**IBM**

# User's Guide

**Note:** Before using this information and the product it supports, be sure to read the general information in Appendix A, "Product warranty and notices" on page 51 and Appendix B, "Notices" on page 63.

**First Edition (April 2002)**

# Contents

# Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

**Statement 1:**



**DANGER**

**Electrical current from power, telephone, and communication cables is hazardous. To avoid a shock hazard:**

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

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

**Statement 2:**

**CAUTION:**



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

**Do not:**
- **Throw or immerse into water.**
- **Heat to more than 100° C (212° F)**
- **Repair or disassemble**

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

**Statement 3:**



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

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



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

**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.**

**Statement 4:**



≥18 kg (39.7 lbs)          ≥32 kg (70.5 lbs)          ≥55 kg (121.2 lbs)
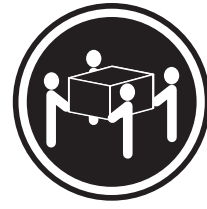
**CAUTION:**

**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 8:**

⚠️

**CAUTION:**

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

⚠️

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

# Chapter 1. Introducing the IBM xSeries 440

Your IBM® @server xSeries 440 is a four U-high[1] rack model server for high-volume network transaction processing. This high-performance server, based on IBM Enterprise X-Architecture™ technologies[2], is ideally suited for networking environments that require superior microprocessor performance, efficient memory management, flexibility, and reliable data storage.

The xSeries 440 comes with a limited warranty. If you have access to the World Wide Web, you can obtain up-to-date information about your xSeries 440 model and other IBM server products at http://www.ibm.com.

Your xSeries 440 server contains several IBM Enterprise X-Architecture technologies, which help increase server performance and reliability. The Enterprise X-Architecture technologies provided in your server model include the most recent advancements in X-Architecture features. For more information about Enterprise X-Architecture features, refer to "What your IBM xSeries 440 offers" on page 5 and "Reliability, availability, and serviceability features" on page 7. You can obtain more information about the IBM Enterprise X-Architecture technologies and features at http://www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html.

For service, assistance, or additional information on the World Wide Web, see "Getting information, help, and service" on page 47.

The machine type and serial number are located on the ID label located on the left side of the bezel just above the hard disk drives. You will need these numbers when you register your server with IBM.



ID Label

---
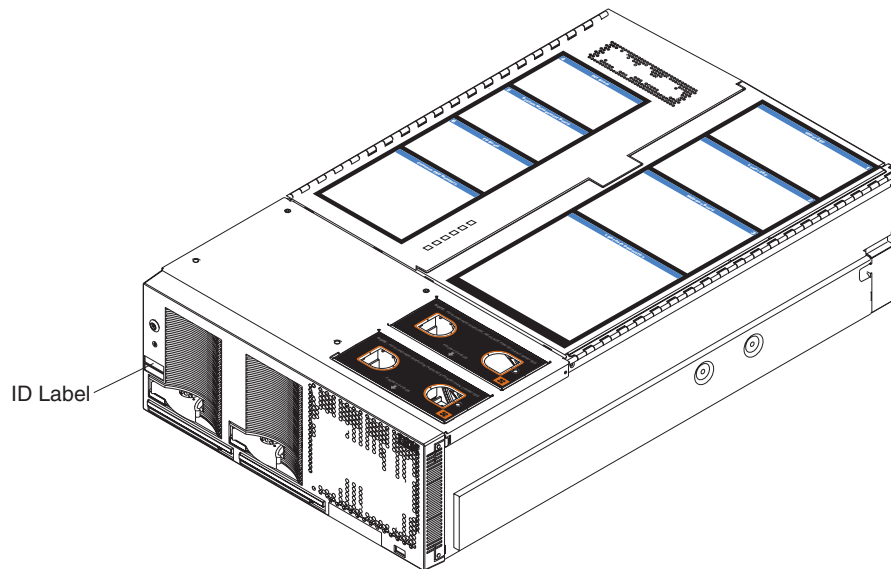
1. Racks are marked in vertical increments of 1.75 inches each. Each increment is referred to as a unit, or ″U.″ A one-U-high device is 1.75 inches tall.

2. Enterprise X-Architecture is an IBM design blueprint that takes full advantage of existing IBM technologies to build powerful, scalable and reliable Intel processor-based servers. For more information about IBM Enterprise X-Architecture, refer to http://www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html.

**1**

# Related publications

This *User's Guide* provides general information about your server, including information about features, how to configure your server, how to use the ServerGuide™ CD, and how to get help.

In addition to this *User's Guide*, the following xSeries 440 documentation is provided with your server:

- *Installation Guide*
  This printed publication contains setup and installation instructions.
- *Rack Installation Instructions*
  This printed publication contains the instructions needed to install your server in a rack.
- *Safety Book*
  This multilingual publication is provided in Portable Document Format (PDF) on the *IBM xSeries Documentation* CD. It contains translated versions of the caution and danger statements that appear in the documentation for your server. Each caution and danger statement has an assigned number, which you can use to locate the corresponding statement in your native language.
- *Troubleshooting Guide*
  This publication is provided in PDF format on the *IBM xSeries Documentation* CD. It contains the information needed to help you solve the problem yourself, or provide helpful information to a service technician.
- *Option Installation Guide*
  This publication is provided in PDF format on the *IBM xSeries Documentation* CD. It contains the information needed to install, remove, and connect optional devices supported by your server.

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

# Features and specifications

The following table provides a summary of the features and specification of your xSeries 440.

| Microprocessor: | Power supply: | Acoustical noise emissions: |
|---|---|---|
| Supports up to 8 microprocessors (depending on your configuration)<br>• The Intel™ Xeon™ MP 1.4 GHz with 512 KB,1.5 GHz with 512 KB, or 1.6 GHz with 1 MB Level-3 cache<br>• IBM XA-32™ chip set with integrated memory, I/O, system cache, and remote I/O controllers<br><br>**Memory:**<br>• Minimum: 2 GB<br>• Maximum: 32 GB (depending on your configuration)<br>• Type: 4-way interleaved PC133 MHz, ECC SDRAM, registered DIMMs only<br>• Supports 512 MB and 1GB dual inline memory modules (DIMMs)<br>• XceL4™ Server Accelerator Cache (up to 64 MB depending on your configuration)<br><br>**Drives:**<br>• Diskette: 1.44 MB<br>• CD-ROM: 24X IDE<br>• Supports up to two internal Ultra160 SCSI hard disk drives<br><br>**Active™ PCI-X expansion slots:**<br><br>Six 64-bit Active PCI-X expansion slots:<br>• Two 66 MHz PCI-X slots<br>• Two 100 MHZ PCI-X slots<br>• Two 133 MHZ PCI-X slots<br>• Additional PCI-X slots available in an optional Remote Expansion Enclosure<br><br>**Cooling:**<br><br>Four hot-swap fans<br>• Two 150 mm x 51 mm redundant fans<br>• Two 150 mm x 38 mm fans | Two hot-swap power supplies (550 watts at 110 V ac or 1050 watts at 220 V ac)<br><br>**Video:**<br>• S3 Savage4 Pro video on system board<br>• PCI bus interface<br>• Compatible with SVGA<br>• 8 MB SDRAM video memory at 125 MHz<br><br>**Size (4U):**<br>• Height: 17.8 cm (7 inches, 4U)<br>• Depth: 69.85 cm (27.5 inches)<br>• Width: 48.3 cm (19 inches)<br>• Maximum weight: 50 kg (110 lb) depending on your configuration<br><br>**Integrated functions:**<br>• Broadcom 5700 10/100/1000 Ethernet controller<br>• Light Path Diagnostics™<br>• Adaptec 7899W Dual Ultra160 SCSI controller<br>• Remote Supervisor Adapter (service processor)<br>  – ASM interconnect (peer-to-peer) port<br>  – Ethernet port<br>  – Serial port<br>• IDE diskette controller<br>• RXE Management Port<br>• Three USB ports<br>• Keyboard port<br>• SCSI port<br>• Mouse port<br>• Symmetrical multiprocessor (SMP) Expansion Ports (up to six ports depending on your configuration)<br>• Two remote expansion enclosure (RXE) Expansion Ports | • Sound power, idling: 6.2 bel maximum<br>• Sound power, operating: 6.2 bel maximum<br><br>**Environment:**<br>• Air temperature:<br>  – Server on: 10° to 35°C (50.0° to 95.0°F). Altitude: 0 to 914 m (2998.7 ft)<br>  – Server on: 10° to 32° C (50.0° to 89.6° F). Altitude: 914 m (2998.7 ft) to 2133 m (6998.0 ft)<br>  – Server off: -40° to 60° C (-104° to 140° F). Maximum altitude: 2133 m (6998.0 ft)<br>• Humidity:<br>  – Server on: 8% to 80%<br>  – Server off: 5% to 100%<br><br>**Heat output:**<br><br>Approximate heat output in British thermal units (Btu) per hour<br>• Minimum configuration: 855 Btu (250 watts)<br>• Maximum configuration: 2726 Btu (800 watts)<br><br>**Electrical input:**<br>• Sine-wave input (47-53 or 57-63 Hz) required<br>• Input voltage low range:<br>  – Minimum: 100 V ac<br>  – Maximum: 127 V ac<br>• Input voltage high range:<br>  – Minimum: 200 V ac<br>  – Maximum: 240 V ac<br>• Input kilovolt-amperes (kVA) approximately:<br>  – Minimum: 0.250 kVA<br>  – Maximum: 0.800 kVA |

# Notices and statements used in this book

The caution and danger statements used in this book also appear in the multilingual Safety Information book provided on the *IBM xSeries Documentation* CD. Each caution and danger statement is numbered for easy reference to the corresponding statement in the safety book.

The notice and statement definitions are as follows:

- **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.

# What your IBM xSeries 440 offers

The design of your server takes advantage of advancements in memory management and data storage. Your server includes:

- IBM Enterprise X-Architecture

  Enterprise X-Architecture is an IBM design blueprint that takes full advantage of existing IBM technologies to build the most powerful, scalable, and reliable Intel processor-based servers. For more information about IBM Enterprise X-Architecture, refer to http://www.ibm.com/pc/us/eserver/xseries/xarchitecture/enterprise/index.html

- Active™ Memory

  Memory Mirroring offers even greater memory reliability. With the same amount of memory in both memory ports and Memory Mirroring enabled in BIOS code, the data from the first memory port is copied or mirrored in the second, giving you redundant copies of the information stored in memory.

- Memory ProteXion™

  This is the equivalent of a hot-spare drive in a RAID array. Memory ProteXion is based in the memory controller, giving your server the ability to sense when a chip on a DIMM has failed and route the data around the failed chip.

