Nortel Networks Layer 2-7 GbE Switch Module
for IBM @server BladeCenter Products

Installation Guide

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for IBM @server BladeCenter Products

IBM

Installation Guide

Note:

Before using this information and the product it supports, read the general information in Appendix B, "IBM Statement of Limited Warranty Z125-4753-08 04/2004," on page 59 and Appendix C, "Notices," on page 83.

Statement of Limited Warranty Preamble

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

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

.לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

Important:

> All caution and danger statements in this documentation begin with a number. This number is used to cross reference an English caution or danger statement with translated versions of the caution or danger statement in the *IBM Safety Information* book.
>
> For example, if a caution statement begins with a number 1, translations for that caution statement appear in the *IBM Safety Information* book under statement 1.
>
> Be sure to read all caution and danger statements in this documentation before performing the instructions. Read any additional safety information that comes with your server or optional device before you install the device.

Statement 1:

DANGER

> **Electrical current from power, telephone, and communication cables is hazardous.**
>
> **To avoid a shock hazard:**
>
> - **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
> - **Connect all power cords to a properly wired and grounded electrical outlet.**
> - **Connect to properly wired outlets any equipment that will be attached to this product.**
> - **When possible, use one hand only to connect or disconnect signal cables.**
> - **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
> - **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open 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 4:

≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
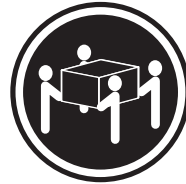
CAUTION:
Use safe practices when lifting.

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 6:

CAUTION:
If you install a strain-relief bracket option over the end of the power cord that is connected to the device, you must connect the other end of the power cord to an easily accessible 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.

Statement 13:

DANGER

> **Overloading a branch circuit is potentially a fire hazard and a shock hazard under certain conditions. To avoid these hazards, ensure that your system electrical requirements do not exceed branch circuit protection requirements. Refer to the information that is provided with your device for electrical specifications.**

WARNING: Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. *Wash hands after handling.*

ADVERTENCIA: El contacto con el cable de este producto o con cables de accesorios que se venden junto con este producto, pueden exponerle al plomo, un elemento químico que en el estado de California de los Estados Unidos está considerado como un causante de cancer y de defectos congénitos, además de otros riesgos reproductivos. *Lávese las manos después de usar el producto.*

Chapter 1. Introducing the Nortel Networks Layer 2-7 GbE Switch Module for IBM @server BladeCenter

This *Installation Guide* contains information about setting up, installing, and configuring your Nortel Networks Layer 2-7 GbE Switch Module for IBM® @server™ BladeCenter®.

For installation details, see Chapter 2, "Installing and removing a switch module," on page 11. For additional information, see the instructions in your BladeCenter documentation. The Nortel Networks Layer 2-7 GbE Switch Module for IBM @server BladeCenter is also referred to throughout this document as the GbE switch module, switch module, or I/O module. All IBM @server BladeCenter unit types are referred to throughout this document as the BladeCenter unit.

Your GbE switch module is one of the I/O modules that can be installed in a BladeCenter unit. See the documentation for your BladeCenter unit type for specific I/O module installation requirements.

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

Notes:
1. The illustrations in this document might differ slightly from your hardware.
2. The sample screens that appear in this document might differ slightly from the screens displayed by your system. Screen content varies based on the type of BladeCenter unit that you are using and the firmware versions and options that are installed.

The product name and serial number are located on the identification label on the side of the GbE switch module. You will need this information when you register your GbE switch module with IBM. The media access control (MAC) address is located on a separate label on the information panel under the external Ethernet port connectors.

See the following illustration for the locations of the identification label and the MAC address label.

1

GbE
switch module

Serial number/
identification label

Media access
control (MAC)
address label
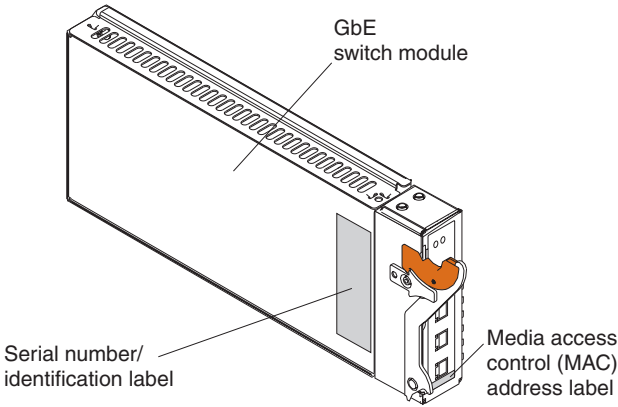
Record your product information in this table.	
Product name	Nortel Networks Layer 2-7 GbE Switch Module for IBM BladeCenter
Serial number	_____
Media access control (MAC) address	_____

Related publications

This *Installation Guide* contains setup and installation instructions for the GbE switch module. This document also provides general information about your GbE switch module, including warranty information, and how to get help. This printed document might also be on the *Documentation* CD for your BladeCenter unit type. The most recent versions of this *Installation Guide* and all other BladeCenter documentation is at http://www.ibm.com/support/.

In addition to this *Installation Guide*, the following related documentation is available for your GbE switch module:

• *Safety Information*

This document contains translated caution and danger statements. Each caution and danger statement that appears in the documentation has a number that you can use to locate the corresponding statement in your language in the *Safety Information* document.

- *Hardware Maintenance Manual and Troubleshooting Guides*

  Selected BladeCenter products have a customized *Hardware Maintenance Manual and Troubleshooting Guide*. These documents contain information to help you solve a problem yourself or to provide helpful information to a service technician.

- *Alteon OS 20.x Application Guide Layer 2-7 GbE Switch Module for IBM @server BladeCenter*

  This Nortel Networks document contains detailed setup and installation instructions for the GbE switch module. It provides:

  – Configuration instructions for your GbE switch module

  – Information about features

  – Information about getting help

  – Guidance for planning, implementing, and administering LAN operating system (LAN OS) software

  – Usage examples

  – Troubleshooting information for your GbE switch module

- *Alteon OS 20.x Browser-Based Interface Quick Guide Layer 2-7 GbE Switch Module for IBM @server BladeCenter*

  This Nortel Networks document contains information about the browser-based interface that you can use to:

  – Access switch information

  – Calculate and obtain statistical data

  – Perform switch configuration

- *Alteon OS 20.x Command Reference Layer 2-7 GbE Switch Module for IBM @server BladeCenter*

  This Nortel Networks document includes:

  – Information about getting started

  – Information about first-time connection to the GbE switch module

  – Telnet program interface requirements

  – Browser-based network interface requirements

  – Command Line Interface (CLI) operations

  – Maintenance menus

  – Statistics

  – Supported SNMP MIBs

  – Syslog messages

  – Usage examples

Depending on your BladeCenter product, additional documents might be included on the *Documentation* CD.

In addition to the documentation in this library, be sure to review the *IBM BladeCenter Planning and Installation Guide* for your BladeCenter unit type for information to help you prepare for system installation and configuration. This document is available at http://www.ibm.com/pc/eserver/bladecenter

You might need to install an I/O expansion card (also known as an Ethernet expansion card) on some blade servers when installing the GbE switch module into certain I/O-module bays of the BladeCenter unit. For information about the types of compatible I/O expansion cards for the blade servers, contact your IBM authorized reseller. See the I/O expansion card documentation for details about I/O expansion card installation, configuration, and use.

Specifications and features

This section provides a summary of the specifications and features for your Nortel Networks Layer 2-7 GbE Switch Module for IBM @server BladeCenter. For detailed information about the features, see the *Alteon OS 20.x Application Guide*.

The Nortel Networks Layer 2-7 GbE Switch Module for IBM @server BladeCenter has the following features:

- Ports
  - Four external 1000BASE-T connectors for making 10/100/1000 Mbps connections to a backbone, end stations, and servers
  - Fourteen internal full-duplex gigabit ports, one connected to each of the blade servers in the BladeCenter unit
  - Two internal full-duplex 10/100 Mbps ports connected to the management module
  - One RS-232 console port that provides an additional means to install software and configure the switch module
- Performance features
  - 64 real servers and 256 real services.
  - 64 virtual servers and 256 virtual services.
  - 128 Internet protocol (IP) interfaces.
  - 128 static route entries.
  - 1024 total policy filters.
  - 2048 dynamic route entries.
  - 2048 forwarding database (FDB) entries.
  - 4096 address resolution protocol (ARP) entries.
  - Layer 2 through Layer 7 (L2-L7) support.
  - 300 000 simultaneous Layer 2 through Layer 7 (L2-L7) sessions.

- 802.1D spanning tree support; can be disabled on the entire switch or on a per-port basis.
- Support for 16 multiple spanning tree groups.
- 802.1Q tagged virtual local area network (VLAN) support.
- Support for 128 VLANs.
- Denial-of-Service protection.
- Forwarding table age time: maximum 1 to 65535 seconds. The default is 300 seconds.
- Content-based load balancing
  - Hypertext transfer protocol (HTTP).
  - Real time streaming protocol (RTSP).
  - Domain name system (DNS).
- Layer 4 load balancing.
- HTTP cookie and secure sockets layer (SSL) session ID persistency.
- Link aggregation with 802.3 support on four external ports for up to two trunk groups.
- Media access control (MAC) address learning: Automatic update. Supports 2048 MAC addresses.
- Packet forwarding rate:
  - Full-wire speed for all connections. 148800 packets per second (pps) per port (for 100 Mbps).
  - 1488100 pps per port (for 1000 Mbps).
- Random-access memory (RAM) buffer: 128 MB.
- Real server health checking.
- High availability Modes
  - Active - Standby
  - Active - Active
  - Hot Standby
  - Trunk Failover
- L2 trunk fail over with virtual router redundancy protocol (VRRP)
- Server processing on external ports
- 32-bit minmisses server load balancing metric
- Support for two network time protocol (NTP) time servers
- Support for terminal access controller access control system (TACACS+)
- Support for Internet group management protocol (IGMP) v1 and v2 snooping
- Routing Information Protocol version 1 (RIPv1), Border Gateway Protocol version 4 (BGPv4), and Open Shortest Path First version 2 (OSPFv2).

- – Transmission method: Store-and-forward.
- Management
  - – Spanning Tree Protocol (STP) for creation of alternative backup paths and prevention of network loops.
  - – Fast port forward
  - – Fast uplink convergence
  - – Simple Network Management Protocol (SNMP) version 1.
  - – Fully configurable either in-band or out-of-band control through SNMP-based software.
  - – Flash memory for software upgrades. This can be done through Trivial File Transfer Protocol (TFTP) or Hypertext Transfer Protocol (HTTP) Web interface.
  - – Built-in SNMP management:
    - - Bridge management information base (MIB) (RFC 1493)
    - - MIB-II (RFC 1213)
    - - 802.1P/Q MIB (RFC 2674)
    - - Interface MIB (RFC 2233)
  - – Browser-based management support
  - – TFTP support
  - – Bootstrap protocol (BOOTP) support
  - – Dynamic Host Configuration Protocol (DHCP) client support
  - – Password enabled
  - – Telnet remote-control console

You can also manage the switch by using a Simple Network Management Protocol (SNMP) version 1 interface, as described in the *Alteon OS 20.1 Application Guide*. The SNMP interface supports the following Internet standards:

- – RFC 1155, Structure and identification of management information for TCP/IP-based internets, M. T. Rose, K. McCloghrie. May-01-1990.
- – RFC 1157, Simple Network Management Protocol (SNMP). J.D. Case, M. Fedor, M. L. Schoffstall, C. Davin. May-01-1990.
- – RFC 1212, Concise MIB definitions. M. T. Rose, K. McCloghrie. Mar-01-1991.
- – RFC 1213, Management Information Base for Network Management of TCP/IP-based internets: MIB-II. K. McCloghrie, M. T. Rose. Mar-01-1991.
- – RFC 1493, Definitions of Managed Objects for Bridges. E. Decker, P. Langille, A. Rijsinghani, K. McCloghrie. July 1993.
- – RFC 1573, Evolution of the Interfaces Group of MIB-II. K. McCloghrie, F. Kastenholz. January 1994.

- RFC 1643, Definitions of Managed Objects for the Ethernet-like Interface Types. F. Kastenholz. July 1994.
- RFC 1657, Definitions of Managed Objects for the Fourth Version of the Border Gateway Protocol (BGP-4) using SMIv2. S. Willis, J. Burruss, J. Chu, Ed. July 1994.
- RFC 1724, RIP Version 2 MIB Extension. G. Malkin, F. Baker. November 1994.
- RFC 1757, Remote Network Monitoring Management Information Base. S. Waldbusser. February 1995.
- RFC 1850, OSPF Version 2 Management Information Base. F. Baker, R. Coltun. November 1995.
- RFC 2021, Remote Network Monitoring Management Information Base Version 2 using SMIv2. S. Waldbusser. January 1997 (partial support).
- RFC 2037, Entity MIB using SMIv2. K. McCloghrie, A. Bierman. October 1996 (partial support).
- Network cables:

  Note: To make sure that the BladeCenter™ unit installation complies with electromagnetic compatibility (EMC) product regulations for intra-building lightning surges, you must use shielded LAN cables that are grounded at both ends.

