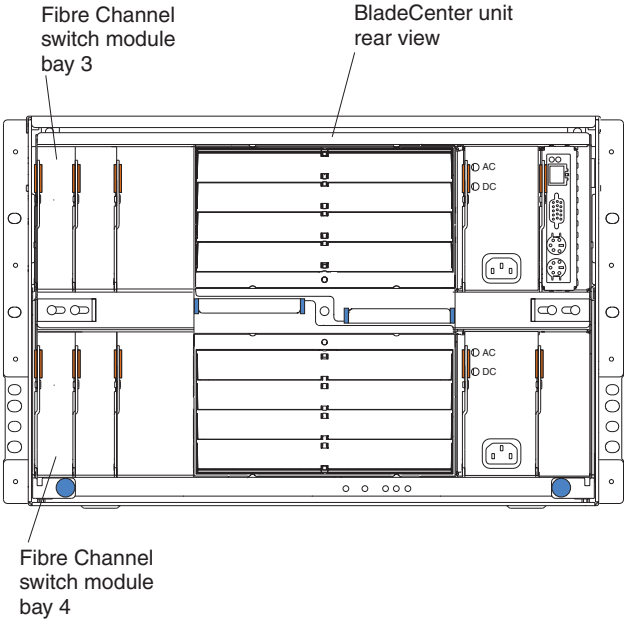


Figure 2. BladeCenter unit rear view

You must install switch modules only in switch-module bays 3 and 4 of the IBM @server BladeCenter Type 8677. At least one switch module is required when you install the IBM HS20 Fibre Channel Expansion Card in the blade server. Installing a switch module in bay 3 or bay 4 provides the first connection to any installed HS20 Fibre Channel expansion card in the BladeCenter unit. Installing a second switch module enables a second connection to an HS20 Fibre Channel expansion card in the BladeCenter unit. Adding a second switch module provides a redundant path and a separate Fibre Channel connection from the blade server to the external Fibre Channel network and SAN.

Important: The switch modules in switch-module bays 3 and 4 and all blade server expansion cards in the BladeCenter unit must use the same interface type. Therefore, you must install Fibre Channel expansion cards when you install Fibre Channel switch modules into your BladeCenter unit.

The following table summarizes the application for each switch module.

Bay	Fibre Channel switch module function
3	Port 1 connection to the blade server interface expansion card in the BladeCenter unit
4	Port 2 connection to the blade server interface expansion card in the BladeCenter unit

Note: The second switch module port connection allows for a redundant path from the blade server to external Fibre Channel devices.

Installation guidelines

Before you begin to install the switch module in your BladeCenter unit, read the following information:

- Become familiar with the safety and handling guidelines specified under "Safety" on page v and "Handling static-sensitive devices" on page 13, and read the safety statements in BladeCenter unit option publications.
- The orange color on components and labels in your BladeCenter unit identifies hot-swap or hot-plug components. You can install or remove hot-swap modules while the BladeCenter unit is running. For complete details about installing or removing a hot-swap or hot-plug component, see the detailed information in this chapter.
- The blue color on components and labels identifies touch points where you can grip a component, move a latch, and so on.
- You do not need to turn off the BladeCenter unit to install or replace any of the hot-swap modules on the rear of the BladeCenter unit.
- For a list of supported options for your BladeCenter unit, go to http://www.ibm.com/pc/us/compat/ on the World Wide Web.

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 within 1 minute of removal.
- A removed hot-swap blade server is replaced with an identical blade server or a filler blade within 1 minute of removal.

Cable requirements for the switch module are described in the IBM *Configuration Options Guide* at http://www.ibm.com/eserver/bladecenter/ on the World Wide Web. See the documentation that comes with your blade server for cable routing information.

Handling static-sensitive devices

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

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

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the BladeCenter unit for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the BladeCenter unit without setting down the device. If it is necessary to set down the device, put it back in its static-protective package. Do not place the device on your system unit 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 switch module

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Complete the following steps to install a switch module:

1. Review the information in "Safety" on page v and "Installation guidelines" on page 12 through "Handling static-sensitive devices" on page 13.
2. Remove the acoustic attenuation module option, if necessary, from the rear of the BladeCenter unit. See the IBM @server *BladeCenter type 8677 Installation and User's Guide* for detailed removal instructions.

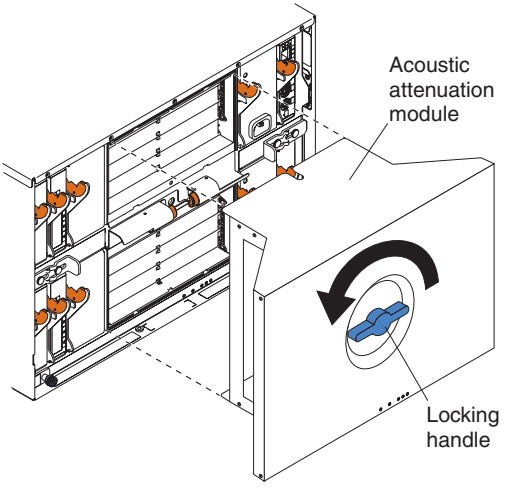


Figure 3. Removing the acoustic attenuation module

3. Be sure that the BladeCenter unit is turned on, the green dc power LED on each power module is lit, and the green OK LED on the management module is lit.
4. Select only switch-module bay 3 or bay 4 in which to install the switch module.
5. Remove the filler module from the switch-module bay in which you are installing the switch module. Store the filler module for future use.

   Note: Install your switch module only in switch-module bay 3 or bay 4.
6. If you have not already done so, touch the static-protective package that contains the switch module to an unpainted metal part of the BladeCenter unit for at least 2 seconds.
7. Remove the switch module from its static-protective package.
8. Ensure that the release lever and latch on the switch module is in the open position (perpendicular to the module).

   Figure 4 on page 17 shows how to install a switch module in the rear of the BladeCenter unit.

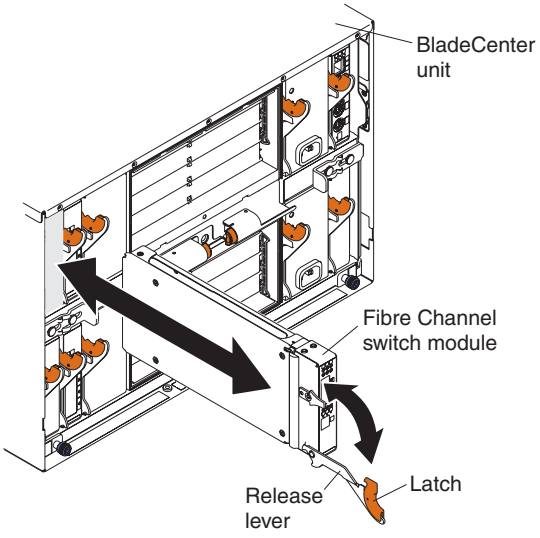


Figure 4. Installing a switch module

9. Slide the switch module into the switch-module bay until it stops.
10. Push the release lever and latch on the front of the switch module to the closed position.

    Note: The switch module takes approximately 85 seconds to complete the POST. When the switch module is powered on, a LED test occurs. All LEDs are lit and remain lit for approximately 10 to 15 seconds and then return to normal state.

11. Make sure that the LEDs on the switch module indicate that it is operating properly. Verify that:
    - When the POST starts, the OK LED on the switch module will be off. The POST tests the condition of firmware, memories, data paths, and switch logic and uses the heartbeat LED to indicate pass or fail conditions.
    - The green OK LED on the switch module is lit to indicate that the switch logic has completed POST.
    - The green heartbeat LED on the switch module has a steady flash rate of once per second. This indicates that the switch module is operating with no errors.

    Note: If the heartbeat LED is not flashing once per second, the POST has failed. Be sure the BladeCenter unit is powered on and the

BladeCenter LEDs are lit. If POST has failed, see the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide* for diagnostic information.

12. If you have a second switch module to install, repeat step 5 on page 16 through step 11 on page 17; otherwise, go to step 13.
13. If needed, connect an SFP module option into external Fibre Channel port 1 and Fibre Channel port 2. For SFP module installation instructions, see the documentation that comes with your SFP module.

    Note: SFP module options do not come with the switch module but are required to use external switch module ports.
14. Use LC-LC fiber-optic cables to connect the switch module external ports to external Fibre Channel devices. For more information, see the documentation that comes with your cable options.

    Note: You can remove and replace an SFP module while the switch module is operating without damaging the switch module or the SFP module. However, transmission on the affected port will be interrupted until the SFP module and cables are installed. See the documentation that comes with your connected Fibre Channel device for information about installation, configuration, and startup sequence.
15. Replace the acoustic attenuation module, if you removed it in step 2 on page 15.
16. Continue with Chapter 3, "Information panel LEDs and external Fibre Channel ports", on page 21.

Removing or replacing a switch module

Statement 8:

CAUTION:
Never remove the cover on a power supply or any part that has the following label attached.

Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Complete the following steps to replace a switch module:

1. Review the information in "Safety" on page v and "Installation guidelines" on page 12 through "Handling static-sensitive devices" on page 13.
2. Remove the acoustic attenuation module, if any, from the rear of the BladeCenter unit. For more information, see the illustration in step 2 on page 15 and the IBM @server *BladeCenter type 8677 Installation and User's Guide*.
3. Remove the LC-LC fiber-optic cables from the two external ports on the SFP module. Removing these cables will disrupt the network connection from the external Fibre Channel port to any connected external Fibre Channel devices. For removal instructions, see the documentation that comes with your cable options.
4. Remove any SFP modules from the switch module external Fibre Channel ports. For SFP module removal instructions, see the documentation that comes with your SFP module.
5. Pull the release latch toward the bottom of the switch module, as shown in Figure 5 on page 20. The module moves out of the bay approximately 0.64 cm (0.25 inch).