- Impressive performance using the latest microprocessor technology

  Your server supports up to eight Intel Xeon MP microprocessors. Your server comes with one or more microprocessors installed; you can install additional microprocessors to further enhance performance and symmetric multiprocessing (SMP) capability.

- Large system memory

  The memory bus in your server supports up to 32 GB of system memory. The memory controller provides error code correction (ECC) support for up to 32 industry-standard PC133, 3.3 V, 168-pin, 133 megahertz (MHz), registered, synchronous dynamic random access memory (SDRAM) dual inline memory modules (DIMMs).

- XceL4™ Server Accelerator Cache
  With up to 64MB of high-performance level-4 system cache, the xSeries 440 introduces XceL4 cache, designed by IBM specifically to alleviate the memory bandwidth demands that the new Intel processors would place on the memory subsystem. XceL4 Server Accelerator Cache also enables speedier access to memory for the PCI-X I/O, Gigabit Ethernet, SCSI and Fibre Channel interfaces, yielding better overall system utilization, and therefore higher throughput.

- Light Path Diagnostics

  The Light Path Diagnostics feature provides LEDs to assist in isolating problems with the server. A light on the operator information panel is lit if an unusual condition or a problem occurs. If this happens, you can look at the LEDs inside the Light Path Diagnostic drawer and those visible through the cover to isolate the cause. Under some circumstances, you might need to remove the cover and view LEDs on the printed circuit boards to pinpoint the source of a problem.

- Systems management capabilities

  The server comes with a Remote Supervisor Adapter installed in a dedicated PCI-X slot. This adapter, in conjunction with the systems-management software provided with the server, enables you to manage the functions of the server both locally and remotely. The Remote Supervisor Adapter also provides system monitoring, event recording, and dial-out alert capability.

- Integrated network environment support

  Your server comes with an integrated Broadcom Gigabit Ethernet controller. This Ethernet controller has an interface for connecting to 10/100/1000-MBps networks. The server automatically selects between 10BASE-T and 100/1000BASE-TX environments. The controller provides full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN). This controller supports Wake on LAN® technology.

- *IBM ServerGuide* CD

  The ServerGuide CD that is included with your server provides programs to help you set up your server and install the network operating system (NOS). The ServerGuide program detects the hardware options that are installed and provides the correct configuration programs and device drivers.

  For more information about the ServerGuide CD, see "Using the ServerGuide CD" on page 22.

# Reliability, availability, and serviceability features

Three of the most important features in server design are reliability, availability, and serviceability (RAS). These RAS features help to ensure the integrity of the data stored on your server; that your server is available when you want to use it; and that should a failure occur, you can easily diagnose and repair the failure with minimal inconvenience.

The following is an abbreviated list of the RAS features that your server supports.
- Active Memory
- Active PCI-X (hot-plug) adapter slots
- Advanced configuration and power interface (ACPI)
- Advanced Desktop Management Interface (DMI) features
- Advanced memory ECC, including Memory ProteXion, and multiple Chipkill™ capability
- Automatic error retry or recovery
- Auto-restart initial program load (IPL) power supply
- Automatic server restart
- Built-in, menu-driven Configuration/Setup and diagnostic programs
- Built-in monitoring for fan, power, temperature, voltage, and power-supply redundancy
- Customer-upgradable basic input/output system (BIOS) code
- Customer support center 24 hours per day, 7 days a week[3]
- Diagnostic support of Ethernet controllers
- Error codes and messages
- Error correction code (ECC) protection on the L3 and XceL4 cache
- Failover Ethernet support
- Front-side buses (FSBs) parity protected
- Hot-swap cooling with fan speed-sensing capability
- Hot-swap hard disk drives
- Light Path Diagnostics
- Memory Mirroring
- Microsoft® Windows® Server family failover support
- Monitoring support for temperature, voltage, and fan speed
- Parity checking on the SCSI buses
- Power-on self-test (POST)
- Processor serial number access
- Read-only memory (ROM) checksums
- Redundant hot-swap
    - Cooling fans with speed-sensing capability
    - Power supplies
- Remote Supervisor Adapter to enable remote server management
- SDRAM with serial presence detect (SPD) and vital product data (VPD)
- Standard cables presence detection
- Standby voltage for system management features and monitoring
- System error logging
- Vital product data (VPD) (includes information stored in nonvolatile memory for easier remote viewing)
- Wake on LAN capability

---

3. Service availability will vary by country. Response time will vary depending on the number and nature of incoming calls.

# Server controls and indicators

The following section identifies the controls and indicators on the front and rear of your server.

## Front view

Hard disk drive activity light (green)
Hard disk drive error light (amber)
Power-on light
Power button
Reset button
USB port
Power supply latch
Diskette drive activity light
System-error light (amber)
Information light (amber)
SCSI activity light (green)
Diskette eject button
Locator light (blue)
Diskette drive eject button
CD-ROM drive eject button
CD eject button
CD-ROM drive activity light

**Power-on light:** This green light turns on and stays on when you turn on your server, and it blinks when the server is in Standby mode.

**Hard disk drive activity light:** When this green light is on, it indicates that the hard disk drive is in use.

**Hard disk drive error light:** When this amber light is on, it indicates that there is a problem with the hard disk drive.

**USB port:** This is an automatically configured port that you can use to connect one or more USB devices to the front of the server, using Plug and Play technology.

**System-error light:** When this amber light is on, it indicates a system error has occurred.

**Information light:** When this amber light is on, it indicates information about a system error has been placed in the System Error log.

**SCSI activity light:** When this green light is on, it indicates that the hard disk drive is in use.

**Locator light:** This blue light is used to help you locate other servers connected to the server.

**CD-ROM drive eject button:** Push this button to release a CD-ROM drive from the server.

**CD eject button:** Push this button to release a CD from the drive.

**CD-ROM drive activity light:** When this light is on, it indicates that the CD-ROM drive is in use.

**Diskette drive eject button:** Push this button to release a diskette drive from the server.

**Diskette eject button:** Push this button to release a diskette from the drive.

**Diskette drive activity light:** When this light is on, it indicates that the diskette drive is in use.

**Power supply latch:** This latch is used to secure the power-supply in place.

**Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might need to use a pen or the end of a straightened paper clip to press the button.

**Power button:** Press this button to manually turn the server on or off.

# Rear view

System power connector (1)  System power connector (2)  RXE Expansion Port (B)  Auxiliary pointing device connector  Keyboard port  Remote Supervisor Adapter ports  Ethernet activity light  Ethernet link light  Gigabit Ethernet port

SMP Expansion Port 1
SMP Expansion Port 2
SMP Expansion Port 3
SCSI port
RXE Management Port
USB 1
USB 2
Video port
RXE Expansion Port (A)
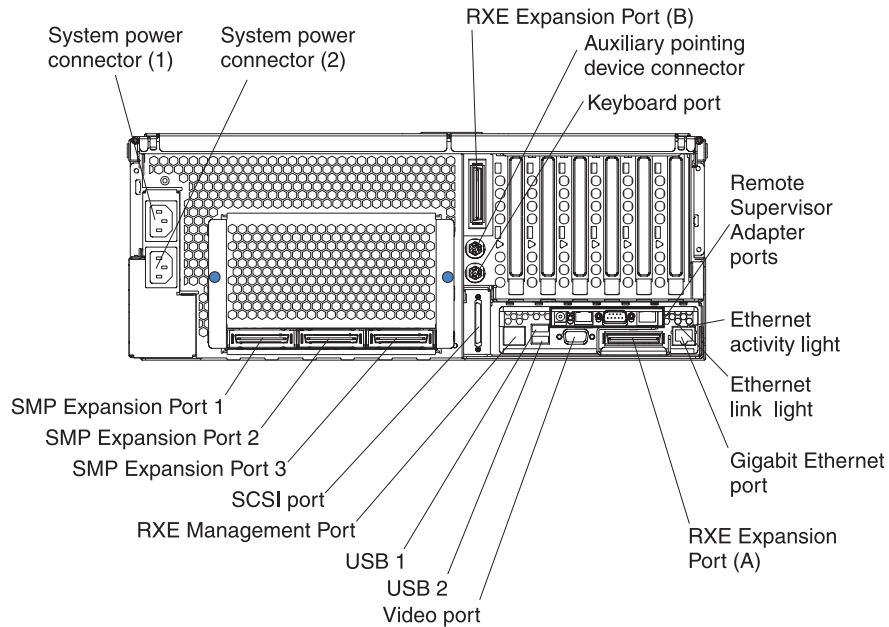
**System power connectors (1 and 2):** The system power cords are connected to these two connectors to provide power to the system.

**RXE Expansion Port B:** Use this port to connect the server to a remote I/O enclosure when two SMP Expansion Modules are installed.

**Auxiliary pointing device connector:** Signal cables for a mouse, trackball, or other pointing device are connected to the auxiliary pointing device connector.

**Keyboard port:** Signal cables for a keyboard are connected to the keyboard port.

**Remote Supervisor Adapter ports and indicators:** This group of ports and indicators located on the back of the server are used for system management information and control.

External power connector  Error LED (amber)  ASM interconnect port  Ethernet link LED (green)  Ethernet activity LED (green)

Power LED (green)  Management port  10/100 Ethernet port
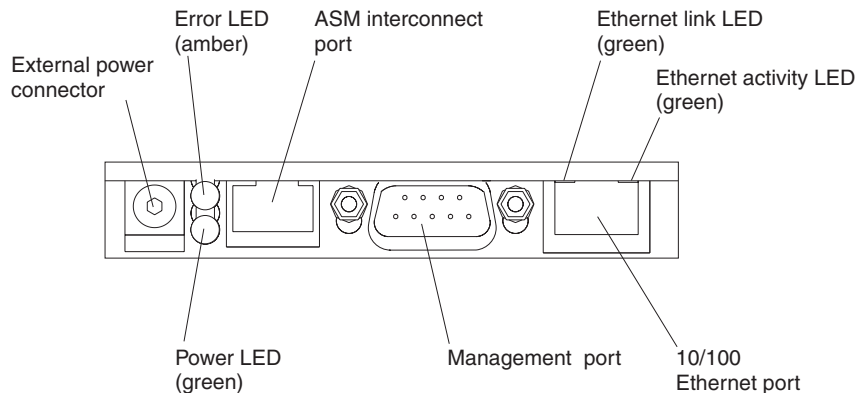
- **External power connector** - This cable connector is used to connect an external power supply to the Remote Supervisor Adapter.