  - 10BASE-T:
    - UTP Category 3, 4, 5 (100 meters maximum)
    - 100-ohm STP (100 meters maximum)
  - 100BASE-TX:
    - UTP Category 5 (100 meters maximum)
    - EIA/TIA-568 100-ohm STP (100 meters maximum)
  - 1000BASE-T:
    - UTP Category 6 (standard for 1 GB devices)
    - UTP Category 5e (100 meters maximum)
    - UTP Category 5 (100 meters maximum)
    - EIA/TIA-568B 100-ohm STP (100 meters maximum)
- RS-232 serial cable:
  - 3 meter console cable DB-9 to 8 pin DIN

Standards

The GbE switch module supports the following standards:

- IEEE standards
  - IEEE 802.1d Spanning Tree Protocol
  - IEEE 802.1P Tagged Packets
  - IEEE 802.1Q Tagged VLAN (frame tagging on all ports when VLANs are enabled)
  - IEEE 802.2 Logical Link Control
  - IEEE 802.3 10BASE-T Ethernet
  - IEEE 802.3u 100BASE-TX Fast Ethernet
  - IEEE 802.3x Full-duplex Flow Control
  - IEEE 802.3z
    - 1000BASE-SX Gigabit Ethernet
    - Link Negotiation

Notices and statements used in this book

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

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

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

Major components of the GbE switch module

The orange color on the release latch on your GbE switch module identifies this device as a hot-swap component. You can install or remove this component while the BladeCenter unit is running.

The following illustration shows the major components of your GbE switch module.

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

Release latch

Information panel

Ethernet ports (4)

Media access control (MAC) address label

Serial number/ identification label
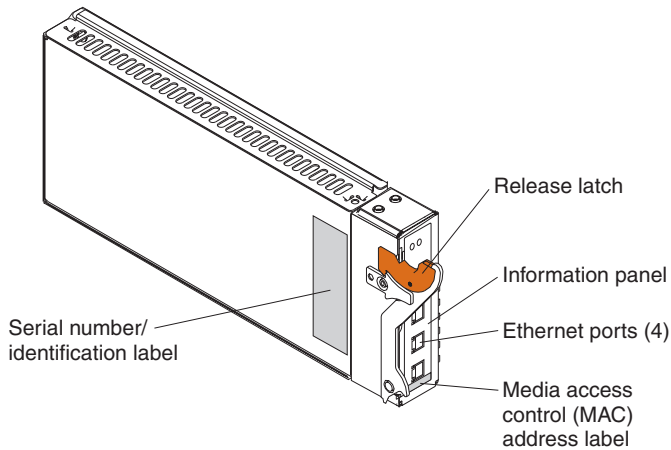
For more information about the components of the information panel, see Chapter 3, "Information panel LEDs and external ports," on page 19. For more information about the MAC address, see the *Alteon OS 20.x Application Guide*.

Chapter 2. Installing and removing a switch module

See the *Installation and User's Guide* for your BladeCenter unit type for information about the I/O-module bay locations in the BladeCenter unit and specific requirements for installing I/O modules in your BladeCenter unit.

Attention: To maintain proper system cooling, each I/O-module bay must contain either an I/O module or a filler module; each blade bay must contain either a blade server or a filler blade.

Your BladeCenter unit supports a minimum of one hot-plug GbE switch module, in I/O-module bay 1. The GbE switch modules in I/O-module bays 1 and 2 are for the integrated Ethernet controllers in the applicable blade server. You might need to install GbE switch modules in other I/O-module bays of the BladeCenter unit when additional Ethernet controllers are installed or activated on a blade server.

For details about network interface requirements and expansion options, see the following books: The

- *Planning and Installation Guide* for your BladeCenter unit type
- *Installation and User's Guide* for your BladeCenter unit type
- *Installation and User's Guide* for each blade server type

Installation guidelines

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

- Read the safety information beginning on page v and the guidelines in "Handling static-sensitive devices" on page 13, and read the safety statements in the BladeCenter unit publications.
- The orange color on the release latch on your GbE switch module identifies this device as a hot-swap component. You can install or remove this component while the BladeCenter unit is on. See the instructions in this chapter for more information about installing or removing hot-swap or hot-plug components.
- You do not need to turn off the BladeCenter unit to install or replace any of the hot-swap modules in the BladeCenter unit.
- If you plan to install additional GbE switch modules in the I/O-module bays of your BladeCenter unit, you might also need to install an I/O expansion card in the applicable blade server to support the GbE switch modules in these bays.

System reliability considerations

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

- Each of the I/O-module bays in the BladeCenter unit has either an I/O module or filler module installed.
- A removed hot-swap module is replaced with another module or filler module within 1 minute of removal.
- A removed hot-swap blade server is replaced with another blade server or filler blade within 1 minute of removal.
- Cables for the GbE switch module are routed according to the illustrations and instructions in this book.

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 any *unpainted* metal surface of the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component 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 your BladeCenter unit without setting it down. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on your BladeCenter chassis 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 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.

The following illustration shows how to install an I/O module in a typical BladeCenter unit.

I/O module

Release latch
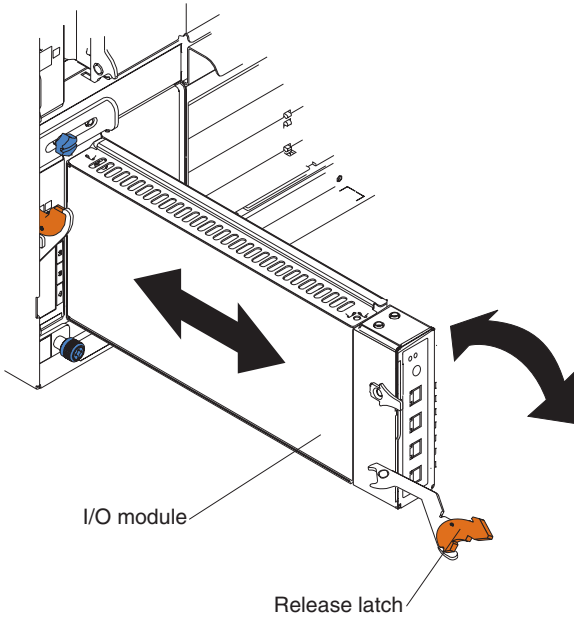
Complete the following steps to install an I/O module:

1. Read the safety information beginning on page v and "Installation guidelines" on page 11.

2. If an acoustic attenuation module is installed on your BladeCenter unit, remove it. See the documentation for your BladeCenter unit for instructions.

3. Select an I/O-module bay in which to install the GbE switch module.

   Note: For details about I/O-module bay requirements, see the documentation for your BladeCenter unit type and blade servers.

4. Remove the filler module from the selected I/O module bay. Store the filler module for future use.

5. If you have not already done so, touch the static-protective package that contains the switch module to any *unpainted* metal surface of the BladeCenter unit or any *unpainted* metal surface on any other grounded rack component for at least 2 seconds.

6. Remove the switch module from its static-protective package.

7. Ensure that the release latch on the switch module is in the open position (perpendicular to the module).

8. Slide the switch module into the applicable I/O-module bay until it stops.

9. Push the release latch on the front of the switch module to the closed position. After you insert and lock the switch module, it is turned on, and a power-on self-test (POST) occurs to verify that the switch module is operating correctly.

10. The POST results are displayed by the status LEDs. Make sure that the LEDs on the switch module indicate that it is operating correctly. Make sure that the OK LED on each switch module is lit. See Chapter 3, "Information panel LEDs and external ports," on page 19 for a more detailed description of the operation of these LEDs.

    For additional information, see Chapter 7, "Solving problems," on page 51.

11. If you have other switch modules to install, do so now; otherwise, go to step 12..

    Note: To make sure that the BladeCenter unit installation complies with EMC product regulations for intra-building lightning surges, you must use shielded LAN cables that are grounded at both ends.

12. Attach any cables or cords required by the switch module. For the location of the connectors on the BladeCenter unit, see the *Installation and User's Guide* for your BladeCenter unit type. For cable requirements, see page 7.

13. Replace the acoustic attenuation module, if you removed it in step 2.

Removing a switch module

Attention: To maintain proper cooling and system reliability, each I/O-module bay in the BladeCenter unit must have either an I/O module or filler module installed. If you remove a hot-swap module, you must replace it with another module or filler module within 1 minute of removal.

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 remove a switch module:

1. Read the safety information beginning on page v and "Installation guidelines" on page 11.

2. If an acoustic attenuation module is installed on your BladeCenter unit, remove it. See the documentation for your BladeCenter unit for instructions.

3. Disconnect any cables from the switch module that you are removing.

4. Pull the release latch toward the bottom of the switch module as shown in the following illustration. The module moves out of the I/O module bay approximately 0.64 cm (0.25 inch).

I/O module

Release latch
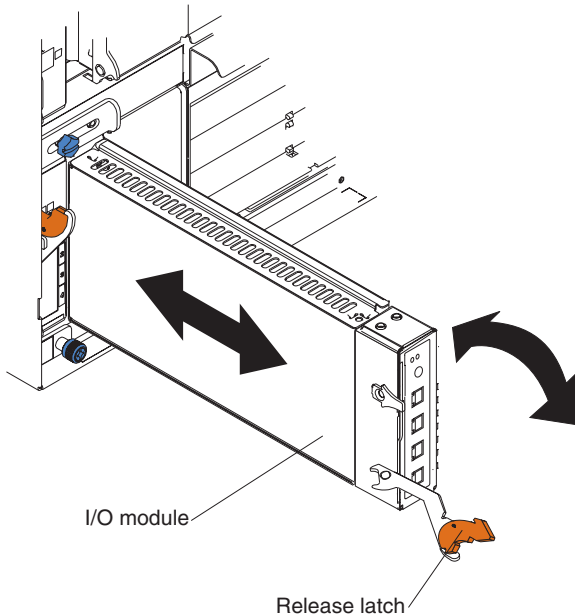
5. Slide the switch module out of the I/O-module bay and set it aside.

6. Place either another switch module or a filler module in the I/O-module bay within 1 minute.

7. If you placed another switch module in the I/O-module bay, reconnect any cables that you disconnected in step 3.

8. Replace the acoustic attenuation module option, if you removed it in step 2.

Chapter 3. Information panel LEDs and external ports

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

Information panel

As shown in the following illustration, the information panel of the GbE switch module contains:

- The LEDs that display the status of the GbE switch module and the network (see "LEDs" on page 20).
- One RS-232 console port that provides an additional means to install software and configure the switch module. This 8-pin DIN connector allows connection of an 8-pin DIN to DB9 serial cable. A protective cap must be removed while the console port is in use and should be reinstalled when the console cable is disconnected.
- Four external 1000BASE-T Ethernet ports for 10/100/1000 Mbps connections to external Ethernet devices, such as backbones, end stations, and servers. These ports are respectively identified as EXT1, EXT2, EXT3, and EXT4 in the switch configuration menus and are labeled 1 through 4 (from top to bottom) on the GbE switch module.

<figure>
LEDs

OK !