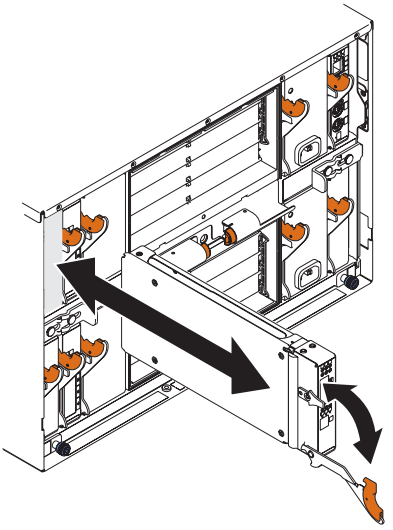


Figure 5. Fibre Channel switch module release latch

Attention: If you do not replace the switch module, you must insert a filler module into the empty bay within 1 minute.

6. Slide the switch module out of the bay and set it aside. Within 1 minute, place either another switch module or a filler module in the bay.

   Note: To verify that the switch module is active after you replace it, see step 10 and step 11 on page 17.

7. If you placed another switch module into the bay, if needed, insert any SFP modules that you removed in step 4 into external Fibre Channel port 1 and Fibre Channel port 2. For SFP module installation instructions, see the documentation that comes with your SFP module.
8. If needed, use LC-LC fiber-optic cables to connect the switch module external port to external Fibre Channel devices. For more information, see the documentation that comes with your cable options.
9. Replace the acoustic attenuation module option, if you removed it in step 2. For detailed installation instructions, see the IBM @server *BladeCenter type 8677 Installation and User's Guide*.

Chapter 3. Information panel LEDs and external Fibre Channel ports

This chapter describes the information panel and LEDs on the switch module. This chapter also identifies the external Fibre Channel ports on the information panel.

Information panel

The switch module information panel contains LEDs and two Fibre Channel ports, as shown in Figure 6.

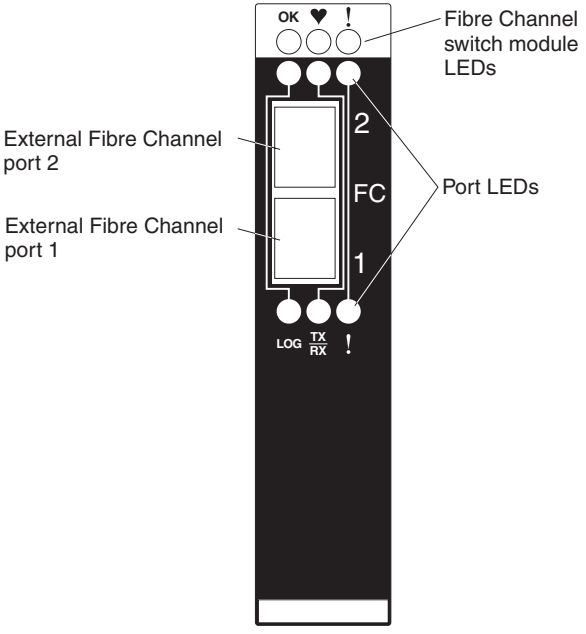


Figure 6. Fibre Channel switch module information panel

The switch module information panel contains:

- Comprehensive LEDs that display the status of the switch module and the network. For more information, see "LEDs" on page 22.
- Two external Fibre Channel ports to connect Fibre Channel devices, end devices, and servers. These ports are identified as port 2 and port 1 in the switch configuration menus and are labeled 2 and 1 (from top to bottom) on the switch module, as shown in the Figure 6.

LEDs

There are three sets of LEDs on the information panel. The first row of LEDs at the top of the switch module represent switch module status and include OK, ♥ (heartbeat), and ! (Fibre Channel switch fault). The second and third sets of LEDs represent status for external Fibre Channel port 2 and external Fibre Channel port 1. The port LEDs include port logged-in, port activity, and port fault. Figure 7 shows the locations of these LEDs on the switch module. In addition, this section provides a description of each LED and their and diagnostic flash patterns. See the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide* for more information about diagnostic flash patterns.

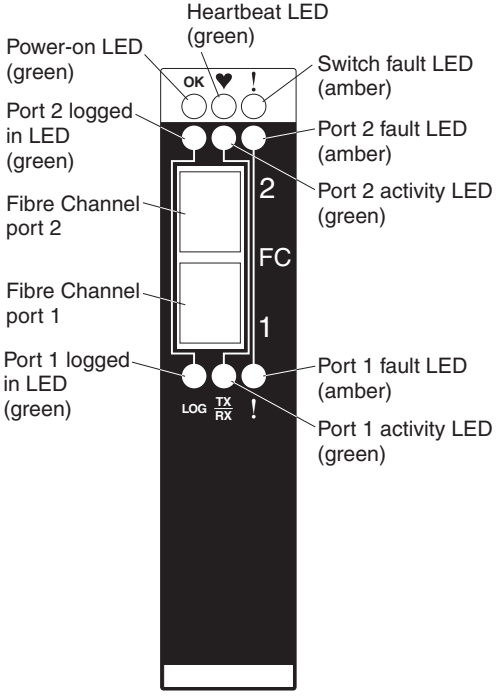


Figure 7. Fibre Channel switch module LEDs

Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. An amber LED is lit when a system error or event has occurred. To identify the error or event, check the LEDs on the information panel of the switch module and see Table 2 on page 23 for more information.

3. An LED test occurs whenever the switch module is turned on. All LEDs are lit and remain lit for approximately 10 to 15 seconds and then return to a normal state.

OK: This green LED is at the top of the switch module on the information panel. When this LED is lit, it indicates that the switch module has passed the POST and is operational.

♥ (heartbeat): This green LED is at the top of the switch module on the information panel. When this LED is flashing, it indicates the status of the internal switch module processor and the results of the POST.

Note: One flash per second indicates that the switch module processor is operating in OK status. Other flash patterns indicate POST errors. For more information, see Table 2.

! (Fibre Channel switch fault): This amber LED is at the top of the switch module on the information panel. This LED indicates that the switch module has a fault. If the switch module fails the POST, this fault LED is lit.

Port logged-in: There are two green port logged-in LEDs. The port 2 logged-in LED is at the top of port 2, and the port 1 logged-in LED is at the bottom of port 1. When one of these LEDs is lit, it indicates that there is a connection (or link) to a device on that port.

Port activity: There are two green port activity LEDs. The port 2 activity LED is at the top of port 2, and the port 1 activity LED is at the bottom of port 1. When one of these LEDs flashes, it indicates that data is being received or transmitted (that is, activity is occurring) on that port. The flash frequency is proportional to the amount of traffic on that port.

Port fault: There are two amber port fault LEDs. The port 2 fault LED is at the top of port 2, and the port 1 fault LED is at the bottom of port 1. When a port fault LED is lit, it indicates that the external port has failed the internal, external, or online port diagnostics tests that are performed with the SAN Utility or CLI. For more information, see the diagnostic section of the *IBM @server BladeCenter Fibre Channel Switch Management User's Guide*.

Table 2. Switch 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 switch module is operational. • The LED does not flash.

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

LED	LED activity
Heartbeat	• The LED is off when you reset the blade server and when the Fibre Channel switch module processor is not operational. • The LED is lit steady on only during LED test. • The LED flashes to indicate the following conditions: – Normal operation - The LED flashes at a steady rate of one flash per second. – Internal firmware failure - The LED flashes two times, at twice the normal rate, followed by a 2-second pause. – Fatal error - The LED flashes three times, at twice the normal rate, followed by a 2-second pause. – Configuration file system error - The LED flashes four times, at twice the normal rate, followed by a 2-second pause. **Note:** See the diagnostic section of the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide* for more information about diagnostic flash patterns.
Switch fault	• The LED is off during initialization or when the switch module is in normal operation. • The LED is lit during LED test or to indicate a system fault during a POST failure or thermal fault. • The LED does not flash.
Port logged-in	• The LED is off when the port is not logged in. • The LED is lit when the port is logged-in or during LED test. • The LED pattern indicates the following conditions: – Logged in - The LED is lit. – Logging in - The LED flashes at 1-second intervals. – Beacon location - The LED flashes at 1-second intervals. For more information, see the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide*. – Error - The LED flashes two times per second.
Port activity	• The LED is off when the port is not logged in or when the port is logged in and there is no port activity. • The LED is lit during LED test. • The LED flashes when port activity performs a normal send or receive operation.
Port fault	• The LED is off when port diagnostics starts and is completed without error. • The LED is lit when port diagnostics discovers a port error. • The LED does not flash.

Chapter 4. Configuring the switch module through the Telnet interface

Your switch module contains a Telnet server. This server enables a Telnet client to establish a Telnet session with the Fibre Channel switch module to retrieve information or to configure parameters using the CLI. You can perform a variety of fabric and switch management tasks through an Ethernet connection using the CLI.