   **Note:** This connector is not supported on this server.

- **Error LED** - This amber light goes on when a system management error has occurred.
- **ASM interconnect port** - Signal cables for managing expansion module resources are connected to this port.
- **Ethernet link light:** This green light, located on the right of the Ethernet port, goes on when there is an active link connection on the Ethernet controller for the Ethernet port.
- **Ethernet activity light:** This green light, located on the left of the Ethernet port, goes on when there is activity on the Ethernet LAN connected to the Ethernet port.
- **10/100 Ethernet port** - Ethernet Signal cables are connected to the Ethernet port.
- **Management port** - Signal cables for modems or other serial devices are connected to this port.
- **Power LED** - This green light goes on and stays on when you plug in your server.

**Ethernet activity light:** This green light, located on the left of the Gigabit Ethernet port, blinks when there is activity on the Ethernet LAN.

**Ethernet link light:** This green light, located on the right of the Gigabit Ethernet port, goes on when there is an active link connection on the Gigabit Ethernet controller for Ethernet port 1.

**Gigabit Ethernet port:** Gigabit Ethernet signal cables are connected to the Gigabit Ethernet port. This port supports 10/100/1000 speed connections.

**RXE Expansion Port A:** Use this port to connect the server to a remote I/O enclosure.

**Video port:** The signal cable for a monitor connects to the video port.

**USB 2:** This is an automatically configured port that you can use to connect one or more USB devices to the server, using Plug and Play technology.

**USB 1:** This is an automatically configured port that you can use to connect one or more USB devices to the server, using Plug and Play technology.

**RXE Management Port:** Use this port to connect a management cable from the server to a remote I/O enclosure.

**SCSI port:** This port is used to connect external SCSI devices to the server.

**SMP Expansion port 3:** This port is used to connect one server to another.

**SMP Expansion port 2:** This port is used to connect one server to another or to make a redundant interconnection between two SMP Expansion Modules.

**SMP Expansion port 1:** This port is used to interconnect two SMP Expansion Modules together.

# Turning on the server

Turning on the server refers to the act of plugging the power cord of your server into the power source and starting the operating system.

You can turn on the server in any of the following ways:

- If the power cords are connected to a power source, you can press the power-control button on the front of the server.
- If the server is turned on and a power failure occurs, it restarts automatically when power is restored.
- You can turn on the server remotely by means of the Remote Supervisor Adapter.

Complete the following steps to turn on the server manually:

1. Turn on all external devices, such as the monitor.
2. Plug the server power cords into the power source.
3. Wait 30 seconds, and then press the power-control button on the front of the server.

**Note:** While the server is powering up, the power light on the operator information panel blinks.

# Turning off the server

Turning off the server refers to the act of disconnecting the server from the power source.

Complete the following steps to turn off the server:

1. Refer to your operating system documentation for the proper procedure to shut down the operating system.

   **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.**
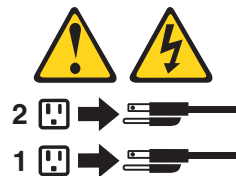
   

2. Press the power-control button on the front of the server. This will put the server in Standby mode.
3. Disconnect the server from the power source.

> **Note:** After you turn off the server, wait at least 5 seconds before you turn on the server again.

## Standby mode

Standby mode refers to the condition in which the server operating system is not running and all core logic is shut down except for the Remote Supervisor Adapter.

Complete the following steps to put the server into Standby mode:

1. See the operating system documentation for the proper procedure to shut down the operating system.

   > **Note:** Each operating system is different. Read all the documentation about shutting down the operating system before continuing.

2. Press the power-control button on the front of the server.
3. You can put the server into Standby mode remotely by means of the Remote Supervisor Adapter.

# Chapter 2. Configuring your server

The following configuration programs are provided with your server:

- **Configuration/Setup Utility**

  This program is part of the basic input/output system (BIOS) code that comes with your server. You can use this program to configure the serial connector assignment, change the drive startup sequence, set the date and time, and set passwords. See "Using the Configuration/Setup Utility program" on page 16 for more information.

- **SCSISelect Utility**

  With the SCSISelect Utility program, you can configure the devices that are attached to the SCSI controller. Use this program to change default values and to resolve configuration conflicts. See "Using the SCSISelect utility program (some models)" on page 20 for more information.

- **ServeRAID™ configuration program**

  This program comes with the optional ServeRAID adapters and with server models that have a ServeRAID adapter preinstalled. If the server has a ServeRAID adapter installed, you must use the ServeRAID configuration program to define and configure the disk-array subsystem *before* you install the operating system. For more information about using the ServeRAID configuration program, see the ServeRAID information on the *IBM Documentation* CD.

- **ServerGuide CD**

  The *ServerGuide* CD includes software setup and installation tools that are specifically designed for IBM xSeries 440 servers. You can use this CD during the initial installation of your server to configure the server hardware and to simplify your NOS installation.

- **Remote Supervisor Adapter configuration process**

  Configuration activities are also required for the Remote Supervisor Adapter. See "Setting up the Remote Supervisor Adapter" on page 26 for information about setting up and cabling the Remote Supervisor Adapter for use with an Advanced System Management (ASM) network. For complete information about cabling, configuring, and using the Remote Supervisor Adapter to manage the server remotely, see "Setting up the Remote Supervisor Adapter" on page 26.

- **Ethernet controller configuration process**

  To configure the integrated Ethernet controller, see "Configuring the Gigabit Ethernet controller" on page 44.

# Using the Configuration/Setup Utility program

Configuration/Setup is a menu-driven utility that is part of the BIOS code that comes with your server. You can use it to:

- Change the drive startup sequence
- Enable USB keyboard and mouse support
- Enable Memory Mirroring
- Resolve configuration conflicts
- Set the date and time
- Set passwords

The following sections provide instructions for starting the Configuration/Setup Utility program and descriptions of the menu choices that are available.

## Starting the Configuration/Setup Utility program

Complete the following steps to start the Configuration/Setup Utility program:

1. Turn on the server and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` appears, press F1.
3. Follow the instructions that appear on the screen.

## Choices available from the Configuration/Setup main menu

From the Configuration/Setup Utility main menu, you can select settings that you want to change. The Configuration/Setup Utility main menu is similar to the following illustration.

```
IBM Setup - (c) Copyright IBM Corporation  2002

        Configuration/Setup Utility
        • System Summary
        • System Information
        • Devices and I/O Ports
        • Date and Time
        • System Security
        • Start Options
        • Advanced Setup
        • Error Logs


          Save Settings
          Restore Settings
          Load Default Settings

          Exit Setup


      <F1>  Help              < ↑ > < ↓ >  Move
      <Esc> Exit                  <Enter> Select
```
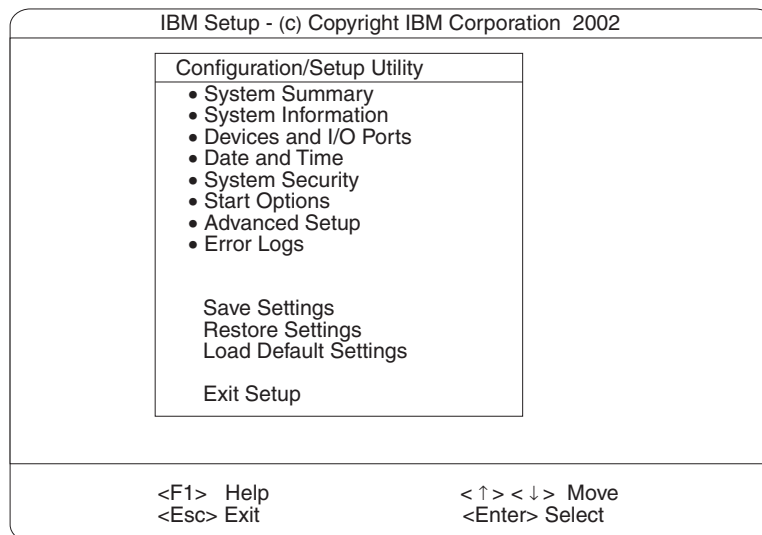
**Notes:**

1. You can press F1 to display help information for a selected menu item.
2. The choices on some menus might differ slightly from the ones that are described in this book, depending on the version of BIOS code in your server.

Descriptions of the choices that are available from the main menu are as follows:

- **System Summary**

  Select this choice to display configuration information. This includes the type and speed of the microprocessor and the amount of memory that is installed.

  Changes that you make to configuration settings appear on this summary screen. You cannot edit the fields.

  This choice appears on both the full and limited Configuration/Setup Utility menus.

- **System Information**
  - Product Data

    Select this choice to view system information, such as the machine type and model, the server serial number, and the revision level, date, and build level of the BIOS code, Diagnostics, and ASM Adapter.
  - System Card Data

    Select this choice to view information about the planar, processor cards, I/O planar, power supplies, DASD backplane, and power backplane.

- **Devices and I/O Ports**

  Select this choice to view or change the assignments for devices and input/output ports. This choice appears only on the full Configuration/Setup Utility main menu.

  You can use this choice to enable or disable the integrated SCSI, Ethernet, and Diskette controllers.

  **Notes:**
  1. The default setting is **Enable** for all the controllers. If you select **Disable**, the system will not configure the disabled device, and the operating system will not detect the device. (This is equivalent to unplugging the device.)
  2. If the integrated SCSI controller is disabled and no other controller for a mass storage device is installed, operating-system startup cannot occur.

  The IDE Configuration Menu is also located in Devices and I/O Ports. This menu is used to enable or disable the primary and secondary IDE channels and to view information about the devices configured on each IDE channel.

- **Date and Time**

  Select this choice to set the system date and time and to change the system time that is sent to the Remote Supervisor Adapter when the server is started. This choice appears only on the full Configuration/Setup Utility main menu.

  The system time is in a 24-hour format (hour:minute:second).

- **System Security**

  Select this choice to set or change the power-on or administrator password. See "Using passwords" on page 19 for more information.

  The Remote Control Security Settings menu is located in System Security. This menu is used to set the Failed Login Threshold and the Automatic Lockout Delay. You can also use this menu to save, change, or delete a remote control password.

- **Start Options**

  Select this choice to view or change the start options. Start options take effect when you start your server.

  You can also specify whether the server starts with the keyboard number lock on or off.

  The server uses a startup sequence to determine the device from which the operating system starts. For example, you can define a startup sequence that

checks for a startable diskette in the diskette drive, then checks the hard disk drive, and then checks a network adapter.

You can enable Wake on LAN and configure the Wake on LAN start sequence. For example, you can define a Wake on LAN startup sequence that checks for a startable CD-ROM in the CD drive, then checks the hard disk drive, and then checks a network adapter.