Console port
(shown with
cover removed)

LINK
1
TX/RX

LINK
2
TX/RX

Ethernet ports

LINK
3
TX/RX
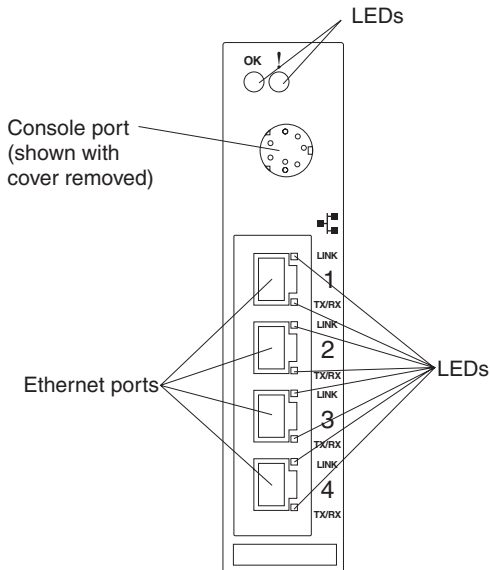
LINK
4
TX/RX

LEDs
</figure>

LEDs

The LEDs on the information panel of the GbE switch module are OK and GbE switch module error (fault). In addition, each external port on the GbE switch module contains an Ethernet link OK LED and an Ethernet Tx/Rx LED. The following illustration shows the LEDs on the GbE switch module. A description of each LED follows the illustration.
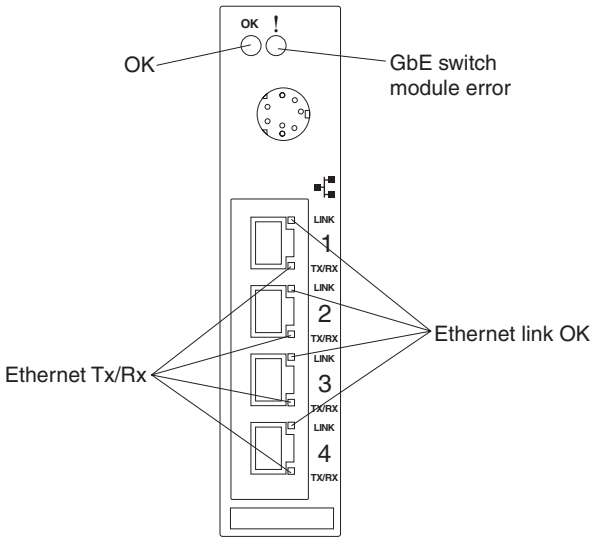
Note: An amber LED is lit when a system error or event has occurred. To identify the error or event, check the LEDs on the information panel of the GbE switch module. For additional information, see Chapter 7, "Solving problems," on page 51.

OK: This green LED is on the left side of the information panel, above the four external 10/100/1000 Mbps ports. When this LED it lit, it indicates that the GbE switch module has passed the power-on self-test (POST) with no critical faults and is operational.

GbE switch module error (fault): This amber LED is on the right side of the information panel, above the four external 10/100/1000 Mbps ports. When this LED it lit, it indicates that the GbE switch module has failed the POST or detected an operational fault.

Note: When the GbE switch module error LED is lit, the system-error LED on the BladeCenter unit will also be lit.

Ethernet link OK: This green link status LED is at the top of each external 10/100/1000 Mbps port. When this LED is lit on a port, it indicates that there is a connection (or link) to a device using that connector.

Ethernet Tx/Rx: This green activity LED is at the bottom of each external 10/100/1000 Mbps port. When this LED blinks on a port, it indicates that data is being transmitted or received (that is, activity is occurring) between that port and another device on the network link. The blink frequency is proportional to the amount of traffic on the network link.

Chapter 4. Configuring the GbE switch module

The GbE switch module supports two remote-access modes for management through Ethernet connections. The GbE switch module has an internal Ethernet path to the management module, four external Ethernet ports on the GbE switch module, and a serial console connection port on the GbE switch module information panel. You can select the mode that is best suited for your BladeCenter environment.

- The default mode uses the internal path to the management module. In this mode, the remote-access link to the management console must be attached to the 10/100 Mbps Ethernet connector on the management module. The IP addresses and SNMP parameters of the GbE switch modules can be automatically assigned by the IBM Director BladeCenter Deployment wizard (when available) or you must manually assign them through the BladeCenter Management and Configuration Program. This mode allows the system administrator to provide a secure LAN for management of the BladeCenter subsystems separately from the data network. See "Establishing a TCP/IP session for the GbE switch through the management module" on page 26 for additional information.

  Important: While using the management-module connection, the GbE switch module does not respond to remote-management commands from the four external Ethernet ports on the GbE switch module.

  See the applicable *BladeCenter Installation and User's Guide* for instructions for configuring the GbE switch module for this mode of operation.

- The system administrator can choose to enable remote management of the GbE switch module through the four external ports on the GbE switch module, instead of or in addition to access through the management module. This mode can be enabled only through the management module configuration interface. When this mode is enabled, the external Ethernet ports will support both management traffic and BladeCenter application data traffic. See "Enabling the external ports" on page 28 for additional information.

  This mode allows the GbE switch module IP addresses to be on a different IP subnet than the management modules. This is useful when the GbE switch modules are to be managed and controlled as part of the overall network infrastructure, while secure management of other BladeCenter subsystems is maintained through the management module. However, management-module access to the Gigabit switch-module link will be lost if the GbE switch module IP address is not on the same IP subnet as the management module. See "Establishing a TCP/IP session for the switch through the external switch-module connectors" on page 31 for additional information. The *Alteon OS 20.x Application Guide* contains instructions for configuring the GbE switch module for this mode of operation.

- The RS-232 console port provides an alternative path to manage and configure the switch that functions the same as the Ethernet connection for management remote access. To establish a console (DCE) connection, an ASCII terminal or a computer running ASCII terminal emulation software is required that is set to the following values:
  - Baud Rate: 9600
  - Data Bits: 8
  - Parity: None
  - Stop Bits: 1
  - Flow Control: None
  - Emulate: VT100

Important:

1. Before you configure your GbE switch module, be sure that the management modules in your BladeCenter unit are properly configured. See the applicable *BladeCenter Installation and User's Guide* publications for more information.

2. The default IP address of the GbE switch module is 192.168.70.127, 192.168.70.128, 192.168.70.129, or 192.168.70.130, depending on the switch module bay where it is installed.

3. If you change the IP address of the GbE switch module and restart the BladeCenter unit, the GbE switch module will maintain this new IP address as its default value.

4. The management module and the GbE switch module can communicate with each other only if they are on the same IP subnet.

5. When you use the management module Web interface to update the GbE switch module configuration, the management module firmware saves the new configuration in its internal non-volatile random-access memory (NVRAM). If the switch module restarts, the management module applies the saved configuration to the switch module.

   If, for some reason, the switch module restarts and the management module cannot apply the saved configuration to the switch module, the switch module defaults to using the configuration that it had previously saved. If the subnet IP address of the switch module does not match the subnet IP address of the management module, you might not be able to manage the switch module any more.

6. For switch communication with a remote management station, such as the IBM Director server, through the management module external Ethernet port, the switch module internal network interface and the management module internal and external interfaces must be on the same IP subnet.

See the following publications for specific details about configuring the GbE switch module:

- The applicable *BladeCenter Installation and User's Guide* publications
- *Alteon OS 20.x Application Guide*
- *Alteon OS 20.x Browser-Based Interface Quick Guide*
- *Alteon OS 20.x Command Reference*

In addition to the publications in this library, be sure to review the following publications for information to help you prepare for system installation and configuration:

- The *BladeCenter Management Module User's Guide* for your BladeCenter unit type.
- The *BladeCenter Management Module Installation Guide* for your BladeCenter unit type.
- *IBM BladeCenter Planning and Installation Guide* for your BladeCenter unit type at http://www.ibm.com/pc/eserver/bladecenter

You can manage and configure the GbE switch using the management module or an external GbE switch interface. When the GbE switch module is set to use the factory default configuration, it can only be accessed through the management module VLAN. The following figure is used as an example of establishing a TCP/IP session through the management module or through the external interface.

Notes:

1. IF 128 defines a subnet to which the GbE, MM eth0, MM eth1 and Client A MUST all belong. Client A on this subnet is used to access the MM BBI by setting the browser to 192.168.70.125.

2. IF 1 allows Client B to access the Gbe management user interfaces (e.g. telnet, BBI, SNMP).

Client A

HTTP

192.168.70.1

eth0
192.168.70.125

MM

Default Vlan
Vlan 1

Client B

Telnet

10.10.1.2

EXT1 17
EXT2 18
EXT3 19
EXT4 20

IF 128 => 192.168.70.127

10.10.1.1 <= IF 1

GbE

15 MGT1

Mgmt VLAN
Vlan 4095

eth1
192.168.70.126

"Client A " manages the GbE switch module through the default management module configuration interface. The management module is always enabled and always a member of VLAN 4095 and interface 128. VLAN 4095 and interface 128 can never be disabled. You can always manage the GbE switch module over this interface, provided that the IP addresses of the client, the management module, and the GbE switch module are on the same subnet, as shown in the following table.

Network entity	IP address
Client A	192.168.70.1
Management module	192.168.70.125
GbE switch module	192.168.70.127

Establishing a TCP/IP session for the GbE switch through the management module

Complete the following steps to establish a TCP/IP session for the switch through the management module:

1. Access and log on to the management module as described in the *BladeCenter Management Module User's Guide*. If necessary, obtain the IP address of the management module from your system administrator. The login window opens.

If you do not have an assigned user identifier (ID) and initial password, type the default user ID (USERID) in the **User ID** field and the default password (PASSW0RD) in the **Password** field (where the sixth alphanumeric character is the number zero, not the letter *O*) and click **OK**. The main page in the management module opens.

> **Note:** Capital letters are required; these fields are both case-sensitive. To increase system security, change the password after you log on for the first time.

2. Select **Management** on the **I/O Module Tasks** menu on the left side of the BladeCenter Management Module window.

3. From the **I/O Module Management** portion of the window, click the bay number that corresponds to the location of the GbE switch module that you installed. The applicable bay number (in this example, bay 1) appears in the bottom portion of the window, followed by other related switch-module information, including the IP address. The switch-module information is divided under two headings: **Current IP Configuration** and **New Static IP Configuration**.
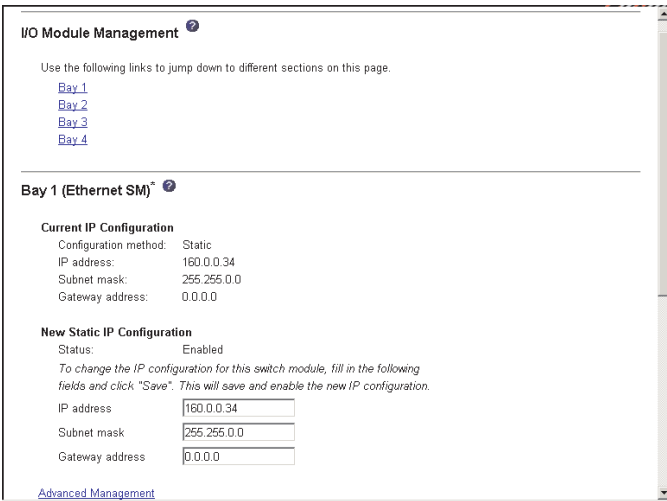
4. To change the IP address of the GbE switch module, use the Tab key to reach the **IP address** data field under the **New Static IP Configuration** heading; then, type the new IP address and click **Save**.

5. Click **Advanced Management** under the applicable bay information (in this example, bay 1) in the BladeCenter Management Module window. You can now start a browser-based interface session, a Telnet session, or a Secure Shell (SSH) session.

Note: The default setting for the SSH session is disabled. To enable this setting, you must use the CLI.

The browser-based interface and the Telnet program are different ways to access the same internal switching software and configure it. Thus, all the settings that you encounter in browser-based management are the same as those found in the Telnet program.

- If your system application requires that you use the browser-based interface program, see "Configuring through the browser-based interface" on page 36 for additional information.
- If your system application requires that you use the Telnet program, see "Configuring through the Telnet interface" on page 38 for additional information.
- For information about running an SSH session, see the *Alteon OS 20.x Command Reference*.

Enabling the external ports

To access and manage your GbE switch module from an external environment, you must enable certain features, such as the external ports (ports) and external management over all ports, through the management module. After you enable these features, you can establish a TCP/IP session for the switch through the external GbE switch module connection as described in "Establishing a TCP/IP session for the switch through the external switch-module connectors" on page 31.

Complete the following steps to configure the external Ethernet interface and to enable the external ports:

1. Access and log on to the management module as described in the *BladeCenter Management Module User's Guide*. If necessary, obtain the IP address of the management module from your system administrator. The login window opens.

   Enter your user ID and password.

   If you do not have an assigned user ID and initial password, type the default user ID (USERID) in the **User ID** field and the default password (PASSW0RD) in the **Password** field (where the sixth alphanumeric character is the number zero, not the letter *O*) and click **OK**. The main page in the management module opens.

   Note: Capital letters are required; these fields are both case-sensitive. To increase system security, change the password after you log on for the first time.