You can access the Telnet interface in two ways:

- In the BladeCenter management module Web interface
- In a command line window on a network management workstation

To configure the switch module through the Telnet interface, the IP address and subnet masks must be compatible. In addition to the IP addressing, to access a switch module from a network management workstation that is connected to an external Ethernet port, the following configuration settings in the management module must be enabled:

- Switch module external port 1 and port 2
- External management for external port 1 and port 2

To enable the configuration settings, in the management module Web interface, click **Switch Tasks** → **Management** → **Advanced Switch Management** → **Advanced Setup**.

Important: Before you configure your switch module, be sure that the management modules in your BladeCenter unit are properly configured. In addition, to access and manage your switch module from an external environment, you might need to enable certain features, such as the external ports and external management over all ports. See the applicable *BladeCenter Installation and User's Guide* publications on the IBM *BladeCenter Documentation* CD for more information. For more detailed information about configuring your switch module, see the IBM **@server** *BladeCenter Fibre Channel Switch Management User's Guide* on the IBM *BladeCenter Documentation* CD.

In addition to reviewing the publications in this library, be sure to review the IBM **@server** *BladeCenter Planning and Installation Guide* at http://www.ibm.com/eserver/bladecenter/ on the World Wide Web for information to help you prepare for system installation and configuration.

Connecting to the switch module

To use the Telnet program (in VT100 compatible terminal mode) to access and control the switch module, you must know the IP address for your switch module and have an existing network connection. If you need to obtain the IP address for your switch module or establish a network connection, contact your system or network administrator. Be sure to use the correct IP address in the required command.

Establishing a Telnet session through the management module

Complete the following steps to establish a Telnet session through the BladeCenter management module:

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

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

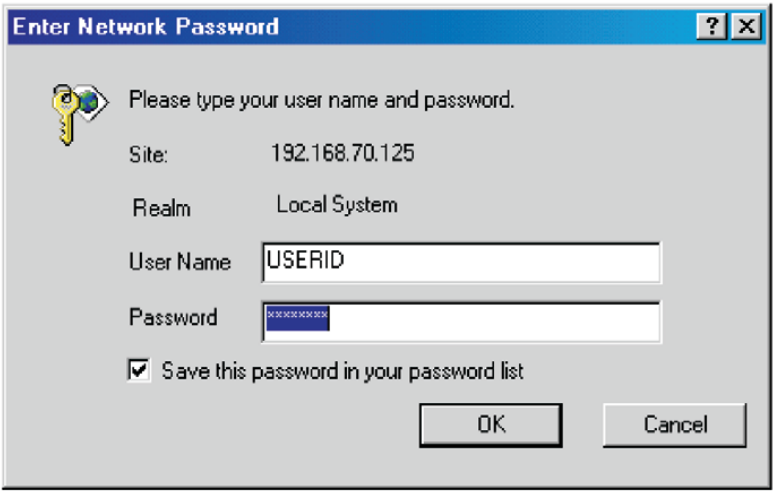


Figure 8. Enter Network Password window

2. In the **User Name** field, type the initial default user ID, `USERID`. In the **Password** field, type the initial default password, `PASSW0RD` (the sixth

character is a zero, not the letter *O*). The user ID and password are case sensitive. The Active Session from Same Client window opens.

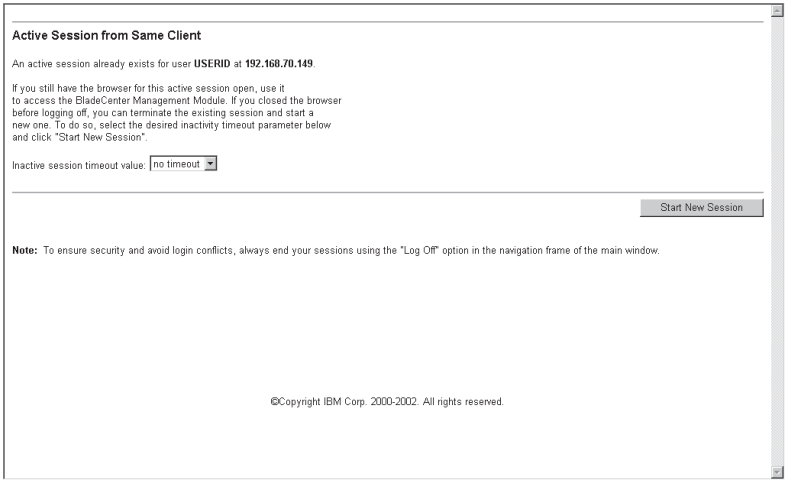


Figure 9. Active Session from Same Client window

3. In the **Inactive session timeout value** field, select the timeout value for this Web session and click **Start New Session**. The BladeCenter management module main window opens.

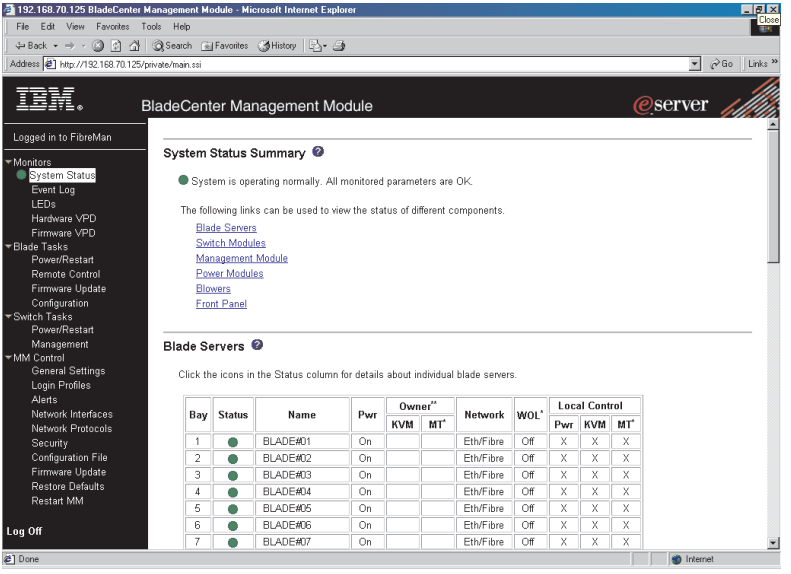


Figure 10. Management Module window

4. In the left navigation pane under **Switch Tasks**, click **Management**. The Switch Management window opens.

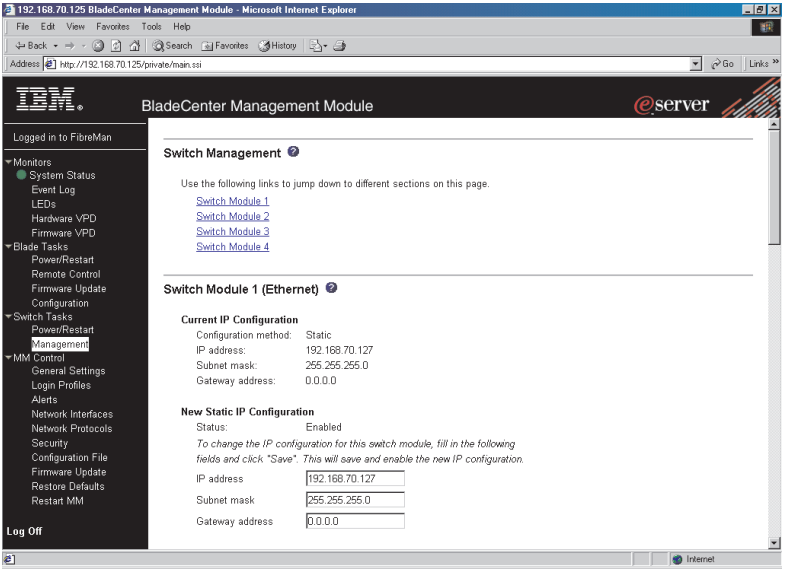


Figure 11. Switch Management window

5. Click the link for either Switch Module 3 or Switch Module 4. A window similar to the one in Figure 12 on page 30 opens.

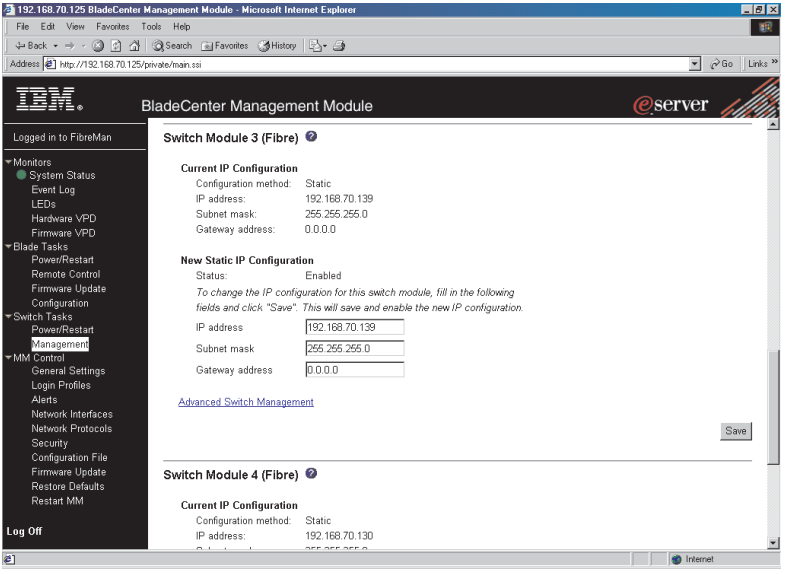


Figure 12. Switch Management window showing switch module 3 example

6. Verify that the IP address is the same in the **Current IP Configuration** and **New Static IP Configuration** sections.
7. Scroll down and click **Advanced Switch Management**. A window similar to the one in Figure 13 on page 31 opens.