You also can enable a virus-warning test that checks for changes in the master boot record at startup.

- **Advanced Setup**

  Select this choice to change values for advanced hardware features, such as Memory Settings, CPU Options, PCI Bus Control, PCI Slot/Device Information, and Advanced System Management Processor Settings.

  A message appears above the choices on this menu to alert you that the system might malfunction if these options are configured incorrectly. Follow the instructions on the screen carefully.

  - **System Partition Visibility**

    Select this choice to identify if the System Partition is visible. To make the System Partition visible, set this value to **Visible**. To make the System Partition invisible, set this value to **Hidden**. See "Using the ServerGuide CD" on page 22 for additional information on the System Partition.

  - **Memory Settings**

    Select this choice to manually enable or disable a bank of memory and to enable Memory Mirroring.

    If a memory error is detected during POST or memory configuration, the server can automatically disable the failing memory bank and continue operating with reduced memory capacity. If this occurs, you must manually enable the memory bank after the problem is corrected. Select **Memory Settings** from the Advanced Setup menu, use the arrow keys to highlight the bank that you want to enable; then, use the arrow keys to select **Enable**.

  - **CPU Options**

    Select this choice to identify if the microprocessor serial number in the microprocessor is readable, or to set the microprocessor cache mode to disabled, write-back or write-through. Selecting write-back mode will provide better system performance.

    You can also enable the hyper-threading for the microprocessors in the local system.

  - **PCI Bus Control**

    Select this choice to view and set interrupts for PCI devices, and to configure the master latency timer value for the server.

  - **PCI-X Slot/Device Information**

    Select this choice to configure and view information about the PCI-X slots and devices in your server and those located in the remote expansion enclosure, if attached.

- **Error Logs**

  Select this choice to view or clear error logs.

  - Select **POST Error Log** to view the three most recent error codes and messages that the system generated during POST.

    Select **Clear error logs** from the POST Error Log menu to clear the error log.

– Select **System Event/Error Log** to view the System Error Log. The System Error Log contains all the system error and warning messages that the system has generated. You can use the arrow keys to move between pages in the System Error Log.

Select **Clear error logs** from the System Event/Error Log menu to clear the error log.

- **Save Settings**

  Select this choice to save your customized settings (except PCI slot utility changes).

- **Restore Settings**

  Select this choice to delete your changes (except PCI slot utility changes) and restore the previous settings.

- **Load Default Settings**

  Select this choice to cancel your changes (except PCI slot utility changes) and restore the factory settings.

- **Exit Setup**

  If you have made any changes and not saved them (except PCI slot utility changes), the program will prompt you to save the changes or exit without saving the changes.

# Using passwords

The **System Security** choice appears only on the full Configuration/Setup Utility menu. After you select this choice, you can set a power-on password or an administrator password.

## Power-on password

After you set a power-on password, you can enable the unattended-start mode. This locks the keyboard and mouse but enables the system to start the operating system. The keyboard and mouse remain locked until you type the correct password.

You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place. When a power-on password is set, POST does not complete until you type the password. If you forget the power-on password, you can regain access to the server through one of the following methods:

- If an administrator password is set, type the administrator password at the power-on prompt. (If necessary, see "Administrator password" on page 20 for details.) Start the Configuration/Setup Utility program and change the power-on password.
- Remove the battery and then reinstall the battery (see ″Replacing the battery″ in the *Option Installation Guide* on the *IBM Documentation* CD for more information).
- Move the jumper on J28 to positions 2 and 3; then, restart the server. This will remove the power-on password. Move the jumper on J28 to positions 1 and 2; then, restart the server and start the Configuration/Setup Utility program to change the power-on password.

  **Notes:**
  1. Before changing any switch settings or moving any jumpers, turn off the server; then, disconnect all power cords and external cables.
  2. Any system-board switch or jumper blocks that are not shown in the illustrations in this book are reserved.

### Administrator password

Select this choice to set an administrator password. The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user. You can use any combination of up to seven characters (A–Z, a–z, and 0–9) for your power-on password. Keep a record of your password in a secure place.

**Attention:** If an administrator password is set and then forgotten, it cannot be overridden or removed. You must replace the system board.

The following table provides a summary of the password features.

*Table 1. Power-on and administrator password features*

| Type of password | Results |
|---|---|
| Power-on password | • Type the password to complete the system startup.<br>• All choices are available on the Configuration/Setup Utility main menu. |
| Administrator password | • No password is required to complete the system startup.<br>• Type the password to access the Configuration/Setup Utility program.<br>• All choices are available on the Configuration/Setup Utility main menu. |
| Administrator *and* power-on password | • You can type either password to complete the system startup.<br>• The administrator password provides access to all choices on the Configuration/Setup Utility main menu. You can set, change, or delete both the administrator and power-on passwords and allow a power-on password to be changed by the user.<br>• The power-on password provides access to a limited set of choices on the Configuration/Setup Utility main menu. This limited access might include changing or deleting the power-on password. |

# Using the SCSISelect utility program (some models)

SCSISelect is a built-in, menu-driven configuration utility program that you can use to:

• View the default SCSI IDs
• Locate and correct configuration conflicts

The following sections provide instructions for starting the SCSISelect Utility program and descriptions of the menu choices that are available.

**Note:** If your server has a redundant arrays of independent disks (RAID) adapter installed, use the configuration method that is supplied with the RAID adapter to view or change SCSI settings for devices attached to the adapter.

# Starting the SCSISelect utility program

Complete the following steps to start the SCSISelect Utility program:

1. Turn on the server.
2. When the `<<< Press <CTRL><A> for SCSISelect™ Utility! >>>` prompt appears, press Ctrl+A.

3. When the message `Would you like to configure the host adapter or run the SCSI disk utility?` appears, make your selection and press Enter.
4. Use the arrow keys to select a choice from the menu.
   - Press Esc to exit the SCSISelect Utility program.
   - Press the F5 key to switch between color and monochrome modes (if your monitor permits).
5. Follow the instructions on the screen to change the settings of the selected items; then, press Enter.

## Choices available from the SCSISelect menu

The following choices appear on the SCSISelect Utility menu:

- **Configure/View Host Adapter Settings**

  Select this choice to view or change the SCSI controller settings. To reset the SCSI controller to its default values, press F6; then, follow the on-screen instructions.

  You can view or change the following controller settings:

  - **Host Adapter SCSI ID**

    Select this choice to view the SCSI controller identification (ID), which is usually 7.

  - **SCSI Parity Checking**

    Select this choice to view the assigned value of *Enabled.*

  - **Host Adapter SCSI Termination**

    Select this choice to view the assigned value of *Automatic.*

  - **Boot Device Options**

    Select this choice to configure startable-device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

  - **SCSI Device Configuration**

    Select this choice to configure SCSI-device parameters. Before you can make updates, you must know the ID of the device whose parameters you want to configure.

    **Note:** The Maximum Sync Transfer Rate is the transfer rate for Ultra SCSI devices.
    - The transfer rate for Ultra160 low voltage differential (LVD) devices is 160.0 MBps.
    - The transfer rate for Ultra2 SCSI LVD devices is 80.0 MBps.
    - The transfer rate for Fast SCSI devices is 20.0 MBps.

  - **Advanced Configuration Options**

    Select this choice to view or change the settings for advanced configuration options. These options include support for large hard disk drives and support for drives with Ultra SCSI speeds.

- **SCSI Disk Utilities**

  Select this choice to view the SCSI IDs that are assigned to each device or to format a SCSI device.

  To use the utility program, select a drive from the list. Read the on-screen instructions carefully before making a selection.

> **Note:** If you press Ctrl+A before the selected drives are ready, an Unexpected SCSI Command Failure screen might appear. Restart the server and watch the SCSISelect messages as each drive starts. After the drive that you want to view or format starts, press Ctrl+A.

## Using the ServeRAID configuration program

See the documentation provided with your ServeRAID adapter or, if you are installing an IBM ServeRAID adapter, refer to the *IBM User's Reference* for the ServeRAID-4 Ultra160 SCSI controller.

The *IBM ServeRAID User's Reference* provides information for configuring an IBM ServeRAID controller, installing devices, and installing and using the ServeRAID utility programs and the IBM ServeRAID cluster solution.

## Using the ServerGuide CD

The ServerGuide CD includes easy-to-use software setup tools and installation tools that are specifically designed for the IBM server. The ServerGuide Setup and Installation program detects the server model and hardware options that are installed and uses that information during setup to configure the hardware. The ServerGuide tools simplify network operating system (NOS) installations by providing updated device drivers, and in some cases, installing them automatically.

If a newer version of the ServerGuide software is available, you can purchase an update package. For details, see the ServerGuide Updates form that comes with the server, or go to the ServerGuide fulfillment Web site at http://www.ibm.com/pc/qtechinfo.migr-42kppt.html.

The ServerGuide software has the following features to make setup easier:
- An easy-to-use interface with online help
- Diskette-free setup and configuration programs that are based on detected hardware
- Performance Optimizer program, which easily tunes the ServeRAID adapter settings for the server environment
- A system BIOS update program, which updates the BIOS directly from the CD
- Device drivers that are provided for your server model and detected hardware
- NOS partition size and file-system type that are selectable during setup
- Powerful application programs and administration tools

# Features at a glance

Specific features and functions can vary with different versions of the ServerGuide software. To learn more about the version that you have, start the *Setup and Installation* CD and view the online Overview.

The following is a summary of ServerGuide features.
- Sets system date and time.
- Detects the ServeRAID adapter or controller and runs the ServeRAID configuration program.
- Updates the licensed internal code (firmware) level without creating diskettes.
- Checks the system BIOS code and microcode (firmware) levels of supported options to determine whether a later level is available from the CD. You can perform updates without the use of diskettes.
- Provides the Performance Optimizer program to easily tune the ServeRAID adapter settings for the server environment.
- Creates a System Partition on the default drive. You can run server-specific utility programs after setup.
- Detects installed hardware options and provides updated device drivers for most adapters and devices.
- Creates a *Setup Replication Diskette* for replicating setup selections for other servers of the same model.
- Provides diskette-free installation for Microsoft Windows 2000 Server Family, Novell NetWare, and select Linux® operating systems.
- Provides a replicated installation path for multiple Windows 2000, and select Linux operating systems.
- Includes an online README file with links to tips for the hardware and NOS installation.

**Notes:**
1. The ServerGuide program requires a supported IBM server with an *enabled* startable (bootable) CD-ROM drive. Not all features are supported on all models.
2. Installation requires the NOS CD.