2. Select **Management** on the **I/O Module Tasks** menu on the left side of the BladeCenter Management Module window.
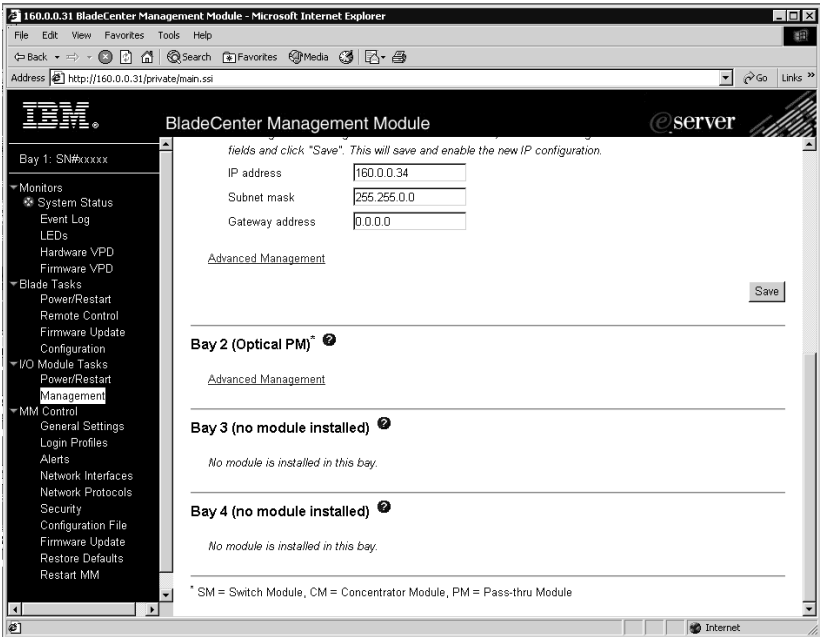
3. Make sure that the following GbE switch-module features are enabled (**I/O Module Tasks** → **Management** → **Advanced Management** in the management module browser-based user interface):

   a. External ports

   b. External management over all ports

   The default value is **Disabled** for both features. If these features are not already enabled, change the value to **Enabled**. Then, click **Save**.

192.168.2.235 BladeCenter Management Module - Microsoft Internet Explorer

File   Edit   View   Favorites   Tools   Help

Back ▾ ▾ ⚙ 🗘 🔍Search 📁Favorites 🖼Media 🕤 🕤▾ 🖶 🔟 ▾ 🖹 🔓

Address 🔗 Http://192.168.2.235/private/main.ssi   ▾   🔗Go   Links ≫ 🖼SnagIt 📷

IBM.   BladeCenter Management Module   @server

Bay 1: WELCHLAPTOP

▾ Monitors
 ● System Status
   Event Log
   LEDs
   Hardware VPD
   Firmware VPD
▾ Blade Tasks
   Power/Restart
   Remote Control
   Firmware Update
   Configuration
▾ I/O Module Tasks
   Power/Restart
   Management
   Firmware Update
▾ MM Control
   General Settings
   Login Profiles
   Alerts
   Network Interfaces
   Network Protocols
   Security
   Configuration File
   Firmware Update
   Restore Defaults
   Restart MM

Log Off

Advanced Management for I/O Module 1 ❓

Use the following links to jump down to different sections on this page.

POST Results
Advanced Setup
Restore Factory Defaults
Send Ping Requests
Start Telnet/Web Session

POST Results ❓

POST results available: FF: Module completed POST successfully.

Advanced Setup ❓

Fast POST   Enabled ▾
External ports   Enabled ▾
External management over all ports   Enabled ▾
Preserve new IP configuration on all resets   Enabled ▾

                                          Cancel   Save

Restore Factory Defaults ❓

This action will cause all module settings to be set to their factory defaults. **You will lose all the changes you made to the configuration of this module as a result.** In order to preserve the new IP configuration, set the field labeled "Preserve new IP configuration on all resets" to enabled. Clearing of the configuration will be followed by a restart of the module. Click the "Restore Defaults" button if you want to proceed.

                                          Cancel   Restore Defaults

🔗   🌐 Internet

Note: See the applicable *BladeCenter Installation and User's Guide* publications for additional information about enabling external management over all ports.

4. Click **Advanced Management** under the applicable bay information in the BladeCenter Management Module window.

You can now start a browser-based interface session, a Telnet session, or a Secure Shell (SSH) session. Otherwise, continue with "Establishing a TCP/IP session for the switch through the external switch-module connectors" on page 31.

Establishing a TCP/IP session for the switch through the external switch-module connectors

To establish a TCP/IP session for the switch through the external GbE switch-module connectors, you must provide a connection to the Ethernet network through the GbE switch module. To do this, you must first enable the external interfaces as described in "Enabling the external ports" on page 28, and then set up the TCP/IP address for the GbE switch module.

Complete the following steps:

1. Access and log on to the management module as described in the *Management Module User's Guide* for your BladeCenter unit type. If necessary, obtain the IP address of the management module from your system administrator. The login window opens.

   If you do not have an assigned user ID and initial password, type the default user ID (USERID) in the **User ID** field and the default password (PASSW0RD) in the **Password** field (where the sixth alphanumeric character is the number zero, not the letter *O*) and click **OK**. The main page in the management module opens.

   Note: Capital letters are required; these fields are both case-sensitive. To increase system security, change the password after you log on for the first time.

2. Select **Management** on the **I/O Module Tasks** menu on the left side of the BladeCenter Management Module window.

3. From the **I/O Module Management** portion of the window, click the bay number that corresponds to the location of the GbE switch module that you installed. The applicable bay number appears in the bottom portion of the window, followed by other related switch-module information, including the IP address. The switch-module information is divided under two headings: **Current IP Configuration** and **New Static IP Configuration**.

4. To change the IP address of the GbE switch module, use the Tab key to reach the **IP address** data field under the **New Static IP Configuration** heading; then, type the new IP address and click **Save**.

You can set up the TCP/IP address for the GbE switch module in one of two ways:

- Use the default TCP/IP address.
- Obtain a valid, unique TCP/IP address from your system administrator.

If you obtain a valid, unique TCP/IP address from your system administrator, you can set up the new TCP/IP address for the GbE switch module from the management module, as shown in the following window:
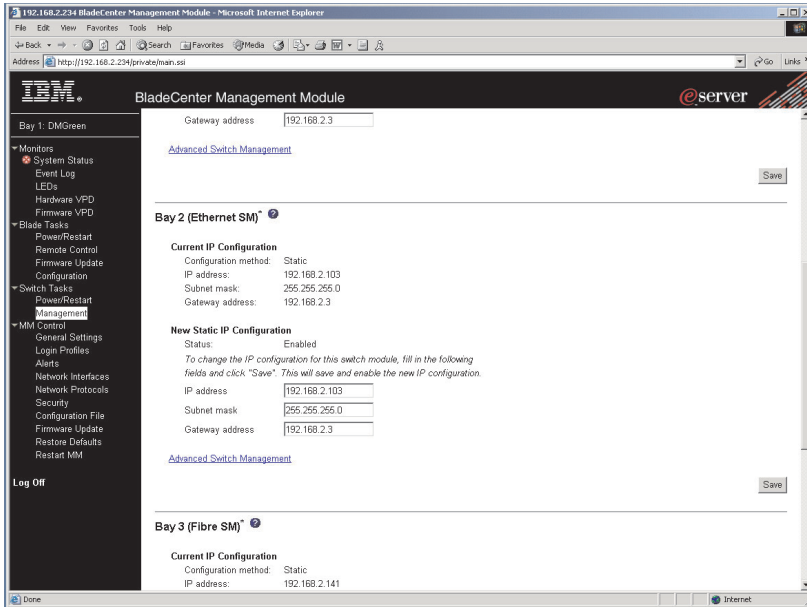
Type the new TCP/IP address of the GbE switch module in the **IP address** data field under the **New Static IP Configuration** heading; then, click **Save**. You are now ready to set up the GbE switch.
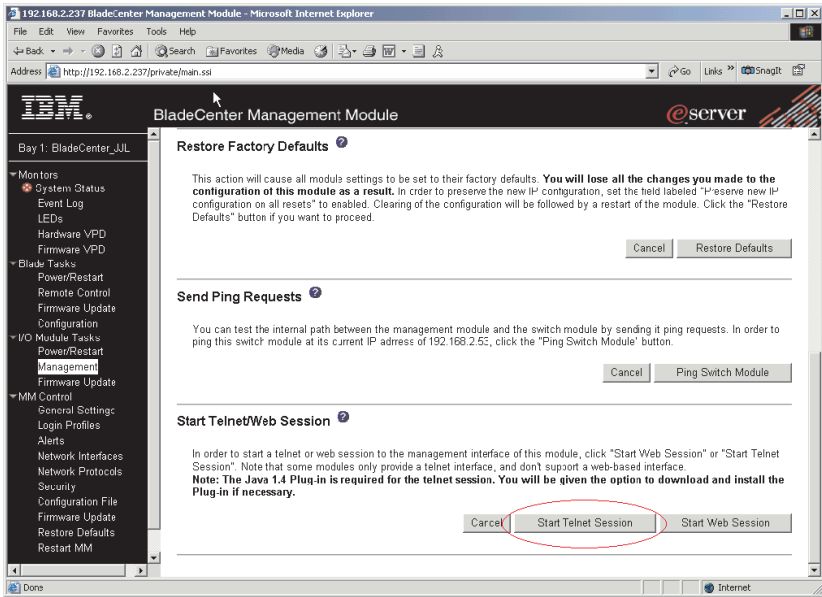
Externally managing the GbE switch module

The following procedure describes how to configure the GbE switch module to enable management through the external ports (EXT1 to EXT4). See the following illustration for an example topology for enabling external management of the GbE switch module.
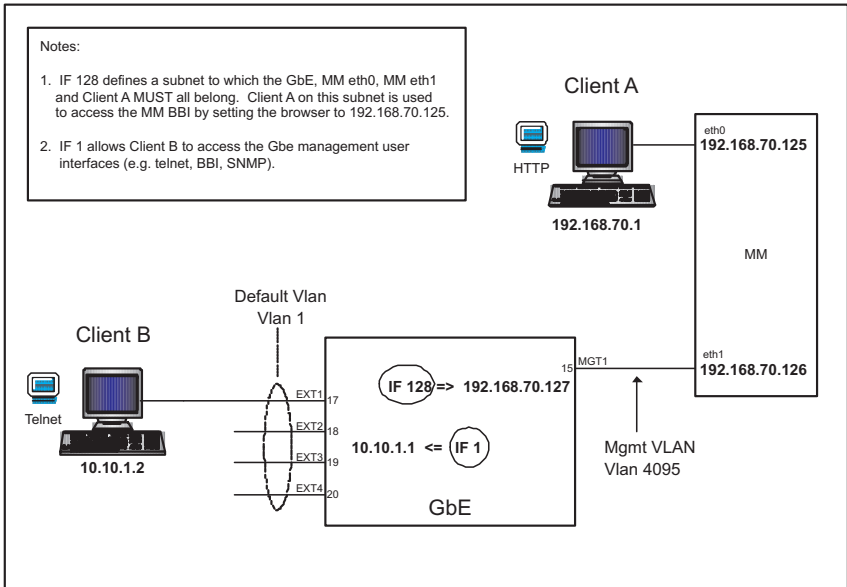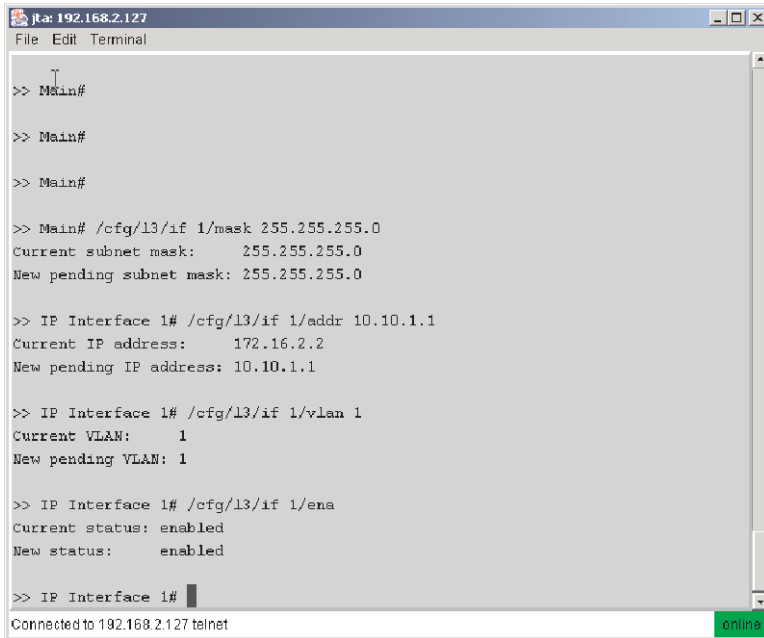

In this illustration, "Client B" manages the GbE switch using the external interface.

Start a Telnet session with the GbE switch module. Click **Start Telnet Session**, as shown in the following illustration. For additional information, see "Configuring through the Telnet interface" on page 38.