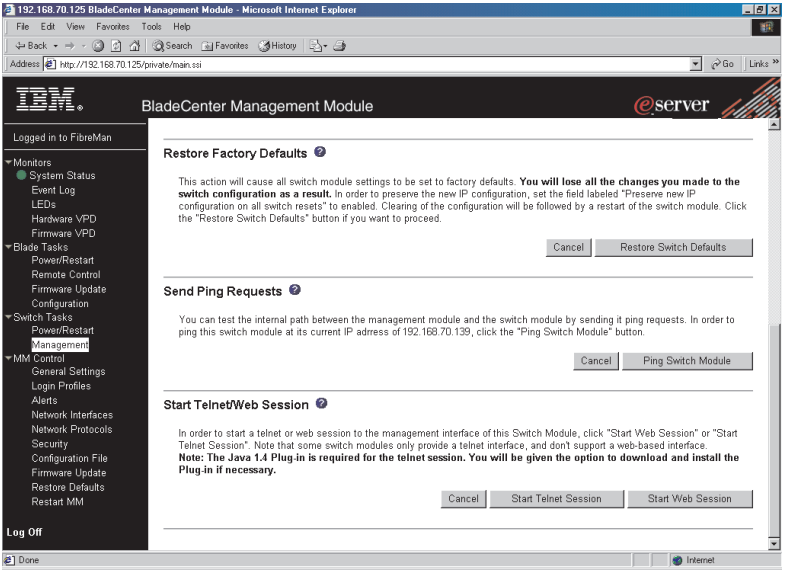


Figure 13. Switch Management window - advanced

8. To start a Telnet session, scroll down to the **Start Telnet/Web Session** section and click **Start Telnet Session**.
9. The switch module Telnet Login window opens, as shown in Figure 14.

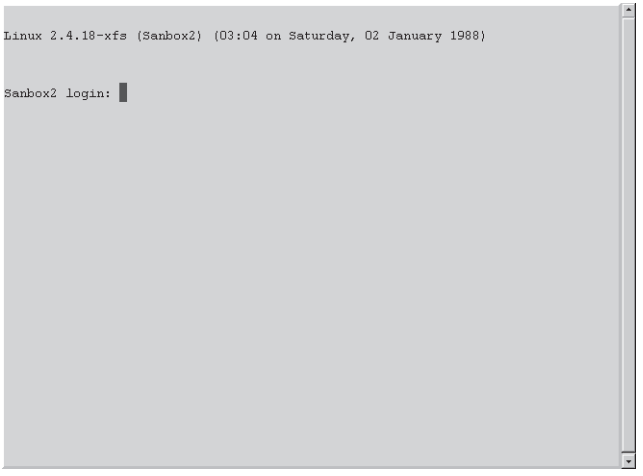


Figure 14. Fibre Channel Switch Module Telnet Login window

10. At the **Login** prompt, type the initial default user ID, USERID and press Enter. At the **Password** prompt, type the initial default password, PASSWORD (the sixth character is a zero, not the letter *O*). The user ID and password are case sensitive.
11. Click **OK** to open the Command Line Interface Shell window.

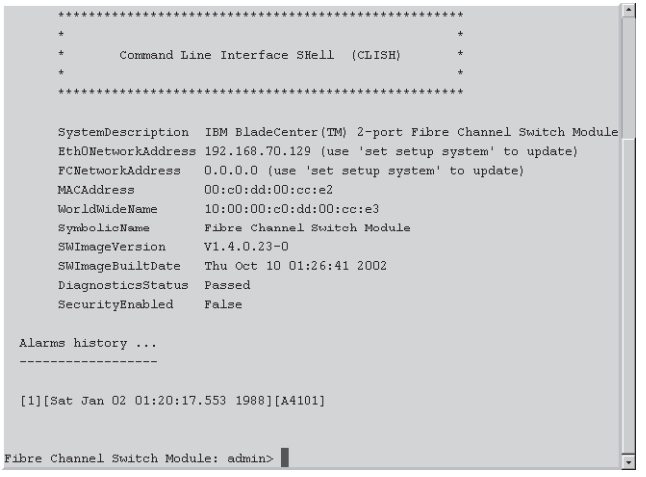


Figure 15. Command Line Interface Shell window

To open online help, type help and press Enter.

Continue with "CLI command format" on page 34. For more information about using the CLI, see the IBM **@server** *BladeCenter Fibre Channel Switch Management User's Guide*.

Establishing a Telnet session in a command-line window

Note: The switch module can be accessed by IP-enabled devices that are connected to BladeCenter Ethernet switch modules. An Ethernet connection to the management module external ports on the BladeCenter unit is required. See the IBM **@server** *BladeCenter Type 8677 Installation and User's Guid*e for more information.

Complete the following steps to establish a Telnet session through a command-line window:

1. Open a command-line window on the network management workstation and type one of the following commands and press Enter. Note that the following are default IP addresses.

For switch module bay 3:

```
telnet 192.168.70.129
```

For switch module bay 4:

```
telnet 192.168.70.130
```

A Command Prompt window opens.

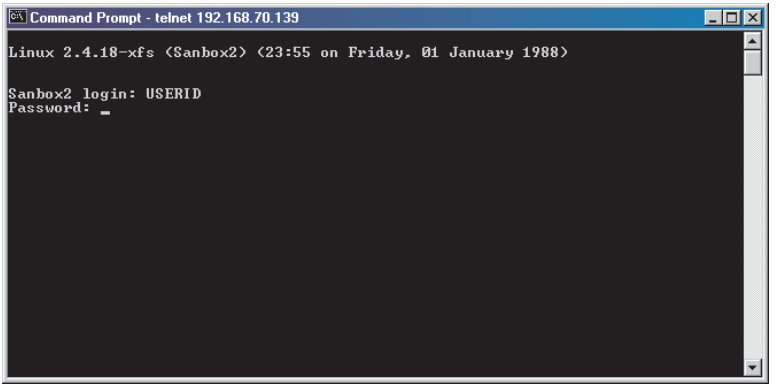


Figure 16. Command Prompt window

2. At the **Login** prompt, type the initial default user ID, USERID and press Enter. At the **Password** prompt, type the initial default password, PASSW0RD (the sixth character is a zero, not the letter *O*). The user ID and password are case sensitive.

   The Command Line Interface Shell window opens.

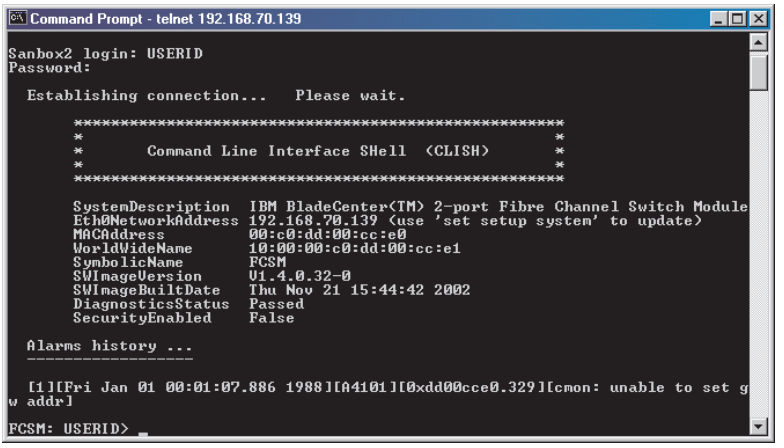


Figure 17. Command Line Interface Shell window

Continue with "CLI command format".

CLI command format

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

For detailed information about using CLI commands, see the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide* on the IBM *BladeCenter Documentation* CD.

A command is followed by one or more keywords. Consider the following rules when typing keywords:

- Commands and keywords are lowercase and case sensitive.
- Required keyword values are shown in standard font: [value}. Optional values are shown in italics *[value]*.
- The underlined portion of each keyword indicates the abbreviated form that can be used. For example, the Delete keyword can be abbreviated as Del.

The CLI command syntax is as follows:

- keyword
- keyword *[value]*
- keyword [value][value 2]

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

Chapter 5. Installing the IBM BladeCenter SAN Utility

You can use the BladeCenter SAN Utility application to access and configure the switch modules. The SAN Utility can be installed on a network management workstation, which is either a BladeCenter blade server or an external network management workstation configured with one of the operating systems described in "System requirements".

This chapter lists system requirements and explains how to install the SAN Utility. In addition, this chapter describes two basic windows you will use to manage your fabrics and switch modules: Topology and Faceplate.

Important: Before you configure your switch module, be sure that the management modules in your BladeCenter unit are properly configured. In addition, to access and manage your switch module from an external environment, you might need to enable certain features, such as the external ports and external management over all ports. See the applicable *BladeCenter Unit Installation and User's Guide* publications on the IBM @server *BladeCenter Documentation* CD for more information. For more detailed information about configuring and managing your switch module, see the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide* on the IBM *BladeCenter Documentation* CD.

In addition to reviewing the publications in this library, be sure to review the IBM @server *BladeCenter Planning and Installation Guide* at http://www.ibm.com/eserver/bladecenter/ on the World Wide Web for information to help you prepare for system installation and configuration.

System requirements

Before you install the SAN Utility, be sure that your network management workstation has the following hardware and software.