# Setup and configuration overview

When you use the *Setup and Installation* CD, you do not need setup diskettes. You can use the CD to configure any supported IBM server model. The setup program checks the system BIOS code, Remote Supervisor Adapter, and other system hardware to determine whether system updates are available. The setup program provides a list of tasks that are required to set up the server model. On RAID servers, you can run the ServeRAID Manager program to create logical drives.

**Note:** Specific features and functions can vary with different versions of the ServerGuide software.

When you start the *Setup and Installation* CD, the following happens:

- You are prompted for the language, country, and keyboard layout. (This information is stored and later passed on to the NOS installation program.)
- The ServerGuide program displays choices for running the configuration programs. For example:
  - The Express Configuration method runs the required programs for the server, based on the hardware that is detected.
  - The Custom Configuration method displays all programs that are available for the server, and you decide which programs to run.
  - The Replicated Configuration method provides the option of duplicating your setup selections to other servers that are the same model.
- If you select the Custom Configuration method, the following programs are optional. If you select the Express Configuration method, some or all of these programs are run, depending on the hardware that is detected.
  - The Set Date and Time feature is provided so that you do not have to use the Configuration/Setup Utility program to access these settings.
  - The Clear Hard Disks program is provided so that you can delete all partitions on all hard disk drives. If the server has a ServeRAID adapter installed, you can select to restore the configuration on the ServeRAID adapter to the factory default settings.
  - The ServerGuide program checks the server BIOS code and microcode (firmware) levels for supported options and then checks the CD for a newer level. CD content can be newer than the hardware. The ServerGuide program can perform a flash update of the BIOS code and supported microcode (firmware) options without the use of diskettes.
  - The ServeRAID configuration program starts, guiding you through the entire configuration process.
  - The Performance Optimizer program easily tunes the server for your environment.
  - The ServerGuide program creates a System Partition on the default drive.
- The ServerGuide program displays a confirmation summary, so that you will know when you have completed all the required tasks. Then, you are ready to install the NOS.

**Notes:**

1. Plug and Play adapters are configured automatically. Non-Plug and Play adapters or non-IBM adapters might require switch settings, additional device drivers, and installation after the NOS is installed. See the documentation that comes with the adapter.
2. Diagnostics for the server come in BIOS code or on a separate diagnostics CD.

## System Partition

The ServerGuide program creates a 50 MB System Partition on the default drive. The System Partition contains server-specific utility programs such as Remote Supervisor Adapter disk operating system (DOS) utilities, system diagnostics, flash BIOS updates, and other programs.

**Note:** Programs in the System Partition vary by server model, and not all server models run utility programs from the System Partition. To determine which ones do, start the *Setup and Installation* CD and view the online Overview.

After setup is complete, you can access programs in the System Partition by restarting the server and pressing Alt+F1 when the prompt is displayed. The System Partition menu displays the programs that are available on the server model.

## Typical NOS Installation

The server supports the following network operating systems:
* Windows 2000 Server Family
* Select Linux operating systems

See "Features at a glance" on page 23 for details about the specific network operating systems supported by ServerGuide.

You can use the ServerGuide program to shorten the installation time. The ServerGuide program provides the necessary device drivers, based on the hardware that you have and the NOS that you are installing. (If you prefer to install the NOS without using ServerGuide, you can do so. (See the important information at "Installing the NOS without ServerGuide" on page 26 for details.) The following is a brief explanation of a typical ServerGuide NOS installation.

**Note:** Specific features and functions can vary with different versions of the ServerGuide software

* After you have completed the setup process, the operating system installation program starts. (You will need a copy of the NOS CD to complete the installation.)
* The ServerGuide program stores information about the server model, Remote Supervisor Adapter, hard disk controllers, and network adapters. It then checks the CD for newer device drivers. This information is stored and then passed to the NOS installation program.
* With some NOS installations, you can create a *NOS Replication Diskette* for setting up additional servers. The diskette will contain the Internet protocol (IP) address, server name, and other selections.
* The ServerGuide program presents NOS partition options that are based on your NOS selection and the installed hard disk drives.
* If you are installing the NOS from diskette, the ServerGuide program displays the required diskettes that you must create, and the optional diskettes that you might want to create. The diskettes that you can create are the device driver diskettes for the installed adapters or controllers.

The ServerGuide program prompts you to insert the NOS CD and restart the server. At this point, the installation program for the NOS (for example, Microsoft Windows 2000) takes control to complete the installation.

# Setting up or updating multiple servers

You can use the ServerGuide program to create diskettes that help you set up or update multiple servers. You can modify information on the diskettes as you use them to set up or update other servers.

**Note:** Availability and function can vary by server model and by the hardware that is installed.

You can create a *Setup Replication Diskette*, which contains your hardware configuration selections. Use this diskette to replicate selections to other servers that are of the same model.

You can create a *NOS Replication Diskette*, which contains the server name, domain name, and other information that you need to complete multiple installations. This feature supports servers running Windows 2000 and select Linux operating systems.

# Installing the NOS without ServerGuide

If you have already configured the server hardware and you decide not to use the ServerGuide program to install the NOS, download the latest NOS installation instructions:

1. Go to http://www.ibm.com/pc/support/.
2. From the **Browse the support site** menu, click **Servers**.
3. From the **Family** menu, click **xSeries 440**.
4. On the left side of the page, click **OS Installation** to see the list of installation instructions for the supported operating systems.
5. From the **Operating System installation by Category** menu, select a supported operating system to see the list of installation instructions.

# Setting up the Remote Supervisor Adapter

This section identifies the Remote Supervisor Adapter features, and prerequisites. It also explains how to use the documentation effectively and how to cable and configure the adapter for use on an Advanced System Management (ASM) network so that you can manage the server from a remote location. For more detailed information, see the *Remote Supervisor Adapter User's Guide* on the Documentation CD.

# Remote Supervisor Adapter features

The Remote Supervisor Adapter provides the following:
- Continuous health monitoring and control
- Advanced Predictive Failure Analysis® (PFA)
- Configurable notification and alerts
- Event logs that are timestamped, saved in nonvolatile memory, and can be attached to e-mail alerts
- Remote graphics console redirection
- LAN, serial, and Advanced System Management (ASM) interconnect remote access
- Point-to-point protocol (PPP) support
- Simple Network Management Protocol (SNMP)

- Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) support
- Remote power control
- Microsoft Windows NT® and Windows 2000 blue-screen capture
- Remote firmware update and access to critical server settings
- Optional, independent power, which enables around-the-clock access to the server, even if the server is powered off

# Setup requirements

Before you set up the Remote Supervisor Adapter, you must download to a diskette, the DOS Remote Supervisor Utility program from the World Wide Web at http://www.ibm.com/pc/support.

Do the following before you set up the Remote Supervisor Adapter.
- Install the operating system on the server, using ServerGuide and the documentation that comes with the operating system.
- You must install the agent component of UM Server Extensions to use the following Advanced System Management (ASM) Web interface features:
  - Shutdown O/S and then Power Off Server
  - Shutdown O/S and then Restart Server

  UM Server Extensions is on the system-management software CD that comes with the server. For information about installing the agent component, see the documentation that comes with the system-management CD.
- To configure the remote alert recipients for Director over LAN or Director over modem, the remote alert recipient must be an IBM Director-enabled server with UM Server Extensions.
- If you want to use a Web browser to access the Remote Supervisor Adapter remotely, the supported Web browsers and browser requirements are:
  - Microsoft Internet Explorer 4.0 (with Service Pack 1), or later
  - Netscape Navigator 4.72, or later (version 6.0 is not currently supported)
  - Java™ enabled Web browser (See your browser documentation or online Help for instructions about enabling its Java support.)
  - Support for JavaScript 1.2, or later (See your browser documentation or online Help for instructions about enabling its JavaScript support.)
  - Support of HTTP version 1.0, or later
  - Minimum display resolution of 800 x 600 pixels and 256 colors

  **Note:** The ASM Web interface and the ASM text-based interface do not support the double-byte character set (DBCS) languages.

# Using the documentation

The documentation for the Remote Supervisor Adapter includes the following publication on the *IBM Documentation* CD.

- *IBM @server xSeries 440 User's Guide* (this document, specifically the topics in this section, which assist you with the cabling and configuring).
- *Remote Supervisor Adapter User's Guide* for the *IBM @server xSeries 440*

  This document explains how to configure and use an ASM network to manage the server remotely through either the Web-based interface or the text-based user interface.

# Cabling and configuring the Remote Supervisor Adapter

Complete the following tasks to cable and configure the Remote Supervisor Adapter.

**Note:** After you initially configure the adapter, use the Web-based interface to create a backup copy of the configuration. If you need to replace the adapter in the future, this enables you to restore the configuration and resume normal operation more quickly. See the *Remote Supervisor Adapter User's Guide* for the @server *xSeries 440,* on the *IBM Documentation* CD for details.

**Task 1.**
Connect the Ethernet and serial port cables. See "Cabling the Ethernet LAN port and serial port".

**Task 2.**
Perform the initial configuration to enable remote access to the Remote Supervisor Adapter. See "Enabling remote access to the adapter" on page 30. This enables you to:
1. Configure the Ethernet port
2. Configure the serial (COM) port
3. Set up the point-to-point protocol

**Task 3.**
Configure the remote control password to enable the ASM Web interface remote control features. See "Configuring the remote control password" on page 37.

**Task 4.**
Install the ASM device drivers. See "Installing Advanced System Management device drivers" on page 35.

For service, assistance, or additional information on the World Wide Web, see "Getting information, help, and service" on page 47.

## Cabling the Ethernet LAN port and serial port

This section describes how to cable the Remote Supervisor Adapter. You can manage the server remotely through the Remote Supervisor Adapter using one of the user interfaces and one of the connection methods that are described in Table 2 on page 29. Choose the interface method you want to use to perform remote management; then, perform the indicated cabling procedure.

If you plan to set up an ASM interconnect network, before you begin cabling the server, see "Using the ASM interconnect network" on page 38 for instructions about cabling the ASM interconnect port and setting up the network. You might want to review the information in "ASM interconnect network configuration examples" on page 42

page 42 before you connect the cables. Then, return here to start the cabling procedures.