After the Telnet session is established, you will use the CLI of the GbE switch module to enter commands. To externally manage the GbE switch module, you will establish a layer 3 IP address and subnet mask to communicate with your management client ("Client B" in the previous illustration). You will also define a layer 2 VLAN and an interface over which the client can communicate with the GbE switch module. You can choose the VLAN and interface for your external management client, or use the default values. There is a maximum of 128 available interfaces for VLANs. You can assign the management IP address to the VLAN ID from 1 to 4094 to any of these interfaces.

```
jta: 192.168.2.127                                              _ □ ×
File  Edit  Terminal
>> Main#

>> Main#

>> Main#

>> Main# /cfg/l3/if 1/mask 255.255.255.0
Current subnet mask:     255.255.255.0
New pending subnet mask: 255.255.255.0

>> IP Interface 1# /cfg/l3/if 1/addr 10.10.1.1
Current IP address:      172.16.2.2
New pending IP address: 10.10.1.1

>> IP Interface 1# /cfg/l3/if 1/vlan 1
Current VLAN:       1
New pending VLAN: 1

>> IP Interface 1# /cfg/l3/if 1/ena
Current status: enabled
New status:     enabled

>> IP Interface 1#
Connected to 192.168.2.127 telnet                         online
```

The following example shows how to create this configuration using the CLI:

```
/cfg/l3/if 1/mask 255.255.255.0
```

```
/cfg/l3/if 1/addr 10.10.1.1
```

```
/cfg/l3/if 1/vlan 1
```

```
/cfg/l3/if 1/ena
```

```
apply
```

```
save
```

"Client B" now has access to manage the GbE switch module.

See the following publications for specific details about configuring the GbE switch module:

- *Alteon OS 20.x Application Guide*
- *Alteon OS 20.x Browser-Based Interface Quick Guide*
- *Alteon OS 20.x Command Reference*

For additional information about the management module, see the *BladeCenter Management Module User's Guide*. For additional information about establishing a remote external Ethernet connection, see the *Management Module Installation Guide* for your BladeCenter unit type.

The browser-based interface and the Telnet program are different ways to access the same internal switching software and configure it. Thus, all the settings that you encounter in browser-based management are the same as those found in the Telnet program.

- If your system application requires that you use the browser-based interface program, see "Configuring through the browser-based interface" for additional information.
- If your system application requires that you use the Telnet program, see "Configuring through the Telnet interface" on page 38 for additional information.
- For information about running an SSH session, see the *Alteon OS 20.x Command Reference*.

Configuring through the browser-based interface

This section describes how to use the browser-based interface to access and configure the internal switching software.

This section also describes some of the browser-based GbE switch module management features. For more detailed information about configuring your GbE switch module, see the *Alteon OS 20.x Application Guide* and the *Alteon OS 20.x Browser-Based Interface Quick Guide*.

The GbE switch module offers an embedded HTML, browser-based interface that you can use to manage the switch through a standard browser, such as Opera, Netscape Navigator/Communicator, or Microsoft® Internet Explorer. The Web browser acts as an access tool and can communicate directly with the switch using HTTP. Your browser window might vary from the window illustrations in this book.

Note: This browser-based interface does not accept Chinese language input (or other double-byte character-set languages).

The browser-based interface contains these features:
- Since the browser-based interface is a built-in component of the Alteon OS switch software, you do not have to install a separate interface program.
- Two levels of password protection.
- User-friendly design.

- The same configuration and monitoring functions as in the command-line interface (CLI).
- Upgradeable upon the availability of future Alteon OS switch software updates.

Before you can access and start the browser-based interface, you must have:
- Installed the GbE switch module in the BladeCenter unit
- Verified that the Alteon OS switch software is installed on the GbE switch module
- Configured at least one IP interface on the switch module
- A computer or workstation with network access to the switch module
- A frame-capable Web-browser program, such as Internet Explorer (version 6.0x or later) or Netscape Navigator (version 4.7x or later)
- Enabled the frames and the JavaScript™ program in your Web browser
- Enabled access to the browser-based interface

To enable access to the browser-based interface, use this command from the CLI: >> Main# **/cfg/sys/http** <**enable** (or just **e**)>

See the *Alteon OS 20.x Command Reference* for details about:
- Configuring IP interfaces through the CLI
- Accessing and configuring the switch module through the CLI

To verify that the latest Alteon OS switch software is installed on the GbE switch module or to update the software, see Chapter 6, "Updating the GbE switch software," on page 45.

To start the browser-based interface, enter the IP address of the switch module in the address field of your browser, in the format http://*xxx.xxx.xxx.xxx*.

The login window opens.

If you do not have an assigned user ID and initial password, type the default user ID (admin) in the **User Name** field and the default password (admin) in the **Password** field and click **OK**.

Notes:
1. The passwords used to access the GbE switch module are case-sensitive.
2. To increase system security, change the password after you log on for the first time.

A window similar to the one in the following illustration opens. The left-side panel contains the main menu. The top panel shows a real-time

information-panel display of the GbE switch module. These items are described in detail in the *Alteon OS 20.x Application Guide*.
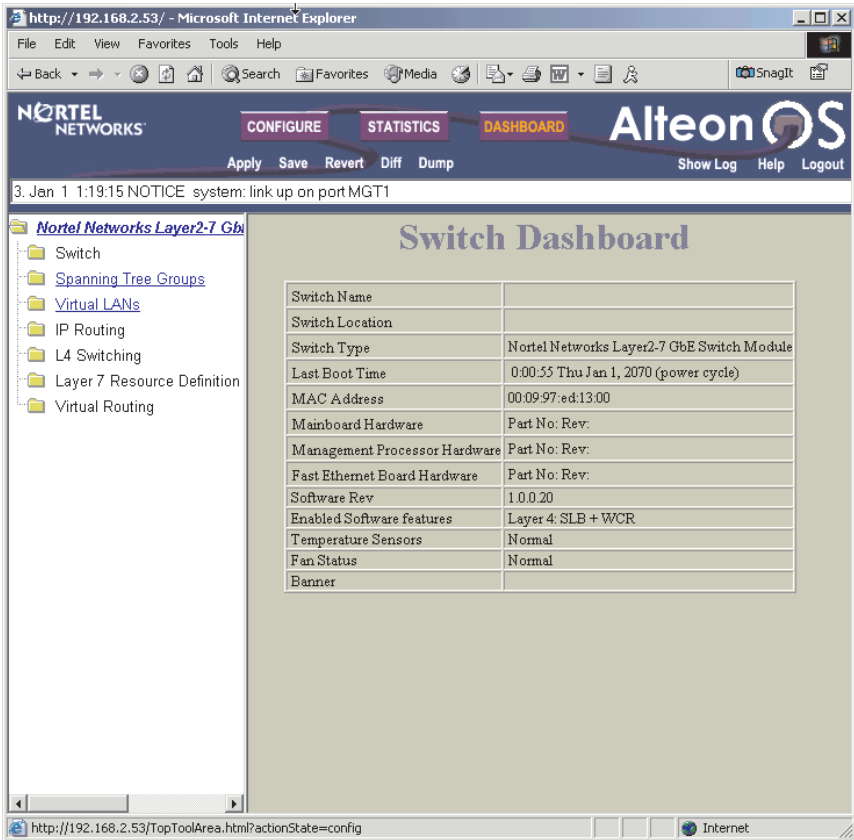
Configuring through the Telnet interface

Your GbE switch module supports a management interface that you can use to set up and control the GbE switch module over the network using the Telnet protocol. You can use this facility to perform many basic network management functions. In addition, you can use the Telnet interface to configure the GbE switch module for management using an SNMP-based network management system. The following sections describe how to use the Telnet interface to access the GbE switch module, change its settings, and monitor its operation.

Connecting to the GbE switch module

When you know the IP address for your switch module and provided that you have an existing network connection, you can use the Telnet program (in VT-100 compatible terminal mode) to access and control the GbE switch module. The Telnet program and your switch module must be on the same network. 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, as specified in "Accessing the main menu."

Telnet usage conventions

The Telnet interface uses the following conventions:

- Items in angle brackets (< >) can be toggled among several choices through the spacebar.
- 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.
- The Up Arrow and Down Arrow keys, the Left Arrow and Right Arrow keys, the Tab key, and the Backspace key can be used to move between selected items.
- Items in uppercase are commands. Moving the selection to a command and pressing Enter will process that command.

Important: The command APPLY makes changes to the switch configuration for the current session only. If you want your changes to be permanent, select **Save Changes** from the main menu. Selecting **Save Changes** enters the current switch configuration, including all changes, into NVRAM and then restarts the GbE switch module.

Accessing the main menu

Complete the following steps to connect to the GbE switch module through the Telnet interface:

1. From a DOS prompt command line, type `telnet` *x* and press Enter (where *x* is the IP address for your switch module).

2. If you do not have an assigned initial password, type the default password (`admin`) in the **Password** field and press **Enter**.

3. Press Enter, and you will be given access to the main menu, shown in the following illustration.

```
C:\WINNT\System32\cmd.exe - telnet 192.168.2.103                        _ □ ×
                       FW_VIEW: wtnelson_elmo
                       FW_CONTEXT: ALT-HW_ELMO-1 / pass2
                       (FLASH image0), unknown configuration.

The switch is booted with factory default configuration.
  To ease the configuration of the switch, a "Set Up" facility which
 will prompt you with those configuration items that are essential
  to the operation of the switch is provided.
Would you like to run "Set Up" to configure the switch? [y/n] n
--------------------------------------------------------------------
[Main Menu]
     info    - Information Menu
     stats   - Statistics Menu
     cfg     - Configuration Menu
     oper    - Operations Command Menu
     boot    - Boot Options Menu
     maint   - Maintenance Menu
     diff    - Show pending config changes  [global command]
     apply   - Apply pending config changes [global command]
     save    - Save updated config to FLASH [global command]
     revert  - Revert pending or applied changes [global command]
     exit    - Exit  [global command, always available]

>> Main# _
```

Note: The first user automatically gets root privileges. Create at least one root-level user for the GbE switch module when you set up your user accounts. See the *Alteon OS 20.x Application Guide* for complete details.

Logging on to the GbE switch module

To log in after you have created a registered user, complete the following steps from the login window (see "First-time connection to the GbE switch module" for additional information):

1. Type your user ID and press Enter.
2. Type your password and press Enter. The main menu window opens based on your access level or privilege.

After you log on to the GbE switch module, you can perform the tasks that are described in the *Alteon OS 20.x Application Guide* and other related documentation.
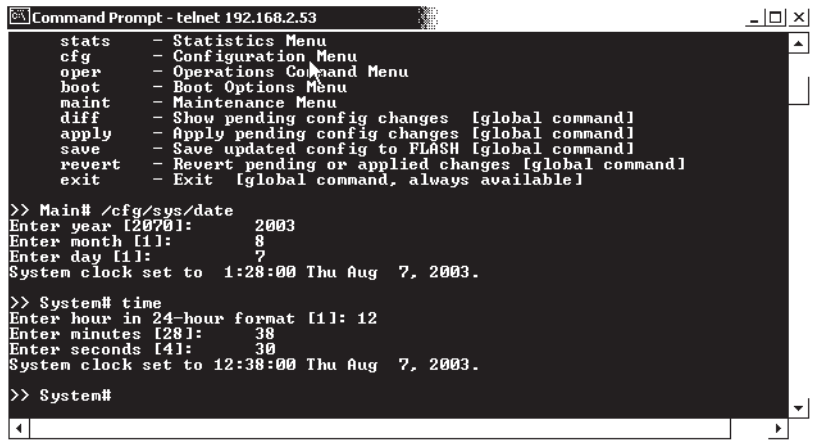
First-time connection to the GbE switch module

The GbE switch module supports user-based security that enables you to prevent unauthorized users from accessing the GbE switch module or changing its settings. This section describes how to log on to the GbE switch module.

The first time that you turn on the GbE switch module, you must set the date and time, either through the browser-based interface or the Telnet interface. Because the GbE switch module does not contain a battery-backed real-time clock, you also must manually reset the date and time whenever any of the following conditions exists:

• The GbE switch module is turned off and then back on

- The GbE switch module is restarted
- The GbE switch module software is updated

The following illustration shows how to set the date and time through the Telnet interface.

```
Command Prompt - telnet 192.168.2.53
    stats   - Statistics Menu
    cfg     - Configuration Menu
    oper    - Operations Command Menu
    boot    - Boot Options Menu
    maint   - Maintenance Menu
    diff    - Show pending config changes  [global command]
    apply   - Apply pending config changes [global command]
    save    - Save updated config to FLASH [global command]
    revert  - Revert pending or applied changes [global command]
    exit    - Exit  [global command, always available]

>> Main# /cfg/sys/date
Enter year [2070]:      2003
Enter month [1]:        8
Enter day [1]:          7
System clock set to  1:28:00 Thu Aug  7, 2003.

>> System# time
Enter hour in 24-hour format [1]: 12
Enter minutes [28]:     38
Enter seconds [4]:      30
System clock set to 12:38:00 Thu Aug  7, 2003.

>> System#
```

Chapter 5. Management module software level

Make sure that you are using the latest version of management module firmware for your BladeCenter unit type. See the *Management Module User's Guide* for your BladeCenter unit type for additional information.