Table 3. Network management workstation requirements

Operating system	• Microsoft® Windows® 2000 Integrated with Service Pack 3 • Red Hat Linux® Advanced Server Version 2.1 • Red Hat Linux Version 7.*x* • SuSE Linux Professional Version 8.0
Memory	128 MB minimum
Disk space	150 MB for each installation
Processor	300 MHz or faster
Hardware	CD-ROM drive, 10/100/1000 Base-T Ethernet port

Table 3. Network management workstation requirements (continued)

Internet browser	Microsoft Internet Explorer or Netscape Navigator

Use the applicable procedure in the following sections to install the SAN Utility on your network management workstation.

Installing the SAN Utility on a Microsoft Windows 2000 platform

Complete the following steps to install the SAN Utility on a network management workstation that is configured with Microsoft Windows 2000:

1. If your network management workstation is a BladeCenter blade server, to associate the CD-ROM drive with the blade server, press the CD/diskette/USB select button on the blade server. For the location of the CD/diskette/USB button, see the documentation that comes with the blade server. The LED on the button flashes while the request is being processed, then is steady when the ownership of the CD-ROM drive is transferred to the blade server.
2. If your network management workstation is a BladeCenter blade server, to associate the keyboard port, mouse port, and video port with the blade server, press the keyboard/mouse/video select button. The LED on this button flashes while the request is processed, then is steady when the ownership of the keyboard, mouse and video is transferred to the blade server.
3. Close all open programs. Insert the IBM *BladeCenter SAN Utility* CD into the CD-ROM drive.
4. Open Windows Explorer and double-click the CD-ROM drive letter.
5. To install the SAN Utility, use one of the following methods, where *x.xx.xx* is the SAN Utility version number:
   - To install from the CD, mount the CD and double-click **Windows*x.xx.xx*.exe**. Follow the SAN Utility installation instructions.
   - To copy and install from the hard disk drive, complete the following steps:
     a. Specify a location and save the Windowsx.xx.xx.exe file.
     b. Click **Save**.
     c. Double-click **Windows*x.xx.xx*.exe**.
     d. Follow the SAN Utility installation instructions.
6. When the installation is completed, use one of the following methods to start the SAN Utility:
   - Double-click the **BladeCenter SAN Utility** shortcut.

- Click **Start → Programs → BladeCenterSANUtility → BladeCenterSANUtility**.

If a default fabric view file exists, the Enter Default File Password for Loading File window opens, as shown in Figure 18. Otherwise, the SAN Utility window opens.

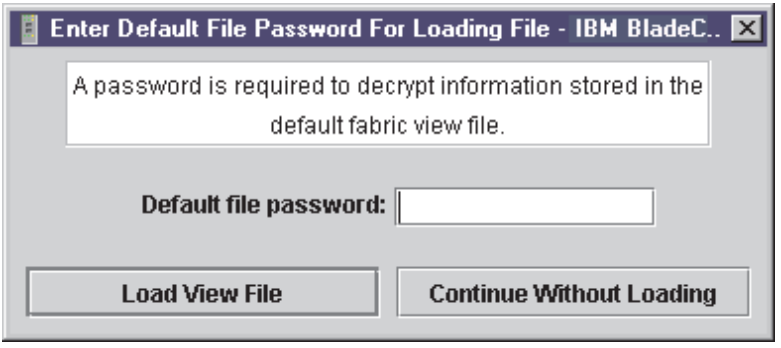


Figure 18. Enter Default File Password For Loading file window

Continue with "Using the SAN Utility" on page 39.

Uninstalling the SAN Utility on a Microsoft Windows 2000 platform

The Uninstaller Data folder is copied into the installation folder during the initial SAN Utility installation process. The Uninstaller Data folder contains the Uninstall BladeCenter SAN Utility program that is used to uninstall the SAN Utility from a network management workstation running Microsoft Windows 2000. In addition, a shortcut to the uninstall program is installed in the user's home directory during the SAN Utility installation process. The default installation directory is C:/Program files/BladeCenterSANUtility.

Complete the following steps to uninstall the SAN Utility:

1. Browse for the uninstallation program file or the shortcut that points to the uninstallation program.

   Locate the uninstallation program shortcut in the same folder as the program shortcut or click **Start → Programs → BladeCenterSANUtility → Uninstall BladeCenterSANUtility**.
2. Double-click the uninstallation program or shortcut and follow the instructions to uninstall the SAN Utility.

Installing the SAN Utility on a Red Hat Linux or SuSE Linux Professional platform

Complete the following steps to install the SAN Utility on a network management workstation that is configured with Red Hat Linux or SuSE Linux Professional:

1. If your network management workstation is a BladeCenter blade server, to associate the CD-ROM drive with the blade server, press the CD/diskette/USB select button on the blade server. For the location of the CD/diskette/USB button, see the documentation that comes with the blade server. The LED on the button flashes while the request is being processed, then is steady when the ownership of the CD-ROM drive is transferred to the blade server.
2. If your network management workstation is a BladeCenter blade server, to associate the keyboard port, mouse port, and video port with the blade server, press the keyboard/mouse/video select button. The LED on this button flashes while the request is processed, then is steady when the ownership of the keyboard, mouse and video is transferred to the blade server.
3. Close all open programs. Insert the IBM *BladeCenter SAN Utility* CD into the CD-ROM drive.
4. Open an xterm or other terminal window.
5. Mount the CD. From a shell command-line prompt, type the following command and press Enter:

   ```
   mount /mnt/cdrom
   ```

6. To install the SAN Utility, use one of the following methods, where *x.xx.xx* is the SAN Utility version number:
   - To install from the CD, type:

     ```
     sh /mnt/cdrom/Linux/Linux_x.xx.xx.bin
     ```

     Follow the SAN Utility installation instructions.
   - To copy and install from your hard disk drive, complete the following steps:
     a. Type:

        ```
        cp /mnt/cdrom/Linux/Linux_x.xx.xx.bin /[directory]/
        ```

        Where[*directory*] is where you want to copy the files to.
     b. Open a terminal window for the directory in which the Linux_*x.xx.xx*.bin file was saved.
     c. Type:

        ```
        sh Linux_x.xx.xx.bin
        ```

     d. Follow the SAN Utility installation instructions.

7. To start the SAN Utility after the installation is completed, from a command prompt, type one the following commands and press Enter:

   ```
   sh /opt/BladecenterSANUtility/BladeCenterSANUtility
   sh /opt/runBladeCenterSANUtility
   ```

   If a default fabric view file exists, the "Enter Default File Password for Loading File" window opens, as shown in Figure 18 on page 37. Otherwise, the SAN Utility window opens.

Go to "Using the SAN Utility".

Uninstalling the SAN Utility on a Red Hat Linux or SuSE Linux Professional platform

The Uninstaller Data folder is copied into the installation folder during the initial SAN Utility installation process. The Uninstaller Data folder contains the Uninstall BladeCenter SAN Utility program that is used to uninstall the SAN Utility from a network management workstation running Red Hat Linux or SuSE Linux Professional. In addition, a shortcut to the uninstallation program is installed in the user's home directory during the SAN Utility installation process. The default installation directory is /opt/BladeCenterSANUtility/.

Complete the following steps to uninstall the SAN Utility:

1. At the command prompt, type the following command and press Enter:

   ```
   # cd /opt/
   ```

2. At the command prompt, type the following command and press Enter:

   ```
   #sh Uninstall_IBM_BladeCenter_San_Utility
   ```

Using the SAN Utility

Use the following procedures to start the SAN Utility and complete the following tasks:

- Start the SAN Utility and add a new fabric
- Change the password for the default fabric view
- Set user preferences
- Access online help
- Save the default fabric
- Exit the SAN Utility

Starting the SAN Utility and adding a new fabric

When you have successfully installed the SAN Utility and the default fabric view does not exist, the IBM BladeCenter SAN Utility - Topology window (referred to as the Topology window) opens, as shown in Figure 19.

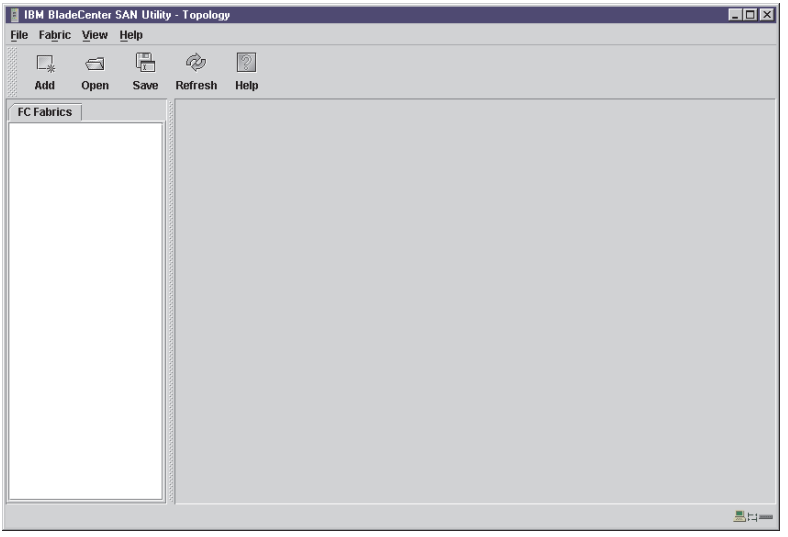


Figure 19. Topology window

If the default fabric view file exists, the Enter Default File Password for Loading File window opens, as shown in Figure 18 on page 37. Complete the following steps to start the SAN Utility and add a new fabric:

1. At the **Default file password** prompt, type the password and click **Load View File**.

   The SAN Utility starts, and any previously saved set of fabrics is displayed. If no set of fabrics has been saved previously, click **Continue Without Loading** to open an empty fabric view.