*Table 2. Cabling tasks to enable remote access to the Remote Supervisor Adapter*

| User interface to Remote Supervisor Adapter | Connection to Remote Supervisor Adapter | For the cabling procedure, see: |
|---|---|---|
| ASM Web interface using the HTTP protocol | LAN using the Ethernet port | "Cabling the Ethernet LAN port" on page 29 |
| Text-based user interface using the TELNET protocol | | |
| Text-based user interface using a modem or a null modem | Serial (COM) port | "Cabling the serial (COM) port" |
| ASM Web interface using point-to-point (PPP) protocol | | |
| Text-based user interface using the TELNET protocol over PPP | | |

***Cabling the Ethernet LAN port:*** Complete the following steps to attach the Ethernet cables.

**Attention:** To avoid damage to the Ethernet connector on the Remote Supervisor Adapter, *do not* plug the ASM Interconnect module into the Ethernet port.

1. Connect one end of a Category 3 or Category 5 Ethernet cable to the Ethernet port on the Remote Supervisor Adapter. Connect the other end of the Ethernet cable to the network.

2. Check the Ethernet LEDs to ensure that the network connection is working. The following illustration shows the location of the LEDs.
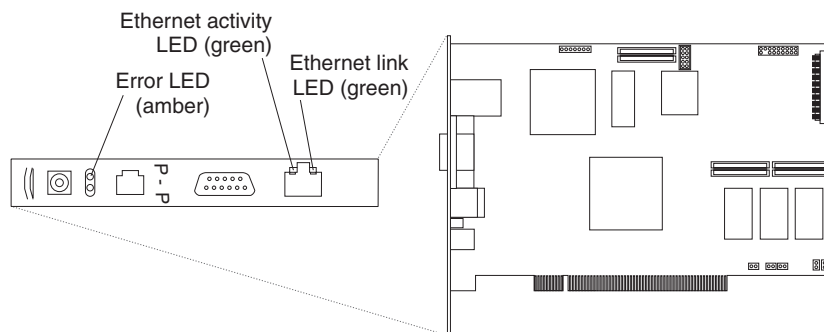


**Ethernet link LED**
   The green Ethernet link LED is lit when the Ethernet cable is connected properly.

**Ethernet activity LED**
   The green Ethernet activity LED flashes when there is Ethernet activity.

If you want to use the serial port connection, continue with "Cabling the serial (COM) port" on page 29; otherwise, go to "Configuring the adapter" on page 30.

***Cabling the serial (COM) port:*** To cable the serial (COM) port, connect a modem or null modem cable to the serial port on the Remote Supervisor Adapter.

Continue with "Configuring the adapter".

## Configuring the adapter
This section describes the following:

- Enabling remote access to the Remote Supervisor Adapter
- Installing ASM device drivers

These procedures assume that you have an operational keyboard and pointing device attached to the server.

***Enabling remote access to the adapter:*** The Remote Supervisor Adapter requires configuration to enable remote access through either the Ethernet port or the serial port. From Table 3, choose the interface method that you want to use to perform remote management; then, perform the indicated configuration procedure.

**Note:** For detailed information about using the ASM Web interface and the text-based user interface, see the *Remote Supervisor Adapter User's Guide* on the IBM Documentation CD.

*Table 3. Configuration tasks to enable remote access to the Remote Supervisor Adapter*

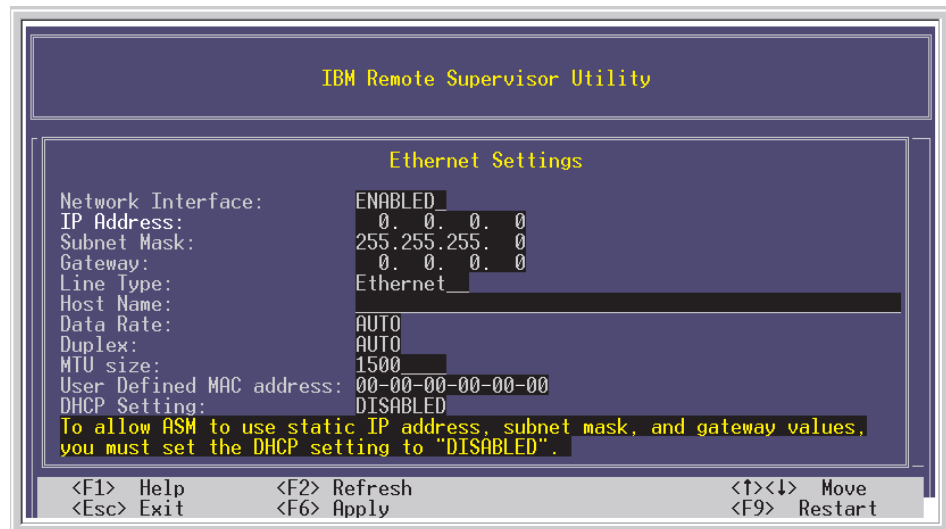| User interface to Remote Supervisor Adapter | Connection to Remote Supervisor Adapter | For the configuration procedure, see: |
|---|---|---|
| ASM Web interface using the HTTP protocol | LAN using the Ethernet port | "Configuring the Ethernet settings for Web-based remote access" |
| Text-based user interface using the TELNET protocol | | |
| Text-based user interface using a modem or a null modem | Serial (COM) port | "Configuring the serial port for text-based remote access" on page 32 and "Setting up point-to-point protocol" on page 34 |
| ASM Web interface using point-to-point (PPP) protocol | | |
| Text-based user interface using the TELNET protocol over PPP | | |

*Configuring the Ethernet settings for Web-based remote access:* If you have an accessible, active, and configured dynamic host configuration protocol (DHCP) server on the network, the hostname, IP address, gateway address, subnet mask, and DNS server IP address are set automatically. You do not need to perform further configuration tasks to enable the Ethernet connection because the default value for the **DHCP Setting** field is Enabled. If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 32; otherwise, go to "Configuring the remote control password" on page 37.

If you do not have a DHCP server on the network, complete the following steps to configure the Ethernet settings.

1. With the server turned off, insert the diskette with the downloaded utility program into the diskette drive; then, turn on the server.
2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter. The Configuration Settings window opens.
4. Use the arrow keys to select **Ethernet Settings**; then, press Enter.

The Ethernet Settings window opens, as shown in the following illustration.

**Note:** The values in the window are only examples; your settings will be different.

```
                        IBM Remote Supervisor Utility


                            Ethernet Settings
    Network Interface:      ENABLED_
    IP Address:                0.  0.  0.  0
    Subnet Mask:            255.255.255.  0
    Gateway:                   0.  0.  0.  0
    Line Type:              Ethernet__
    Host Name:
    Data Rate:              AUTO
    Duplex:                 AUTO
    MTU size:               1500___
    User Defined MAC address: 00-00-00-00-00-00
    DHCP Setting:           DISABLED
    To allow ASM to use static IP address, subnet mask, and gateway values,
    you must set the DHCP setting to "DISABLED".

    <F1>  Help        <F2> Refresh                    <↑><↓>  Move
    <Esc> Exit        <F6> Apply                      <F9>  Restart
```

5. Use the arrow keys to navigate to each field. Your system administrator can provide the information for the following fields:

   **Network Interface**
   The default value is Enabled; verify that it is still set to Enabled.

   **IP Address**
   Type the IP address of the Remote Supervisor Adapter.

   **Subnet Mask**
   Type the subnet mask used by the Remote Supervisor Adapter. The default value is 255.255.255.0.

   **Gateway**
   Type the IP address of the gateway.

   **Host Name**
   Type the hostname of the Remote Supervisor Adapter. The default hostname is ASMA*<burned-in MAC address>*.

   For detailed information about the Ethernet settings, see the *Remote Supervisor Adapter User's Guide* on the *IBM Documentation* CD.

6. Change the DHCP Setting field to **Disabled**. The default value is Enabled.

7. Press F6 to apply the change.

8. Press Esc. After the Warning window opens, press Enter to restart the Remote Supervisor Adapter.

9. Press Esc to return to the Configuration Settings window. If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 32.

10. Press Esc to return to the Utility program main window.

11. Use the arrow keys to select **Exit Utility** from the menu or press Esc to close the Utility program.

12. Remove the diskette from the server. The server restarts automatically.

13. If you also want to configure the serial port, continue with "Configuring the serial port for text-based remote access". Otherwise, go to "Installing Advanced System Management device drivers" on page 35.
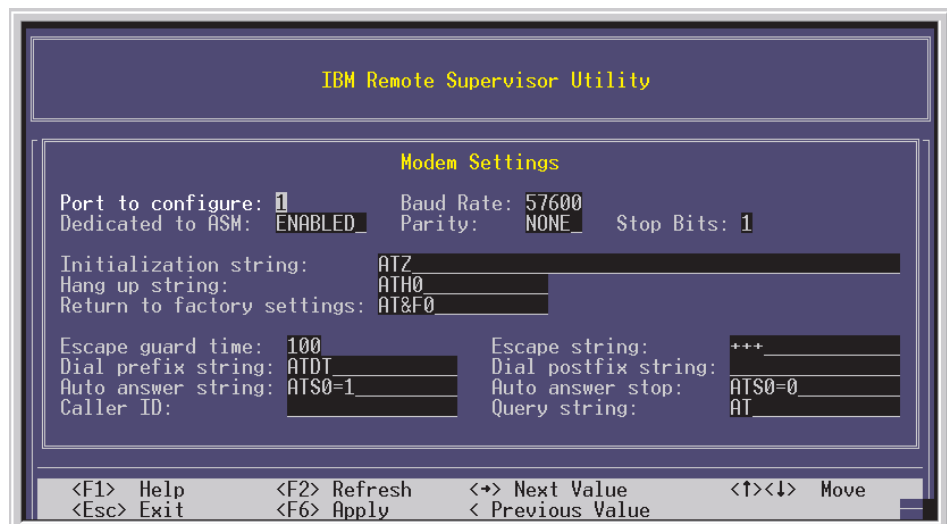
*Configuring the serial port for text-based remote access:* Complete the following steps to configure the Remote Supervisor Adapter serial port for access using a modem or null modem. If you completed the procedure for configuring the Ethernet port and the Configuration Settings window is open, go to step 4

1. With the server turned off, insert the diskette with the downloaded utility program into the diskette drive; then, turn on the server.
2. The utility starts automatically, displaying the Remote Supervisor Utility window.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter.

   The Configuration Settings window opens.
4. Use the arrow keys to select **Modem Settings**; then, press Enter.

   The Modem Settings window opens, as shown in the following illustration.