Chapter 6. Updating the GbE switch software

This chapter describes how to determine the level of the software that is installed on the GbE switch module, how to obtain the latest level of switch software, how to upgrade the switch software, and how to reset the switch module to activate the software upgrade.

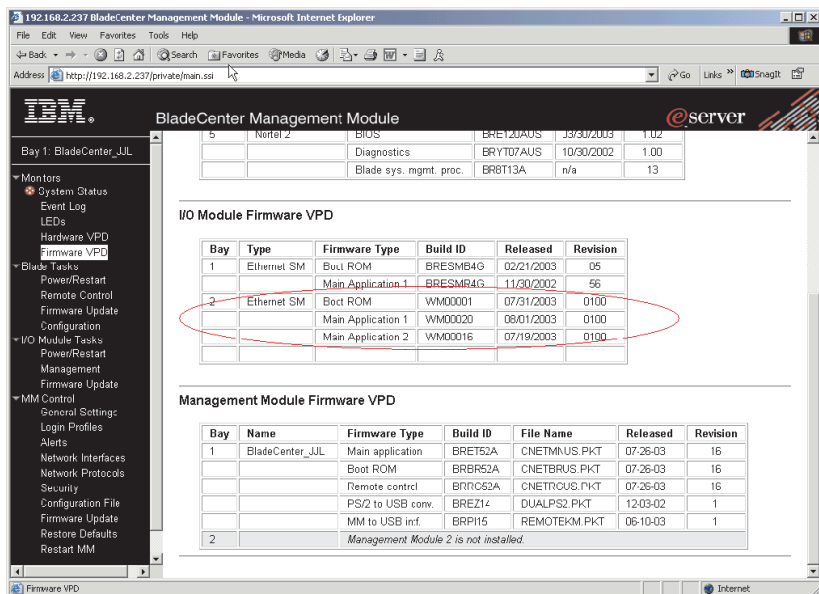## Determining the level of GbE switch software

After you install the GbE switch module in your BladeCenter unit, make sure that the latest Alteon OS switch software is installed on the GbE switch module. To determine the level of the Alteon OS switch software that is installed on the GbE switch module, complete the following steps:

1. Access and log on to the management module as described in the *Management Module User's Guide* for your BladeCenter unit type. If necessary, obtain the IP address of the management module from your system administrator. The login window opens.

   If you do not have an assigned user identifier (ID) and initial password, type the default user ID (USERID) in the **User ID** field and the default password (PASSW0RD) in the **Password** field (where the sixth alphanumeric character is the number zero, not the letter *O*) and click **OK**. The main page in the management module opens.

   Note: Capital letters are required; these fields are both case-sensitive. To increase system security, change the password after you log on for the first time.

2. Select **Firmware VPD** on the **Monitors** menu on the left side of the BladeCenter Management Module window. The Firmware VPD window opens.

3. On the Firmware VPD window, locate the **I/O Module Firmware VPD** heading between the **Blade Server Firmware VPD** and **Management Module Firmware VPD** headings. Page down to the number of the I/O module bay that contains the GbE switch module that you just installed; then, note the corresponding level of the software for the switch module.

			BRE120AUS	J3/30/2003	1.02
5	Nortel 2	BIOS			
		Diagnostics	BRYT07AUS	10/30/2002	1.00
		Blade sys. mgmt. proc.	BR8T13A	n/a	13

I/O Module Firmware VPD

Bay	Type	Firmware Type	Build ID	Released	Revision
1	Ethernet SM	Boot ROM	BRESMB4G	02/21/2003	05
		Main Application 1	BRESMR4G	11/30/2002	56
2	Ethernet SM	Boot ROM	WM00001	07/31/2003	0100
		Main Application 1	WM00020	08/01/2003	0100
		Main Application 2	WM00016	07/19/2003	0100

Management Module Firmware VPD

Bay	Name	Firmware Type	Build ID	File Name	Released	Revision
1	BladeCenter_JJL	Main application	BRET52A	CNETMNUS.PKT	07-26-03	16
		Boot ROM	BRBR52A	CNETBRUS.PKT	07-26-03	16
		Remote control	BRRC52A	CNETRCUS.PKT	07-26-03	16
		PS/2 to USB conv.	BREZ14	DUALPS2.PKT	12-03-02	1
		MM to USB inf.	BRPI15	REMOTEKM.PKT	06-10-03	1
2		Management Module 2 is not installed.				

Obtaining the latest level of switch software

To determine the latest level of the Alteon OS switch software that is available from IBM, complete the following steps:

1. Go to http://www.ibm.com/pc/support/; then, click **Support & downloads**.

2. Type the switch model number. A window opens, displaying the latest level of available software.

3. Compare the level of software that you noted in the **I/O Module Firmware VPD** section of the Firmware VPD window to the latest level of available software. If the two software levels do not match, download the latest level from the World Wide Web to your switch module.

The GbE switch module contains two software operating-system images. Therefore, you can always return to a previous image if the current download process fails.

Upgrading the switch software

The switch software is upgraded through a TFTP server application. Typically, this software runs as an application under your operating system. Make sure that this software is installed on your server; then, download the software images from the IBM Web site into a directory on your TFTP server. Enable the TFTP server and set its default directory to the one where the image is.

To transfer the software image files from the TFTP server to the switch, you must establish a Telnet session through the management module. The Telnet session will work correctly only if all three network entities (TFTP server, management module, and switch IP addresses) are on the same subnet. Use the management module graphical user interface (GUI) to configure the IP addresses of the management module external interface (eth0) and the GbE switch module so that they both are on the same subnet as the TFTP server.
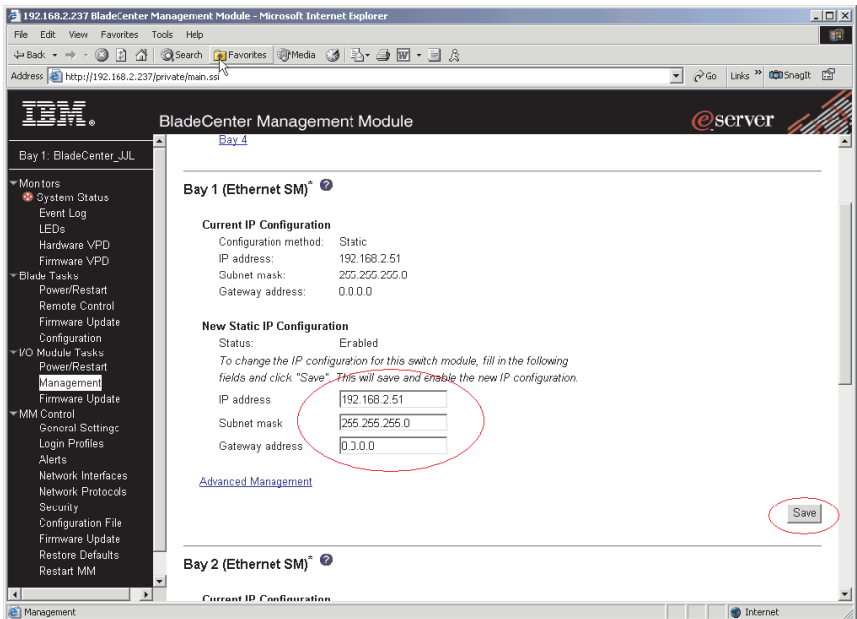
In this illustration, the IP addresses and masks in the following table are used.

Network entity	IP address	Mask
TFTP server	192.168.2.178	255.255.255.0
Management module (eth0)	192.168.2.237	255.255.255.0
GbE switch current IP configuration	192.168.2.51	255.255.255.0

**Note:** With this configuration, you can ping the GbE switch module.

Use the management module GUI to start a Telnet session, as described in the following steps. The requirements for running a Telnet session are described in Chapter 4, "Configuring the GbE switch module," on page 23.

1. Access and log on to the management module as described in the *Management Module User's Guide* for your BladeCenter unit type. The login window opens.

   If you do not have an assigned user identifier (ID) and initial password, type the default user ID (USERID) in the **User ID** field and the default password (PASSW0RD) in the **Password** field (where the sixth alphanumeric character is the number zero, not the letter *O*) and click **OK**. Type n when asked if you want to run setup. The main page in the management module opens.

   Note: Capital letters are required; these fields are both case-sensitive. To increase system security, change the password after you log on for the first time.

2. Select **Management** on the **I/O Module Tasks** menu on the left side of the BladeCenter Management Module window. The I/O Module Tasks window opens.

3. Click **Start Telnet Session**, as shown in the following illustration. If you do not have an assigned initial password, type the default password (admin) in the Password field and press **Enter**.
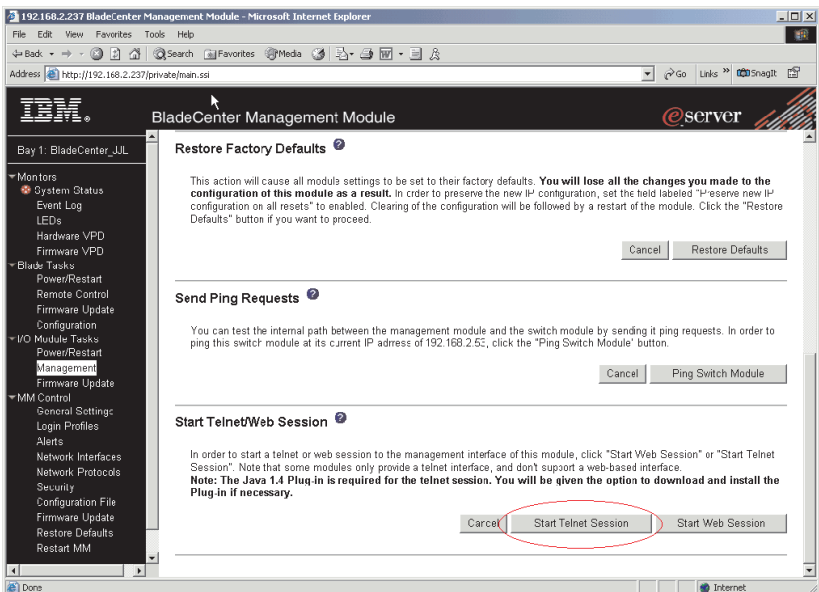
The following illustration shows the TFTP window for the software download to the GbE switch module. Complete the following steps to upgrade the switch software:

1. Using the CLI, type the following command and press Enter:

   `/boot/gtimg imageX TADDR zzzzz` (where `imageX` is the image to be installed and `zzzzz` is the operating-system image software; for example, GbE-1.0.0.20-os.img).

2. Reset and restart the GbE switch module as described in "Resetting and restarting the GbE switch module."

3. Using the CLI, type the following command and press Enter:

   `/boot/gtimg boot TADDR yyyyy` (where `yyyyy` is the boot image software; for example, GbE-1.0.0.24-boot.img).

4. Reset and restart the GbE switch module as described in "Resetting and restarting the GbE switch module."

Note: There might only be one image to install.

```
Command Prompt - telnet 192.168.2.53                              _ □ ×

>> Main# /boot/gtimg boot 192.168.2.153 GbE-1.0.0.18-Boot.img

boot kernel currently contains Software Version 1.0.0.20

New download will replace boot kernel with the file "GbE-1.0.0.18-Boot.img"
     from TFTP server 192.168.2.153.
Confirm download operation [y/n]: y
Starting download...
File appears valid
Download in progress.................................................................
..................................................................................
....................................................
Boot image (FS) download complete.
Writing to flash...This takes about 90 seconds. Please wait
FS Sector now contains Software Version 1.0.0.18

Boot image (FPGA) download complete.
Writing to flash...This takes about 90 seconds. Please wait
FPGA Sector now contains Software Version 1.0.0.18

Boot image (Kernel) download complete.
Writing to flash...This takes about 90 seconds. Please wait
Kernel Sector now contains Software Version 1.0.0.18

Boot image (Boot) download complete.
Writing to flash...This takes about 90 seconds. Please wait
Boot Sector now contains Software Version 1.0.0.18

>> Boot Options#
```

Resetting and restarting the GbE switch module

To activate the new image or images, you must reset the GbE switch module through the management module GUI. Complete the following steps to reset the GbE switch module:

1. Select **Management** on the **I/O Module Tasks** menu on the left side of the BladeCenter Management Module window. The I/O Module Tasks window opens.