   The Topology window opens, as shown in Figure 19.
2. Click **Add**.

   The Add a New Fabric window opens, as shown in Figure 20 on page 41.

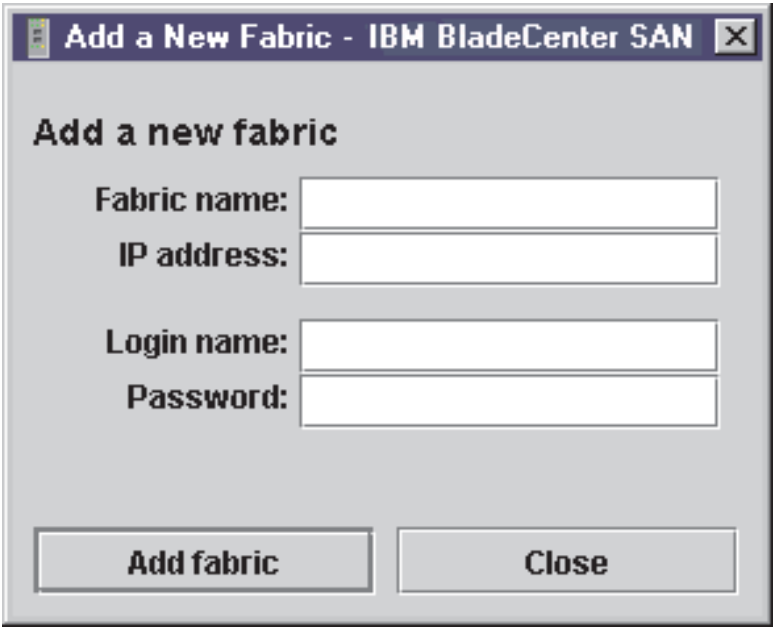


Figure 20. Add a New Fabric window

3. In the **Fabric name** field, type a fabric name.
4. In the **IP address** field, type the IP address of the switch module.
5. In the **Login name** field, type the initial default user ID, `USERID`. In the **Password** field, type the initial default password, `PASSW0RD` (the sixth character is a zero, not the letter *O*). The user ID and password are case sensitive.

   Note: Security is disabled by default. When security is disabled, you are not required to type a login name or password. The default password is for the switch module and is stored in the switch module firmware. If you want to use a Telnet command set to grant user and authority levels, see the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide* for more information.
6. Click **Add Fabric**.

See the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide* for information about managing fabrics.

Changing the password for the default fabric view

Complete the following steps to change the password for the default fabric view file:

1. In the Topology window, click **File** → **Change Default File Password**. The Set New Password window opens, as shown in Figure 21.

Figure 21. Set New Password window

2. In the **Default file password** field, type the new password.
3. In the **Re-enter password to confirm** field, type the same password again.
4. Click **OK** to save your changes.

Note: If you lose the password for the account, contact IBM Support (see Appendix A, "Getting help and technical assistance", on page 49).

Setting user preferences

Use the Preferences window to perform the following tasks:

- Change the location of the working directory that you will use to save files.
- Change the location of the browser used to view the online help.
- Choose the fabric discovery interval. Rates are 30, 45, or 60 seconds. The fabric discovery interval indicates how often the SAN Utility polls the fabric.
- Enable or disable the default view file auto save and load feature. See "Using the SAN Utility" on page 39 for more information about the default fabric view file.
- Select the default port view when opening the SAN Utility Faceplate window (referred to as the Faceplate window). See the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide* for more information about port views.

Complete the following steps from the Faceplate window to set user preferences for your SAN Utility sessions:

1. Click **File** → **Preferences**.
   The Preferences window opens, as shown in Figure 22.

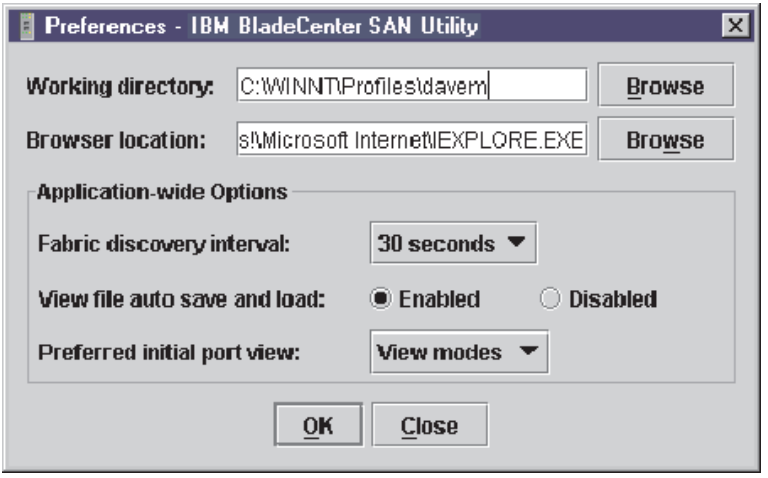


Figure 22. Preferences window

2. Type or browse to the paths to the working directory and browser.
3. In the **Application-wide Options** area of the window, complete the following steps:
   a. In the **Fabric discovery interval** field, select a polling frequency (30 seconds is the default value).
   b. In the **View file auto save and load** field, select **Enabled** or **Disabled**.
   c. In the **Preferred initial port view** field, select the port view mode for the Faceplate window.
4. Click **OK** to save your changes.

Using online help

Online help is available for the SAN Utility. You can access online help using the following two methods:

- From the BladeCenter SAN Utility window menu bar, click **Help** → **Help Topics**.
- From the BladeCenter SAN Utility window toolbar, click **Help**.

To view the SAN Utility software version and copyright information, click **Help** → **About**.

Exiting the SAN Utility

When you exit the SAN Utility, the current fabric view is encrypted and saved to the default fabric view file (fc_view.dft). A password is required to encrypt and save the default fabric view file the first time you exit the SAN Utility. When you exit subsequent sessions, the SAN Utility closes and saves the default fabric view file automatically without requiring a password.

In your next session, the SAN Utility opens the default fabric view file automatically after you type the password. To prevent the SAN Utility from automatically saving the default fabric view file each time you exit a session, select **Disabled** in the **View file auto save and load** field (it is set to **Enabled** by default). See "Setting user preferences" on page 42 for more information.

Complete the following steps to exit a SAN Utility session:

1. From the Faceplate window, click **File → Exit**.

   The Enter Default File Password for Loading File window opens, as shown in Figure 18 on page 37.
2. When you are prompted to type a password with which to protect the default fabric view file, complete one of the following tasks:
   - To save the current set of fabrics in the default fabric view file (fc_view.dft) in the working directory, type a password and click **Save View File**.

     Note: If the default fabric view file was saved with a password, the next time you open the SAN Utility, you will be prompted for the password in the Load Default Fabric View File window. The fabric window opens after you type the password.
   - Click **Exit Without Saving** to exit the program without saving the current fabrics to the default fabric view file.
   - Click **Cancel Exit** to cancel the exit operation.

SAN Utility Topology and Faceplate windows

The SAN Utility provides two basic windows for you to manage the fabric and switch modules. The windows are called Topology and Faceplate. Both windows share the following common elements:

Menu bar: The menus and the items offered in them vary depending on which window is open. For example, the port menu and many of the switch menu selections are displayed only in the Faceplate window. Menu items have a gray background.

In addition to the menu bar, each window has context-sensitive menus that open when you right-click in the graphic window. See the information about

opening the Faceplate window and pop-up window in the IBM @server *BladeCenter Fibre Channel Switch Management User's Guide*.

Toolbar: The toolbar consists of a row of graphical buttons that you can use to access SAN Utility functions. The toolbar buttons are an alternative method to using the menu bar.

Fabric tree: The fabric tree, shown in the FC Fabrics pane, lists the managed fabrics and their associated switches. The pane width can be adjusted by clicking and dragging the moveable border. An entry handle to the left of an entry in the tree indicates that the entry can be expanded. Click this handle or double-click the entry to expand or contract a fabric tree entry. A fabric entry expands to show its member switches.

You can use the fabric tree to access any fabric or switch using the Topology or Faceplate window. You can click a fabric entry to open the Topology window from the fabric tree. You can click a switch entry to open the Faceplate window from the fabric tree.

Graphic window: The graphic window presents graphic information about fabrics and switches such as the fabric topology and the switch faceplate. You can adjust the window length by clicking and dragging the window border that it shares with the data window.

Data window and tabs: A table of data and statistics associated with the selected tab is displayed in the data window. Use the scroll bar to browse through the data. The window length can be adjusted by clicking and dragging the border that it shares with the graphic window. The data window tabs present options for the type of information that is displayed in the data window. These options vary depending on the tab you select.

Working status indicator: The working status indicator is in the lower-right corner of the SAN Utility window. The indicator is displayed when the network management workstation is exchanging information with the fabric. As conditions change, the fabric forwards this information to the network management workstation where it is displayed in the various windows.

Switch modules that are enabled and the connections between switch modules are displayed in the Topology window, as shown in Figure 23 on page 46.