   **Note:** The values in the window are only examples; your settings might be different.

```
                    IBM Remote Supervisor Utility


                            Modem Settings

   Port to configure: 1          Baud Rate: 57600
   Dedicated to ASM:  ENABLED_   Parity:    NONE_    Stop Bits: 1

   Initialization string:     ATZ_____
   Hang up string:            ATH0_____
   Return to factory settings: AT&F0_____

   Escape guard time:   100          Escape string:       +++_____
   Dial prefix string:  ATDT_____  Dial postfix string: _____
   Auto answer string:  ATS0=1_____  Auto answer stop:   ATS0=0_____
   Caller ID:           _____   Query string:        AT_____


   <F1>  Help        <F2> Refresh      <→> Next Value       <↑><↓>  Move
   <Esc> Exit        <F6> Apply        < Previous Value
```

5. Verify the following serial port values:

   **Baud Rate**
   The default is 57600. Make sure that the baud rate matches the baud rate of the device you are connecting to the serial port on the Remote Supervisor Adapter.

   **Dedicated to ASM**
   The default is Disabled. If you are using point-to-point protocol (PPP), set this field to Enabled. If the value in this field is Enabled when the server is restarted, the serial port remains dedicated to system management and is not returned to the operating system.

   You can dedicate the integrated serial port on the Remote Supervisor Adapter to system management or share it with the operating system. If the serial port is dedicated to system management, it serves only the Remote Supervisor Adapter and is always available for dial-in or

dial-out alerting purposes. You cannot view the port using the operating system or any application.

**Note:** To use this serial port, you must first install the ASM device drivers as described in "Installing Advanced System Management device drivers" on page 35.

If the serial port is shared with the operating system, it is dedicated to the Remote Supervisor Adapter only while the server is turned off or during POST. The port is returned to the operating system after POST completes. You can view the port using the operating system or any application. The Remote Supervisor Adapter takes over the port from the operating system only when information about a critical event is received. The Remote Supervisor Adapter dials out and transmits an alert and keeps the port dedicated until the server is restarted. The port is no longer available to the operating system or applications.

**Parity**  The default is None.

**Stop Bits**
The default is 1.

**Note:** The data bits value is preset to 8 and cannot be changed.

For detailed information about the serial port and modem settings, see the *Remote Supervisor Adapter User's Guide* on the *IBM Documentation* CD.

6. If you made changes to the serial port settings, press F6 to apply the change.
7. Press Esc to return to the Configuration Settings window. If you need to set up point-to-point protocol, go to "Setting up point-to-point protocol" on page 34.
8. Press Esc to return to the Utility program main window.
9. Use the arrow keys to select **Exit Utility** from the menu, or press Esc to close the Utility program.
10. Remove the diskette from the diskette drive. The Remote Supervisor Adapter restarts automatically.
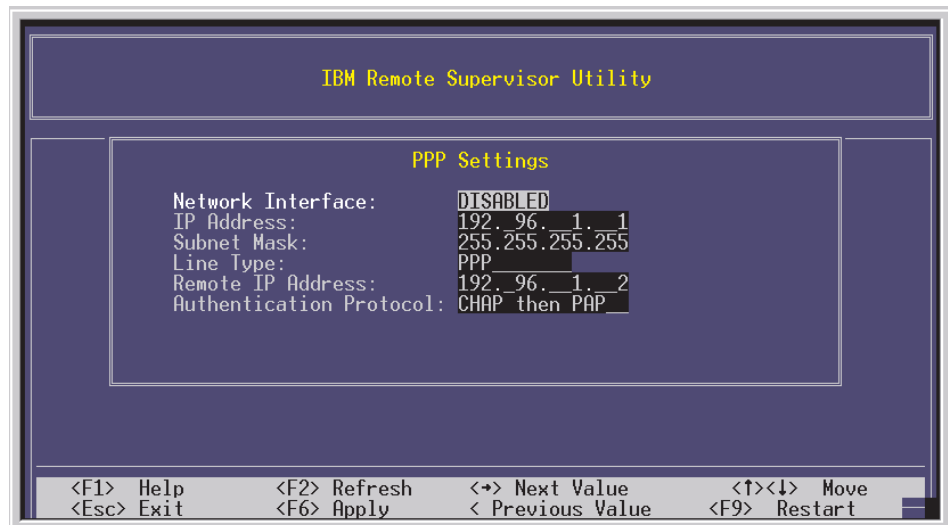11. Continue with "Setting up point-to-point protocol" on page 34.

*Setting up point-to-point protocol:* The Remote Supervisor Adapter serial port supports point-to-point protocol (PPP). PPP enables TCP/IP communication over the serial port, which enables Web-based management and TELNET sessions over a modem. To set up PPP, complete the following steps. If you completed the procedure for configuring the serial port and the Configuration Settings window is open, go to step 4 on page 34.

1. With the server turned off, insert the downloaded utility program into the diskette drive; then, turn on the server.

2. The utility starts automatically, displaying the Remote Supervisor Utility window.

3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **Configuration Settings**; then, press Enter.

   The Configuration Settings window opens.

4. Use the arrow keys to select **PPP Settings**; then, press Enter.

   The PPP Settings window opens, as shown in the following illustration.

   **Note:** The values in the window are only examples; your settings will be different.

```
                    IBM Remote Supervisor Utility


                              PPP Settings
          Network Interface:        DISABLED
          IP Address:               192._96.__1.__1
          Subnet Mask:              255.255.255.255
          Line Type:                PPP
          Remote IP Address:        192._96.__1.__2
          Authentication Protocol:  CHAP then PAP__



    <F1>  Help        <F2> Refresh     <→> Next Value      <↑><↓>  Move
    <Esc> Exit        <F6> Apply       < Previous Value    <F9>  Restart
```

5. Use the arrow keys to navigate to each field. Verify the values in the following fields:

   **Network Interface**
   > The default is Disabled. Change this field to Enabled.

   **IP Address**
   > The default value is 192.96.1.1. You can use the default value or another value, but the server must be able to establish a connection to that address. The default IP address (local and remote) is easily reconfigurable.

   **Subnet Mask**
   > The default value is 255.255.255.255.

   **Line Type**
   > The value is set to PPP.

   **Remote IP Address**
   > The default value is 192.96.1.2.

**Authentication Protocol**
The default is CHAP then PAP. Make sure that the value in this field matches your client settings.

For detailed information about the PPP settings, see the information about configuring PPP access over a serial port in the *Remote Supervisor Adapter User's Guide* on the *IBM Documentation* CD.

6.  Press F6 to apply the changes.
7.  Press Esc. After the Warning window opens, press Enter to restart the Remote Supervisor Adapter.
8.  Press Esc to return to the Configuration Settings window. If you need to configure the serial port, go to "Configuring the serial port for text-based remote access" on page 32.
9.  Press Esc to return to the Utility program main window.
10. Use the arrow keys to select **Exit Utility** from the menu or press Esc to close the Utility program.
11. Remove the diskette from the diskette drive. The server restarts automatically.
12. Continue with "Installing Advanced System Management device drivers".

***Installing Advanced System Management device drivers:*** You must install the ASM device drivers for the server. The device drivers enable communication between the Remote Supervisor Adapter and the server in which it is installed. You can obtain the most current device drivers from the World Wide Web at http://www.ibm.com/pc/support/.

The following sections describe the procedure for installing the ASM device drivers for the server, depending on your operating system.

**Notes:**
1.  If you are installing device drivers manually, note the following requirements:
    *   Make sure that the operating system is installed on the server before you install the ASM device drivers. For information about installing the operating system, see the documentation that comes with the operating system.
    *   Before installing the ASM device drivers for the Remote Supervisor Adapter, stop any system-management application.
2.  If you are using ServerGuide to install device drivers and your operating system is either Microsoft Windows NT or Windows 2000, ServerGuide installs the ASM device drivers automatically.
*   Windows 2000: Continue with "Installing Windows 2000 ASM device drivers"
*   Windows NT: Go to "Installing Windows NT ASM device drivers" on page 36.

After you install the ASM device drivers, go to "Configuring the remote control password" on page 37 to set the remote control password.

***Installing Windows 2000 ASM device drivers:*** To install the ASM device drivers for Windows 2000, complete the following steps.

**Notes:**
1.  Do not use the Hardware Wizard to install the drivers. If the Hardware Wizard starts itself for the installation of any System Management Driver hardware, exit the Hardware Wizard by selecting **Cancel**.

2. If IBM Netfinity® Director, IBM Director, or UM Services is running on the server, stop the system-management application before proceeding.

Complete the following steps to manually install the Windows 2000 ASM device drivers.

1. Open a command prompt.
2. If you are installing from a diskette, type: `A:\WIN2000\SETUP`, where A is the drive letter of the diskette drive.
3. If you are installing from a CD, type: `D:\DD\WIN2000\SETUP`, where D is the drive letter of the CD-ROM drive.
4. Follow the directions that display on the screen.
5. Go to "Configuring the remote control password" on page 37.

*Installing Windows NT ASM device drivers:*   Choose one of the following methods to install the ASM device drivers for Windows NT:

- Non-interactive

  The non-interactive method for installing the ASM device drivers accepts the default values for any window prompts that appear. You are prompted to respond only if an error occurs during installation.

- Interactive

  The normal (interactive) method for installing the ASM device drivers prompts you with instructions and waits for you to respond before continuing with the installation.

**Note:** If IBM Netfinity Director, IBM Director, UM Services, or IBM Netfinity Manager is running on the server, stop the system-management application before proceeding.

*Using the non-interactive method:*   Complete the following steps to use the non-interactive method.

1. Open a Windows NT command prompt; then, type one of the following commands:
   - If the installation is from a diskette, type:

     `A:\NT\SETUP -q`

     (where *A* is the drive letter assigned to the diskette drive).

     Press Enter.
   - If the installation is from a CD, type:

     `D:\DD\NT\SETUP -q`

     (where *D* is the drive letter assigned to the CD-ROM drive).

     Press Enter.
2. Follow the instructions that appear in the window.
3. Go to "Configuring the remote control password" on page 37.

*Using the interactive method:*   Complete the following steps to use the interactive method.

1. Open a Windows NT command prompt; then, type one of the following commands:
   - If the installation is from a diskette, type:

```
A:\NT\SETUP
```

(where *A* is the drive letter assigned to the diskette drive).

Press Enter.
- If the installation is from a CD, type:
```
D:\DD\NT\SETUP
```

(where *D* is the drive letter assigned to the CD-ROM drive).

Press Enter.
2. Follow the instructions that appear in the window.
3. Continue with "Configuring the remote control password".

***Configuring the remote control password:***  If you want to use the remote control features of the Remote Supervisor Adapter ASM Web interface, you must configure the remote control password using the Configuration/Setup Utility program that comes with the server. This program is part of the basic input/output system (BIOS) code.