2. Select the I/O module bay on which the software update was just installed.

3. From the I/O Module Tasks window, select **Power/Restart**.

4. Click **POWER OFF SWITCH MODULE**.

5. Select the I/O module bay on which the software update was just installed.

6. Click **POWER ON SWITCH MODULE**.

7. Wait 70 seconds for POST to be completed.

8. Make sure that the latest Alteon OS switch software was correctly installed on the GbE switch module. Select **Firmware VPD** on the **Monitors** menu on the left side of the BladeCenter Management Module window. The Firmware VPD window opens.

9. On the Firmware VPD window, locate the **I/O Module Firmware VPD** heading between the **Blade Server Firmware VPD** and **Management Module Firmware VPD** headings. Page down to the number of the I/O module bay that contains the GbE switch module that you just installed; then, note the corresponding level of the software for the switch module.
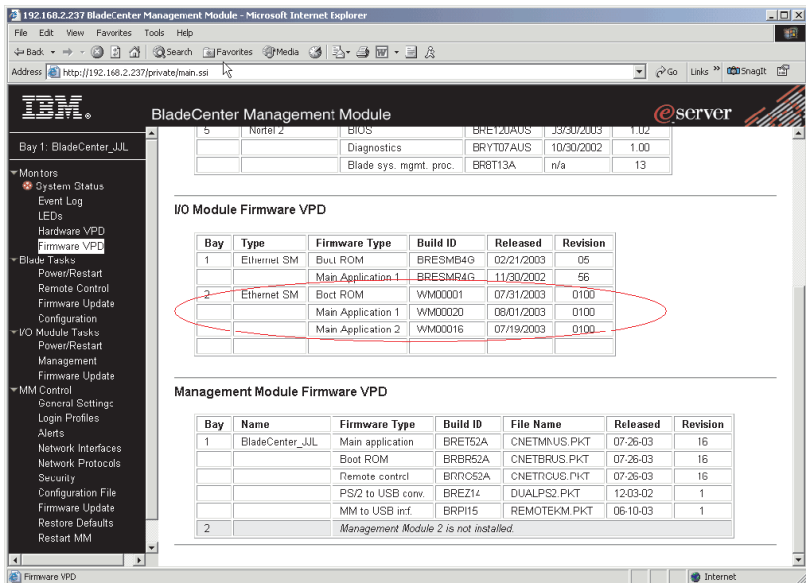
10. Make sure that the latest Alteon OS switch software was correctly installed on the GbE switch module.

Chapter 7. Solving problems

This section provides basic troubleshooting information to help you solve some problems that might occur while you are setting up the GbE switch module. The *Alteon OS 20.x Application Guide* contains more details about troubleshooting the GbE switch module.

If you cannot locate and correct the problem using the information in this section, see Appendix A, "Getting help and technical assistance," on page 57.

Running POST

To ensure that it is fully operational, the GbE switch module processes a series of tests during power-up or a restart (power-on self-test or POST). These tests take approximately 1 minute to complete. The management module reads the test results and displays them for you. During normal operation, these tests are completed without error, and the green OK LED is lit. However, if POST fails, the amber GbE switch module error (fault) LED and the system-error LED on the BladeCenter unit will be lit. An event is stored in the event log in the System Status panel of the management module. The specific failure is displayed on the System Status I/O Module panel of the management module. The following illustrations are examples of the windows that will be displayed if a POST error occurs.

Note: For the location and description of the GbE switch module LEDs, see Chapter 3, "Information panel LEDs and external ports," on page 19.
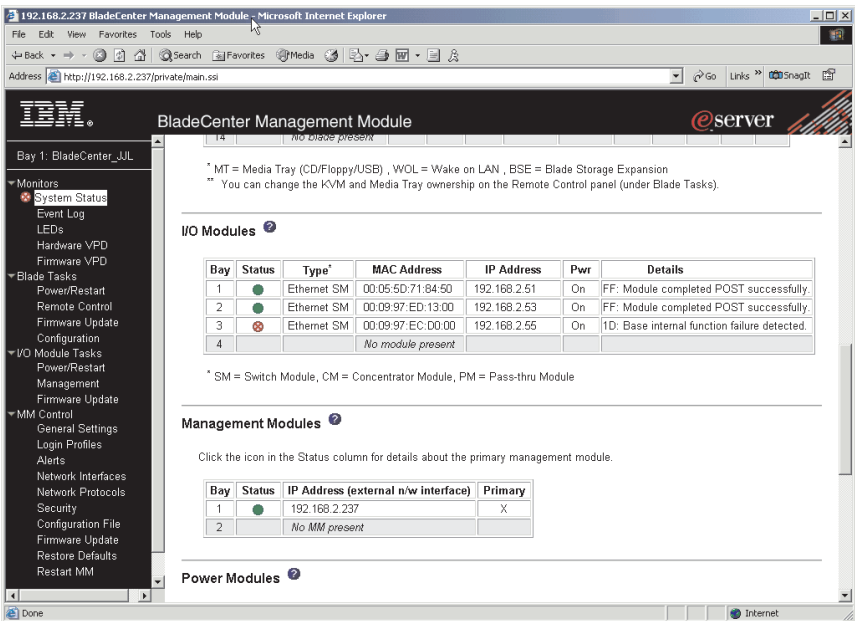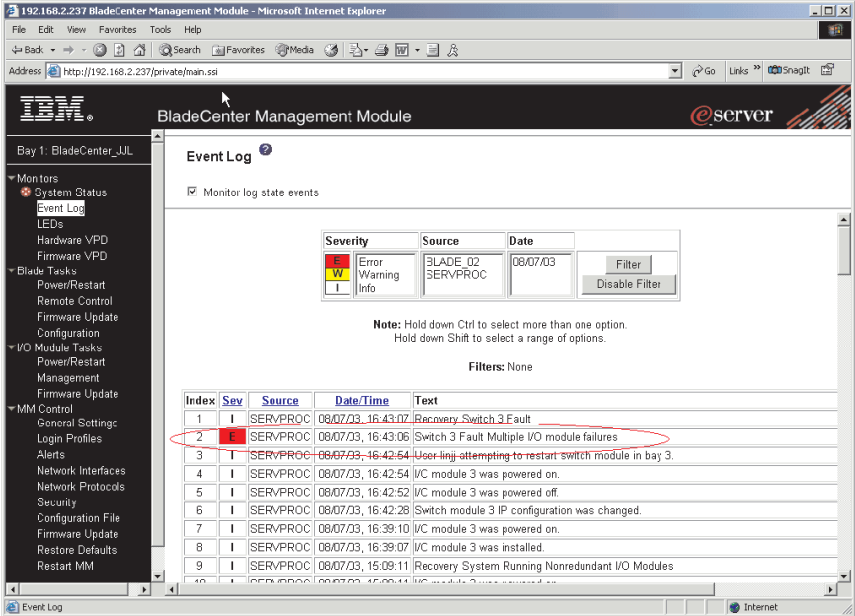
POST errors

There are two types of errors: noncritical and critical. Noncritical errors apply to one port, and the GbE switch module is operational. You can continue to operate the GbE switch module; however, you must replace it as soon as possible. When critical errors occur, the GbE switch module does not operate. If a critical error occurs, complete the following steps:

1. Open the Management Module Switch Information window.

2. Turn off the GbE switch module; then, turn it back on.

3. After POST is completed, the management module displays the results. Refresh the window to view the POST results. If the error remains, the GbE switch module is defective. Replace the GbE switch module.

The following table describes the basic critical and noncritical failures. This abbreviated list is representative; it is not intended as an exhaustive list. An error code is associated with each failure. Error codes appear on the Management Module Switch Information window. Be sure to note the applicable error code and corresponding failure. You might need to provide this information when you call the IBM HelpCenter®. For more details, see Appendix A, "Getting help and technical assistance," on page 57.

Diagnostic indicator (in hex)	Failing functional area	Failure criticality
00 - 7F	Base internal functions	Critical
80 - 9F	Internal interface failures	Noncritical
A0 - AF	External interface errors	Noncritical
B0 - FE	Reserved	Noncritical
FF	Switch module "good" indicator	Operation

Chapter 8. Parts listing

This parts listing supports the Nortel Networks Layer 2-7 GbE Switch Module for IBM @server BladeCenter.

Note: Field replaceable units (FRUs) should be serviced only by qualified field service technicians. Customer replaceable units can be replaced by the customer.

Nortel Networks Layer 2-7 GbE Switch Module for IBM @server BladeCenter

GbE switch module

Serial number/ identification label

Media access control (MAC) address label
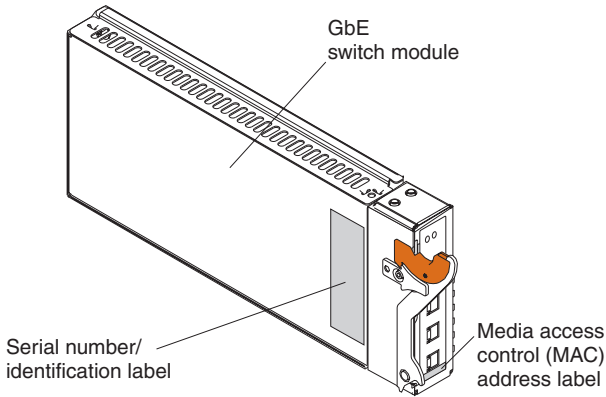
Option	FRU No.	CRU/FRU
GbE switch module assembly	73P9044	CRU
Serial Console Cable	26K6541	CRU

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 appendix 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. Information about diagnostic tools is in the *Hardware Maintenance Manual and Troubleshooting Guide* on the IBM *xSeries Documentation* CD or in the IntelliStation *Hardware Maintenance Manual* at the IBM Support Web site.
- 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 or to submit a request for information.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the 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/.

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. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

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

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

Appendix B. IBM Statement of Limited Warranty Z125-4753-08 04/2004

Part 1 - General Terms

Part 1 - General Terms

*This Statement of Limited Warranty includes Part 1 - General Terms, Part 2 - Country-unique Terms, and Part 3 - Warranty Information. The terms of Part 2 replace or modify those of Part 1. The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you purchase for your use, and not for resale. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. The term "Machine" does not include any software programs, whether pre-loaded with the Machine, installed subsequently or otherwise. **Nothing in this Statement of Limited Warranty affects any statutory rights of consumers that cannot be waived or limited by contract.**

What this Warranty Covers

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications ("Specifications") which are available on request. The warranty period for the Machine starts on the original Date of Installation and is specified in Part 3 - Warranty Information. The date on your invoice or sales receipt is the Date of Installation unless IBM or your reseller informs you otherwise. 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. Unless IBM specifies otherwise, these warranties apply only in the country or region in which you purchased the Machine.

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

What this Warranty Does not Cover

This warranty does not cover the following:
- any software programs, whether pre-loaded or shipped with the Machine, or installed subsequently;
- failure resulting from misuse (including but not limited to use of any Machine capacity or capability, other than that authorized by IBM in writing), accident, modification, unsuitable physical or operating environment, or improper maintenance by you;
- failure caused by a product for which IBM is not responsible; and
- any non-IBM products, including those that IBM may procure and provide with or integrate into an IBM Machine at your request.

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

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

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

How to Obtain Warranty Service

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

What IBM Will Do to Correct Problems

When you contact IBM for service, you must follow the problem determination and resolution procedures that IBM specifies. An initial diagnosis of your problem can be made either by a technician over the telephone or electronically by access to an IBM website.

The type of warranty service applicable to your Machine is specified in Part 3 - Warranty Information.

You are responsible for downloading and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM Machine) and other software updates from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides.

If your problem can be resolved with a Customer Replaceable Unit ("CRU") (e.g., keyboard, mouse, speaker, memory, hard disk drive), IBM will ship the CRU to you for you to install.

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

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

Exchange of a Machine or Part

When the warranty service involves the exchange of a Machine or part, the item IBM or 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.

Your Additional Responsibilities

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 service request procedures that IBM or your reseller provides;
   b. backup or secure all programs, data, and funds contained in the Machine;
   c. provide IBM or your reseller with sufficient, free, and safe access to your facilities to permit IBM to fulfill its obligations; and
   d. inform IBM or your reseller of changes in the Machine's location.
4. (a) ensure all information about identified or identifiable individuals (Personal Data) is deleted from the Machine (to the extent technically possible), (b) allow IBM, your reseller or an IBM supplier to process on your behalf any remaining Personal Data as IBM or your reseller considers necessary to fulfill its obligations under this Statement of Limited Warranty (which may include shipping the Machine for such processing to other IBM

service locations around the world), and (c) ensure that such processing complies with any laws applicable to such Personal Data.