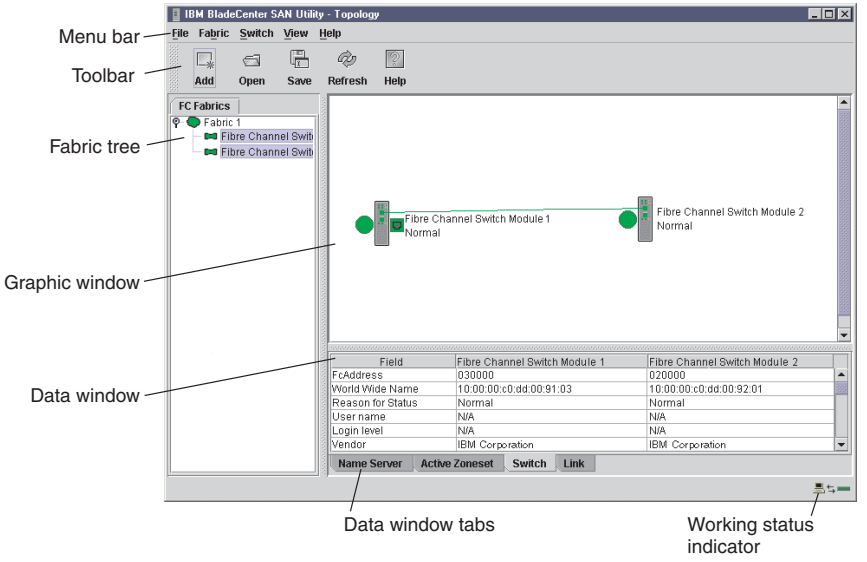


Figure 23. Topology window elements

A single switch and its active ports are displayed in the Faceplate window, as shown in Figure 24 on page 47.

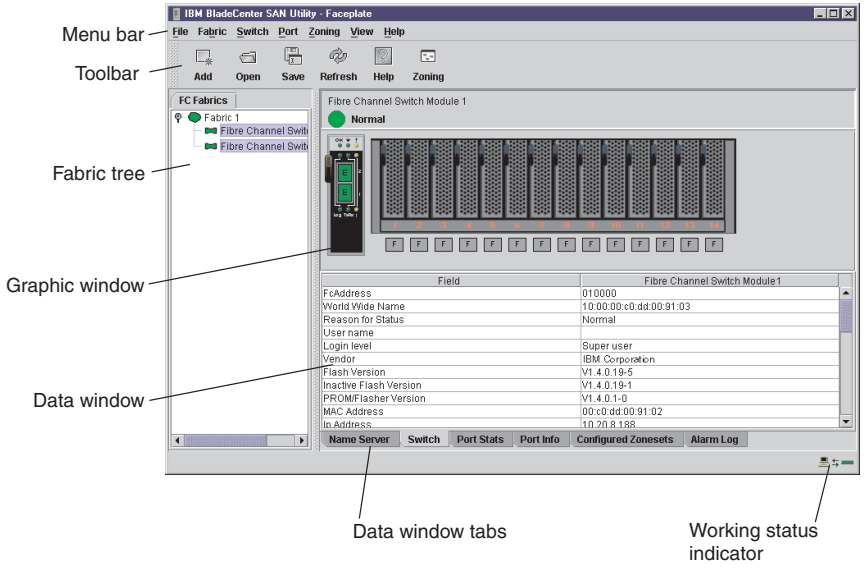


Figure 24. Faceplate window elements

The fabric tree, in the FC Fabrics pane, lists the managed fabrics and their switches. You can adjust the window by clicking and dragging the moveable window border. An entry handle at the left of the entry in the tree indicates that the entry can be expanded. When you click the handle or double-click the entry, the entry expands to show its member switches. These fabric tree elements are shown in Figure 25.

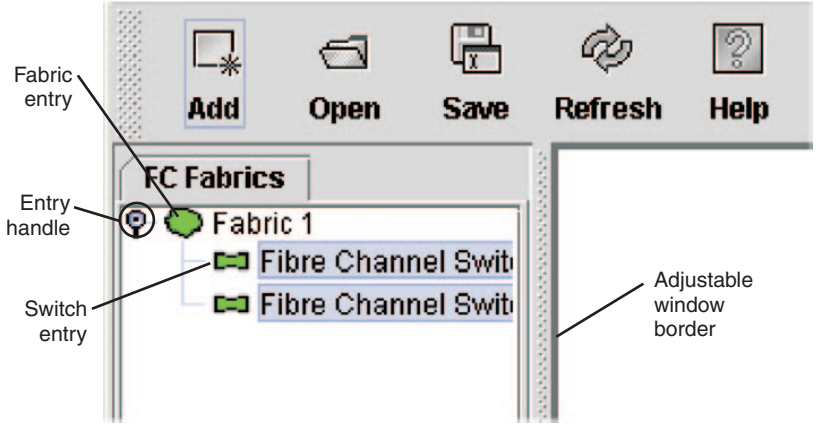


Figure 25. Fabric tree elements

Each fabric tree entry has a small icon next to it that uses color to indicate the following operational status:

- A green switch entry icon indicates that the switch module is in normal operation.
- A red switch entry icon indicates that the switch module has a communications failure.
- A blue switch entry icon indicates that the switch status is Unknown or that security is enabled on the switch module, but security is disabled on the fabric management switch.
- A amber icon indicates that a switch is operational with errors.

The fabric tree provides access to the Topology and Faceplate windows for any fabric or switch.

- To open the Topology window from the fabric tree, click a fabric entry.
- Top open the Faceplate window from the fabric tree, click a switch entry.

See the IBM **@server** *BladeCenter Fibre Channel Switch Management User's Guide* for information about using the Faceplate and Topology windows.

Appendix A. Getting help and technical assistance

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

Before you call

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

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system.
- Go to the IBM Support Web site at http://www.ibm.com/pc/support/ to check for technical information, hints, tips, and new device drivers.
- Use an IBM discussion forum on the IBM Web site to ask questions.

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

Using the documentation

Information about your IBM xSeries or IntelliStation system and preinstalled software, if any, is available in the documentation that comes with your system. That documentation includes printed books, online books, 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/pc/support/ and follow the instructions. Also,

you can order publications through the IBM Publications Ordering System at http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi.

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 xSeries and IntelliStation products, services, and support. The address for IBM xSeries information is http://www.ibm.com/eserver/xseries/. The address for IBM IntelliStation information is http://www.ibm.com/pc/intellistation/.

You can find service information for your IBM products, including supported options, at http://www.ibm.com/pc/support/. If you click **Profile** from the support page, you can create a customized support page. The support page has many sources of information and ways for you to solve problems, including:

- Diagnosing problems, using the IBM Online Assistant
- Downloading the latest device drivers and updates for your products
- Viewing Frequently Asked Questions (FAQ)
- Viewing hints and tips to help you solve problems
- Participating in IBM discussion forums
- Setting up e-mail notification of technical updates about your products

Software service and support

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

For more information about Support Line and other IBM services, go to http://www.ibm.com/services/, or go to http://www.ibm.com/planetwide/ for support telephone numbers.

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services or through your IBM reseller, if your reseller is authorized by IBM to provide warranty service. Go to http://www.ibm.com/planetwide/ for support telephone numbers.

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.

Appendix B. Warranty information

This section contains information about your warranty period and the service and support that are provided by your warranty.

Warranty period

The warranty period varies by machine type and country or region.

Contact your place of purchase for warranty service information. Some IBM Machines are eligible for on-site warranty service depending on the country or region where service is performed.

Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician.

This paragraph applies only to products with a warranty period of 3 years on parts and 1 year on labor. A warranty period of 3 years on parts and 1 year on labor means that IBM will provide warranty service without charge for:

1. parts and labor during the first year of the warranty period
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor it provides in performance of the repair or replacement.

The IBM Machine Warranties Web site at http://www.ibm.com/servers/support/machine_warranties/ contains a worldwide overview of the IBM Statement of Limited Warranty for IBM Machines, a glossary of terms used in the Statement of Limited Warranty, Frequently Asked Questions (FAQ), and links to Product Support Web pages. The IBM Statement of Limited Warranty is available from this Web site in 29 languages in Portable Document Format (PDF).

Machine - IBM @server BladeCenter 2-Port Fibre Channel Switch Module

Country or region	Warranty period	Service delivery method
Worldwide	Parts - 3 years, labor - 3 years	On-site

Problem determination

Prior to on-site warranty service, you are required to go through problem determination with an IBM service specialist call center technician. The service specialist will run diagnostic tests on the hardware and check the software.

Running diagnostics

The IBM service specialist will help you determine whether your equipment is functioning as specified. It might be necessary to isolate the failing xSeries, Netfinity®, or IntelliStation system; IBM component; or both from any active production environment to run diagnostics and perform defect-isolation programs. You are responsible for making the system, IBM component, or both available for running diagnostics and defect-isolation programs.

Checking software

The IBM service specialist will help you ensure that the correct BIOS code, firmware, device drivers, and other supporting IBM software are installed and correctly configured. It might be necessary to manually gather information about the relevant software levels or run IBM-approved utility programs to gather this information. It might be necessary to isolate the failing system from any active production environment to gather this information. You are responsible, with assistance from the service specialist, for gathering this information. The IBM Statement of Limited Warranty does not include on-site assistance with this activity.

Warranty service and support

With the original purchase of an IBM xSeries or IntelliStation system, you have access to extensive service and support. During the IBM Machine warranty period, you may call IBM or your reseller for problem-determination assistance under the terms of the IBM Statement of Limited Warranty.

The following services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service, either on-site or at an IBM service center as determined by IBM.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been shipped from IBM. In those instances, IBM will make Engineering Changes (ECs) available that apply to your hardware.
- **Customer replaceable units (CRUs)** - Some parts of IBM xSeries and IntelliStation systems are designated as customer replaceable units. IBM ships CRUs to you for replacement by you. CRUs include keyboards, monitors, memory, diskette drives, hard disk drives, and mice (this list is not inclusive of all CRUs).

The following items are not covered under warranty service:

- Replacement or use of non-IBM parts. All IBM parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of BIOS code, firmware, or device drivers that are designated as customer installable.

See the IBM Statement of Limited Warranty for a full explanation of IBM warranty terms. Be sure to retain your proof of purchase to obtain warranty service.

Please have the following information ready when you call:

- The machine type and model of your IBM hardware product (if available)
- Serial numbers of your IBM hardware products
- A description of the problem
- The exact wording of any error messages
- Hardware and software configuration information

International Warranty Service

If you travel with your xSeries or IntelliStation system or relocate it to a country or region where your system is sold and serviced by IBM or IBM resellers authorized to perform warranty service, International Warranty Service (IWS) is available during the warranty period. Eligible IBM systems are identified by their four-digit machine types.

You can obtain IWS through the service delivery method (such as depot, carry-in, or on-site) provided in the servicing country or region. Service methods and procedures vary by country or region, and some service or parts might not be available in all countries and regions. Service centers in certain countries or regions might not be able to service all models of a particular machine type. In addition, some countries or regions might have fees and restrictions that apply at the time of service.

To determine whether your system is eligible for IWS, go to http://www.ibm.com/pc/support/ and click **Warranty lookup**.

Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for IBM and non-IBM hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region.

For more information about these services, contact your IBM marketing representative.

IBM Statement of Limited Warranty Z125-4753-06 8/2000

Part 1 - General Terms

This Statement of Limited Warranty includes Part 1 - General Terms and Part 2 - Country-unique Terms. 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, from IBM or your reseller. 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 preinstalled with the Machine, installed subsequently or otherwise. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract. If you have any questions, contact IBM or your reseller.

The IBM Warranty for Machines: IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications"). The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise.

If a Machine does not function as warranted during the warranty period, and IBM or your reseller are unable to either 1) make it do so or 2) replace it with one that is at least functionally equivalent, you may return it to your place of purchase and your money will be refunded.

Extent of Warranty: The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for which IBM is not responsible. The warranty is voided by removal or alteration of Machine or parts identification labels.

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. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

Items Not Covered by Warranty: 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 via telephone with "how-to" questions and those regarding Machine set-up and installation, will be provided **WITHOUT WARRANTIES OF ANY KIND.**

Warranty Service: To obtain warranty service for a Machine, contact IBM or your reseller. If you do not register your Machine with IBM, you may be required to present proof of purchase.

During the warranty period, IBM or your reseller, if approved by IBM to provide warranty service, provides without charge certain types of repair and exchange service to keep Machines in, or restore them to, conformance with their Specifications. IBM or your reseller will inform you of the available types of service for a Machine based on its country of installation. At its discretion, IBM or your reseller will 1) either repair or exchange the failing Machine and 2) provide the service either at your location or a service center. IBM or your reseller will also manage and install selected engineering changes that apply to the Machine.

Some parts of IBM Machines are designated as Customer Replaceable Units (called "CRUs"), e.g., keyboards, memory, or hard disk drives. IBM ships CRUs to you for replacement by you. You must return all defective CRUs to IBM within 30 days of your receipt of the replacement CRU. You are responsible for downloading designated Machine Code and Licensed Internal Code updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its 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. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to

1. ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange;

2. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
3. where applicable, before service is provided:
   a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provides;
   b. secure all programs, data, and funds contained in a Machine;
   c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit them to fulfill their obligations; and
   d. inform IBM or your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for the transportation charges.

Neither IBM nor your reseller is responsible for any of your confidential, proprietary or personal information contained in a Machine which you return to IBM or your reseller for any reason. You should remove all such information from the Machine prior to its return.

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.

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

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST SAVINGS, EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME 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 Agreement, without regard to conflict of law principles.

Part 2 - Country-unique Terms

AMERICAS

BRAZIL

Governing Law: *The following is added after the first sentence:*Any litigation arising from this Agreement will be settled exclusively by the court of Rio de Janeiro.

NORTH AMERICA

Warranty Service: *The following is added to this Section:* To obtain warranty service from IBM in Canada or the United States, call 1-800-IBM-SERV (426-7378).

CANADA

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.

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

The IBM Warranty for Machines: *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, LAOS, AND VIETNAM

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.

The following is added to this Section: Disputes and differences arising out of or in connection with this Agreement shall be finally settled by arbitration which shall be held in Singapore in accordance with the rules of the International Chamber of Commerce (ICC). The arbitrator or arbitrators designated in conformity with those rules shall have the power to rule on their own competence and on the validity of the Agreement to submit to arbitration. The arbitration award shall be final and binding for the parties without appeal and the arbitral award shall be in writing and set forth the findings of fact and the conclusions of law.

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. 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 before proceeding upon the reference. The third arbitrator shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the ICC. 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.

The English language version of this Agreement prevails over any other language version.

HONG KONG AND MACAU

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:* laws of Hong Kong Special Administrative Region.

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;
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, IBM's liability will be limited to the charge paid by you for the individual Machine that is the subject of the claim.

JAPAN

Governing Law: *The following sentence is added to this Section:*Any doubts concerning this Agreement will be initially resolved between us in good faith and in accordance with the principle of mutual trust.

NEW ZEALAND

The IBM Warranty for Machines: *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 this Section:* Both you and IBM consent to the application of the laws of the State of New York (except when local law requires otherwise) to govern, interpret, and enforce all your and IBM's rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Agreement, without regard to conflict of law principles.

Any disputes arising from or in connection with this Agreement will first be resolved by friendly negotiations, failing which either of us has the right to submit the dispute to the China International Economic and Trade Arbitration Commission in Beijing, the PRC, for arbitration in accordance with its arbitration rules in force at the time. The arbitration tribunal will consist of three arbitrators. The language to be used therein will be English and Chinese.

An arbitral award will be final and binding on all the parties, and will be enforceable under the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958).

The arbitration fee will be borne by the losing party unless otherwise determined by the arbitral award.

During the course of arbitration, this Agreement will continue to be performed except for the part which the parties are disputing and which is undergoing arbitration.

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.

Warranty Service: If you purchase an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, 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. If you purchase an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, 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.

If you purchase an IBM Machine in a Middle Eastern 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 authorized service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM authorized service provider.

Governing Law: The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia,

Hungary, Former Yugoslav Republic of Macedonia, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) 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, this Agreement will be governed by English Law and disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA AND GERMANY

The IBM Warranty for Machines: *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 six months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a partial refund 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.

Extent of Warranty: *The second paragraph does not apply.*

Warranty Service: *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.

EGYPT

Limitation of Liability: *The following replaces item 2 in this Section:* as to any other actual direct damages, IBM's liability will be limited to the total amount you paid for the Machine that is the subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

Applicability of suppliers and resellers (unchanged).

FRANCE

Limitation of Liability: *The following replaces the second sentence of the first paragraph of this Section:*In such instances, regardless of the basis on which you are entitled to claim damages from IBM, IBM is liable for no more than: *(items 1 and 2 unchanged).*

IRELAND

Extent of Warranty: *The following is added to this Section:* Except as expressly provided in these terms and conditions, all statutory conditions, including all warranties implied, but without prejudice to the generality of the foregoing all warranties implied by the Sale of Goods Act 1893 or the Sale of Goods and Supply of Services Act 1980 are hereby excluded.

Limitation of Liability: *The following replaces items one and two of the first paragraph of this Section:*1. death or personal injury or physical damage to your real property solely caused by IBM's negligence; and 2. the amount of any other actual direct damages, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim.

Applicability of suppliers and resellers (unchanged).

The following paragraph is added at the end of this Section: IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

ITALY

Limitation of Liability: *The following replaces the second sentence in the first paragraph:*In each such instance unless otherwise provided by mandatory law, IBM is liable for no more than: 1. *(unchanged)* 2. as to any other actual damage arising in all situations involving nonperformance by IBM pursuant to, or in any way related to the subject matter of this Statement of Warranty, IBM's liability, will be limited to the total amount you paid for the Machine that is the subject of the claim. *Applicability of suppliers and resellers (unchanged).*

The following replaces the third paragraph of this Section: Unless otherwise provided by mandatory law, IBM and your reseller are not liable for any of the following: *(items 1 and 2 unchanged)* 3) indirect damages, even if IBM or your reseller is informed of their possibility.

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.

UNITED KINGDOM

Limitation of Liability: *The following replaces items 1 and 2 of the first paragraph of this Section:*

1. death or personal injury or physical damage to your real property solely caused by IBM's negligence;
2. the amount of any other actual direct damages or loss, up to 125 percent of the charges (if recurring, the 12 months' charges apply) for the Machine that is the subject of the claim or which otherwise gives rise to the claim;

The following item is added to this paragraph: 3. breach of IBM's obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982.

Applicability of suppliers and resellers (unchanged).

The following is added to the end of this Section: IBM's entire liability and your sole remedy, whether in contract or in tort, in respect of any default shall be limited to damages.

Appendix C. Notices

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Important notes

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

CD-ROM 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.

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

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. 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 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 89/336/EEC 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.

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。

Japanese Voluntary Control Council for Interference (VCCI) statement

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