Limitation of Liability

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

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

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

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

UNDER NO CIRCUMSTANCES IS IBM, ITS SUPPLIERS OR RESELLERS LIABLE FOR ANY OF THE FOLLOWING EVEN IF INFORMED OF THEIR POSSIBILITY: 1) THIRD PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, DATA; 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES; OR 4) LOST PROFITS, BUSINESS REVENUE, GOODWILL OR ANTICIPATED SAVINGS. SOME STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

Governing Law

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

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

<u>Jurisdiction</u>

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

Part 2 - Country-unique Terms

<u>AMERICAS</u>

ARGENTINA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Ordinary Commercial Court of the city of Buenos Aires.

BOLIVIA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the courts of the city of La Paz.

BRAZIL

Jurisdiction: *The following is added after the first sentence:*
Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the court of Rio de Janeiro, RJ.

CHILE

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Civil Courts of Justice of Santiago.

COLOMBIA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Judges of the Republic of Colombia.

EQUADOR

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Judges of Quito.

MEXICO

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Federal Courts of Mexico City, Federal District.

PARAGUAY

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the courts of the city of Asuncion.

PERU

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

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

URUGUAY

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the City of Montevideo Court's Jurisdiction.

VENEZUELA

Jurisdiction: *The following is added after the first sentence:*

Any litigation arising from this Statement of Limited Warranty will be settled exclusively by the Courts of the Metropolitan Area Of the City of Caracas.

NORTH AMERICA

How to Obtain 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

Limitation of Liability: *The following replaces item 1 of this section:*
1. damages for bodily injury (including death) or physical harm to real property and tangible personal property caused by IBM's negligence; and

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

What this Warranty Covers: *The following paragraph is added to this section:*
The warranties specified in this Section are in addition to any rights you may have under the Trade Practices Act 1974 or other similar legislation and are only limited to the extent permitted by the applicable legislation.

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

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

CAMBODIA AND LAOS

Governing Law: *The following replaces "laws of the country in which you acquired the Machine" in the first sentence:*
laws of the State of New York, United States of America.

CAMBODIA, INDONESIA, AND LAOS

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

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

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

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

HONG KONG S.A.R. OF CHINA AND MACAU S.A.R. OF CHINA

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 of China.

INDIA

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

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

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

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

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

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

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

JAPAN

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

MALAYSIA

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

NEW ZEALAND

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

Limitation of Liability: *The following is added to this section:*
Where Machines are not acquired for the purposes of a business as defined in
the Consumer Guarantees Act 1993, the limitations in this section are subject to
the limitations in that Act.

PEOPLE'S REPUBLIC OF CHINA (PRC)

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

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

PHILIPPINES

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

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

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

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

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

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

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

SINGAPORE

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

<u>**EUROPE, MIDDLE EAST, AFRICA (EMEA)**</u>

THE FOLLOWING TERMS APPLY TO ALL EMEA COUNTRIES:
The terms of this Statement of Limited Warranty apply to Machines purchased from IBM or an IBM reseller.

How to Obtain Warranty Service:

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

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

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

If you purchased a Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kyrgyzstan, 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 a 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 approved service provider. You are responsible for transportation costs for Machines located outside 50 kilometers of an IBM approved service provider.

Governing Law:

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

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

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

1) **In Austria** the choice of jurisdiction for all disputes arising out of this Statement of Limited Warranty and relating thereto, including its existence, will be the competent court of law in Vienna, Austria (Inner-City); 2) **in Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique, Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, West Bank/Gaza, Yemen, Zambia, and Zimbabwe** all disputes arising out of this Statement of Limited Warranty or related to its execution, including summary proceedings, will be submitted to the exclusive jurisdiction of the English courts; 3) in **Belgium** and **Luxembourg**, all disputes arising out of this Statement of Limited Warranty or related to its interpretation or its execution, the law, and the courts of the

capital city, of the country of your registered office and/or commercial site location only are competent; 4) **in France, Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo Republic, Djibouti, Democratic Republic of Congo, Equatorial Guinea, French Guiana, French Polynesia, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Madagascar, Mali, Mauritania, Mauritius, Mayotte, Morocco, New Caledonia, Niger, Reunion, Senegal, Seychelles, Togo, Tunisia, Vanuatu, and Wallis & Futuna** all disputes arising out of this Statement of Limited Warranty or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 5) **in Russia**, all disputes arising out of or in relation to the interpretation, the violation, the termination, the nullity of the execution of this Statement of Limited Warranty shall be settled by Arbitration Court of Moscow; 6) **in South Africa, Namibia, Lesotho and Swaziland**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the High Court in Johannesburg; 7) **in Turkey** all disputes arising out of or in connection with this Statement of Limited Warranty shall be resolved by the Istanbul Central (Sultanahmet) Courts and Execution Directorates of Istanbul, the Republic of Turkey; 8) in each of the following specified countries, any legal claim arising out of this Statement of Limited Warranty will be brought before, and settled exclusively by, the competent court of a) Athens for **Greece**, b) Tel Aviv-Jaffa for **Israel**, c) Milan for **Italy**, d) Lisbon for **Portugal**, and e) Madrid for **Spain**; and 9) **in the United Kingdom**, both of us agree to submit all disputes relating to this Statement of Limited Warranty to the jurisdiction of the English courts.

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

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

In Estonia, Latvia and Lithuania all disputes arising in connection with this Statement of Limited Warranty will be finally settled in arbitration that will be held in Helsinki, Finland in accordance with the arbitration laws of Finland then in effect. Each party will appoint one arbitrator. The arbitrators will then

jointly appoint the chairman. If arbitrators cannot agree on the chairman, then the Central Chamber of Commerce in Helsinki will appoint the chairman.

EUROPEAN UNION (EU)

THE FOLLOWING TERMS APPLY TO ALL EU COUNTRIES:

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

How to Obtain Warranty Service: *The following is added to this section:*

To obtain warranty service from IBM in EU countries, see the telephone listing in Part 3 - Warranty Information.

You may contact IBM at the following address:
   IBM Warranty & Service Quality Dept.
   PO Box 30
   Spango Valley
   Greenock
   Scotland PA16 0AH

CONSUMERS

Consumers have legal rights under applicable national legislation governing the sale of consumer goods. Such rights are not affected by the warranties provided in this Statement of Limited Warranty.

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

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

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

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

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

FRANCE AND BELGIUM

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

Except as otherwise provided by mandatory law:

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

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

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

THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:

AUSTRIA

The provisions of this Statement of Limited Warranty replace any applicable statutory warranties.

What this Warranty Covers: *The following replaces the first sentence of the first paragraph of this section:*
The warranty for an IBM Machine covers the functionality of the Machine for its normal use and the Machine's conformity to its Specifications.

The following paragraphs are added to this section:

The limitation period for consumers in action for breach of warranty is the statutory period as a minimum. 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.

The second paragraph does not apply.

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

During the warranty period, IBM will reimburse you for the transportation charges for the delivery of the failing Machine to IBM.

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 ("LIC").

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).

GERMANY

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

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

The following paragraphs are added to this section:

The minimum warranty period for Machines is twelve months. In case IBM or your reseller is unable to repair an IBM Machine, you can alternatively ask for a 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.

The second paragraph does not apply.

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

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

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

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

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

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

HUNGARY

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

The limitation and exclusion specified herein shall not apply to liability for a breach of contract damaging life, physical well-being, or health that has been caused intentionally, by gross negligence, or by a criminal act.

The parties accept the limitations of liability as valid provisions and state that the Section 314.(2) of the Hungarian Civil Code applies as the acquisition price as well as other advantages arising out of the present Statement of Limited Warranty balance this limitation of liability.

IRELAND

What this Warranty Covers: *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 the terms of this section in its entirety:*

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

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

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

Items for Which IBM is Not Liable

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

3. loss of profits, business, revenue, goodwill, or anticipated savings.

SLOVAKIA

Limitation of Liability: *The following is added to the end of the last paragraph:*

The limitations apply to the extent they are not prohibited under §§ 373-386 of the Slovak Commercial Code.

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 the terms of this section in its entirety:*

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

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

This section sets out the extent of IBM's liability and your sole remedy.
1. IBM will accept unlimited liability for:
    a. death or personal injury caused by the negligence of IBM; and
    b. any breach of its obligations implied by Section 12 of the Sale of Goods Act 1979 or Section 2 of the Supply of Goods and Services Act 1982, or any statutory modification or re-enactment of either such Section.
2. IBM will accept unlimited liability, subject always to the **Items for Which IBM is Not Liable** below, for physical damage to your tangible property resulting from the negligence of IBM.
3. IBM's entire liability for actual damages for any one Default will not in any event, except as provided in items 1 and 2 above, exceed the greater of 1) Pounds Sterling 75,000, or 2) 125% of the total purchase price payable or the charges for the Machine directly relating to the Default.

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

Items for Which IBM is Not Liable

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

Part 3 - Warranty Information

This Part 3 provides information regarding the warranty applicable to your Machine, including the warranty period and type of warranty service IBM provides.

Warranty Period

The warranty period may vary by country or region and is specified in the table below.

Note: "Region" means either Hong Kong or Macau Special Administrative Region of China.

A warranty period of 3 years on parts and 1 year on labor means that IBM provides warranty service without charge for:
1. parts and labor during the first year of the warranty period; and
2. parts only, on an exchange basis, in the second and third years of the warranty period. IBM will charge you for any labor provided in performance of the repair or replacement(s) in the second and third year of the warranty period.

Machine - Nortel Networks Layer 2-7 GbE Switch Module for IBM @server BladeCenter

Country or Region of Purchase	Warranty Period	Type of Warranty Service*
Worldwide	3 years	1
* See "Types of Warranty Service" for the legend and explanations of warranty-service types.		

Types of Warranty Service

If required, IBM provides repair or exchange service depending on the type of warranty service specified for your Machine in the above table and as described below. Warranty service may be provided by your reseller if approved by IBM to perform warranty service. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations, additional charges may apply outside IBM's normal service area, contact your local IBM representative or your reseller for country and location specific information.

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

   IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your Machine and are available from IBM at any time on your request. Installation of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation. You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service designated for your Machine. IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 30 days of your receipt of the replacement.

2. **On-site Service**

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

3. **Courier or Depot Service***

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

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

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

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

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

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

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

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

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

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

* This type of service is called ThinkPad® EasyServ or EasyServ in some countries.

The IBM Machine Warranty World Wide Web site at http://www.ibm.com/servers/support/machine_warranties/ provides a worldwide overview of IBM's Limited Warranty for Machines, a Glossary of IBM definitions, Frequently Asked Questions (FAQs) and Support by Product (Machine) with links to Product Support pages. **The IBM Statement of Limited Warranty is also available on this site in 29 languages.**

To obtain warranty service contact IBM or your IBM reseller. In Canada or the United States, call 1-800-IBM-SERV (426-7378). In the EU countries, see the telephone numbers below.

EU Country Telephone List

Phone numbers are subject to change without notice. For the warranty service contact telephone number in a country subsequently added to the EU and not yet reflected in the list below, contact IBM in that country or visit the website above for a current telephone listing.

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Cyprus -- +357-22-841100	Luxembourg -- +352-298-977-5063
Czech Republic -- +420-2-7213-1316	Malta -- +356-23-4175
Denmark -- +45-4520-8200	Netherlands -- +31-20-514-5770
Estonia -- +386-61-1796-699	Poland -- +48-22-878-6999
Finland -- +358-8001-4260	Portugal -- +351-21-892-7147
France -- +33-238-557-450	Slovakia -- +421-2-4954-1217
Germany -- +49-1805-253553	Slovenia -- +386-1-4796-699
Greece -- +30-210-680-1700	Spain -- +34-91-714-7983
Hungary -- +36-1-382-5720	Sweden -- +46-8-477-4420
Ireland -- +353-1-815-4000	United Kingdom -- +44-1475-555-055

Italy -- +39-800-820-094	

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

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

In the Netherlands, the following applies.
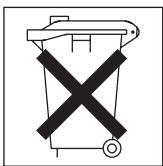
For Taiwan: Please recycle batteries.

廢電池請回收

Electronic emission notices

Federal Communications Commission (FCC) statement

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

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

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

Industry Canada Class A emission compliance statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

Australia and New Zealand Class A statement

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

United Kingdom telecommunications safety requirement

Notice to Customers

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

European Union EMC Directive conformance statement

This product is in conformity with the protection requirements of EU Council Directive 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.

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種情況下,使用者會被要
求採取某些適當的對策。

Chinese Class A warning statement

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