To set up a remote control password, complete the following steps:
1. Start the server, and watch the monitor screen.
2. When the message `Press F1 for Configuration/Setup` is displayed, press F1. The Configuration/Setup Utility main menu window opens.
3. Use the Up Arrow and Down Arrow keys (↑ and ↓) to select **System Security;** then, press Enter. The System Security window opens.
4. Select **Remote Control Security Settings**; then, press Enter. The Remote Control Security Settings window opens.
5. Enter the Remote Control Password that you will use each time you log into the remote control features of the Remote Supervisor Adapter ASM Web Interface.
6. Select **Save New Remote Control Password**; then, press Enter.
7. In the System Security window, press Esc.
8. Select **Save Settings**; then, press Enter.
9. Confirm your selection; then, exit the Configuration/Setup Utility.
10. Continue with "Completing the configuration".

***Completing the configuration:***  To complete the configuration of the Remote Supervisor Adapter, see the *Remote Supervisor Adapter User's Guide* on the *IBM Documentation* CD. The tasks include the following:
- Defining the login IDs and passwords
- Selecting the events that will receive alert notification
- Monitoring remote server status using the ASM Web interface or a text-based user interface
- Controlling the server remotely

If you want to set up an ASM interconnect network and have not already done so, continue with "Using the ASM interconnect network" on page 38. If you do not want to set up an ASM interconnect network, Remote Supervisor Adapter configuration is now complete. To start managing the server remotely, see the *Remote Supervisor Adapter User's Guide* on the *IBM Documentation* CD.

# Using the ASM interconnect network

This section explains how to configure and connect the server to function within an ASM interconnect network.

The ASM interconnect network can include as many as 12 individual ASM connections in a single bus. These connections can include Remote Supervisor Adapters, ASM processors, and ASM PCI Adapters. When the clients and servers are connected, they use the ASM interconnect network to share ASM resources, information, and alerts among multiple servers, without having to add additional communications hardware or network interface adapters.

An ASM interconnect network provides two levels of functionality. First, the ASM interconnect network enables you to configure settings and to control the servers where other Remote Supervisor Adapters, ASM processors, and ASM PCI Adapters on the network reside. Second, the ASM interconnect network enables other interconnect network devices to use the resources (Ethernet or modem) of other Remote Supervisor Adapters, ASM processors, and ASM PCI Adapters in the ASM interconnect network for sending alerts. This interconnect network is used when Remote Supervisor Adapters, ASM processors, or ASM PCI Adapters cannot send an alert and must forward the information to another one of these devices to send the alert.

## Planning and cabling the interconnect network

To support the most recent ASM features, a Remote Supervisor Adapter must be the main gateway interconnect to the ASM interconnect bus if the bus also includes servers with ASM PCI adapters or ASM processors. The Remote Supervisor Adapter forwards the ASM information generated by the servers attached to the ASM interconnect bus to other servers on the Ethernet network. The connected ASM processors and ASM PCI Adapters are managed through the new user interface and Web browser access of the Remote Supervisor Adapter.

**Note:** To ensure the stability of the system, you must have the most current level of firmware installed on the Remote Supervisor Adapter that is the main interconnect gateway for the ASM interconnect network. The most current level of firmware is available on the World Wide Web at http://www.ibm.com/pc/support. For more information on updating firmware, see the *Remote Supervisor Adapter User's Guide for the xSeries 440* on the Documentation CD.

You must connect an ASM Interconnect module to the Remote Supervisor Adapter and to each xSeries 440 server that you connect to the ASM interconnect network bus.

**Attention:**  To avoid damage to the Ethernet connector on the Remote Supervisor Adapter, do not plug the ASM Interconnect module into the Remote Supervisor Adapter Ethernet port.

To connect the servers, note the following setup and configuration considerations:
- Make sure that the ASM interconnect network is set up as a bus, not as a ring. You must connect the servers to the ASM interconnect network in a series, with terminated beginning and end points.
- Make sure that the total combined length of all Ethernet cables connecting the server in the ASM interconnect network does not exceed 91 M (300 ft).
- Each Remote Supervisor Adapter, ASM PCI adapter, or ASM processor that is connected to the ASM interconnect network bus counts as one connection. For

example, if an ASM PCI adapter is installed in a server that has an ASM processor, the processor and the adapter connect to each other using one ASM interconnect connection, but the processor and the adapter count as two connections on the ASM interconnect network bus.

## Forwarding alerts

Remote Supervisor Adapters, ASM PCI adapters, and ASM processors that are connected to an ASM interconnect network share resources and system-management information. This section provides information on how alerts are forwarded in the ASM interconnect network.

During normal operation, each Remote Supervisor Adapter, ASM processor, or ASM PCI adapter on the ASM interconnect network communicates with the other processors and adapters on the network. Processors or adapters that have a modem or Ethernet connection notify the other processors and adapters that these communications resources are available for use by other servers on the ASM interconnect network. These resources are then used as ASM interconnect network resources, enabling Remote Supervisor Adapters, ASM processors, or ASM PCI adapters on the ASM interconnect network to send alerts using a modem or the network, even if they do not have a modem or network connection physically attached.

When alerts are generated, they are forwarded to the Remote Supervisor Adapter, ASM processor, or ASM PCI adapter on the ASM interconnect network that has the communication resources to forward the alert. If no system on the ASM interconnect network meets the requirements, the alert is set for transmission if the connection type is configured or becomes available later.

If multiple modems or network connections exist in the ASM interconnect network, you cannot specify which system will receive an alert or which will use its modem or network connection to forward the alert. If an alert is forwarded to a Remote Supervisor Adapter, ASM processor, or ASM PCI adapter that is unable to deliver the alert (for example, the modem it is configured to use has failed or the network cannot resolve the destination IP address), the processor or adapter attempts to forward the alert to another system on the ASM interconnect network that has the communication resources to forward the alert.

Alerts are typically sent only once (per connection type), but an alert is forwarded to another interconnect device if the resources exist on other interconnect devices in the network. For example, on a three ASM processor network where ASM processor 1 generates a modem alert, but does not have a modem and the other ASM processors have modems, the following might occur:

If ASM processor 1 generates an alert and the modem is unplugged from ASM processor 2 45 seconds prior to ASM processor 1 generating the alert, ASM processor 1 forwards the alert to ASM processor 2, having previously determined that ASM processor 2 has an available modem. When ASM processor 2 receives the forwarded alert, it determines that a modem is attached to ASM processor 3, and forwards the alert. Therefore, depending upon the time frame (45 seconds) within which a resource (modem) fails, the alert might be forwarded multiple times until an interconnect device can send the alert.

## Cabling for the ASM interconnect network

Depending upon the servers you have, you might need additional ASM Interconnect modules or Category 5 or Category 3 Ethernet cables. Table 4 on page 40 lists some IBM Netfinity and IBM xSeries products, and indicates whether you need to

use an ASM Interconnect module to set up the ASM interconnect network.

*Table 4. ASM interconnect network server list*

| Server Name | ASM Interconnect module needed |
|---|---|
| Netfinity 4500R | yes |
| Netfinity 5000 | yes |
| Netfinity 5500 | yes |
| Netfinity 5500-M10 | yes |
| Netfinity 5500-M20 | yes |
| Netfinity 5600 | yes |
| Netfinity 6000R | no |
| Netfinity 7100 | no |
| Netfinity 7600 | no |
| xSeries 220 | yes |
| xSeries 232 | yes |
| xSeries 240 | yes |
| xSeries 330 | The ASM interconnect module is required to link the Remote Supervisor Adapter to the microprocessor in the server. Use the RS-485 ports to create the ASM interconnect network. |
| xSeries 340 | yes |
| xSeries 342 | yes |
| xSeries 350 | no |
| xSeries 360 | yes |
| xSeries 440 | yes |

For the servers that do not need an ASM Interconnect module, a module is still needed to connect the Remote Supervisor Adapter in the gateway server to the integrated ASM processor. After you make that connection, you can connect the servers together using their ASM interconnect ports. For additional information, see "ASM interconnect network configuration examples" on page 42.

***Connecting the ASM Interconnect module to the xSeries 440:*** The ASM Interconnect module connects the Remote Supervisor Adapter to the ASM interconnect network. This module must be purchased separately. To connect the ASM interconnect module to the Remote Supervisor Adapter, complete the following steps.

**Attention:** To avoid damage to the Ethernet connector, do not plug the ASM interconnect module into the Remote Supervisor Adapter Ethernet port.

1. Connect the ASM Interconnect module **1** to the Remote Supervisor Adapter ASM interconnect (peer-to-peer) port **2** as shown in the following illustration. This port is on the edge of the Remote Supervisor Adapter that is accessible

from the rear of the server and is labeled RS485.
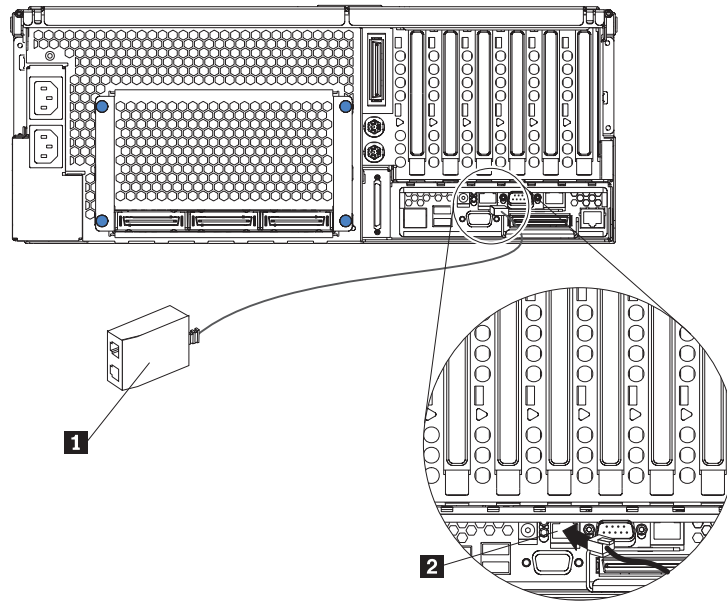


2. Connect one or two Category 3 or Category 5 Ethernet cables to the other end of the ASM Interconnect module.
3. Continue with "ASM interconnect network configuration examples" on page 42.

## ASM interconnect network configuration examples

The illustrations in this section show sample ASM interconnect network configurations.

The following illustration shows an Ethernet cable connecting the remote administrator system to the Remote Supervisor Adapter that is installed in an xSeries 440. Server 1 uses the LAN connection to forward system-management data generated by the other xSeries 440s in the ASM interconnect network bus to the remote system-management administrator.
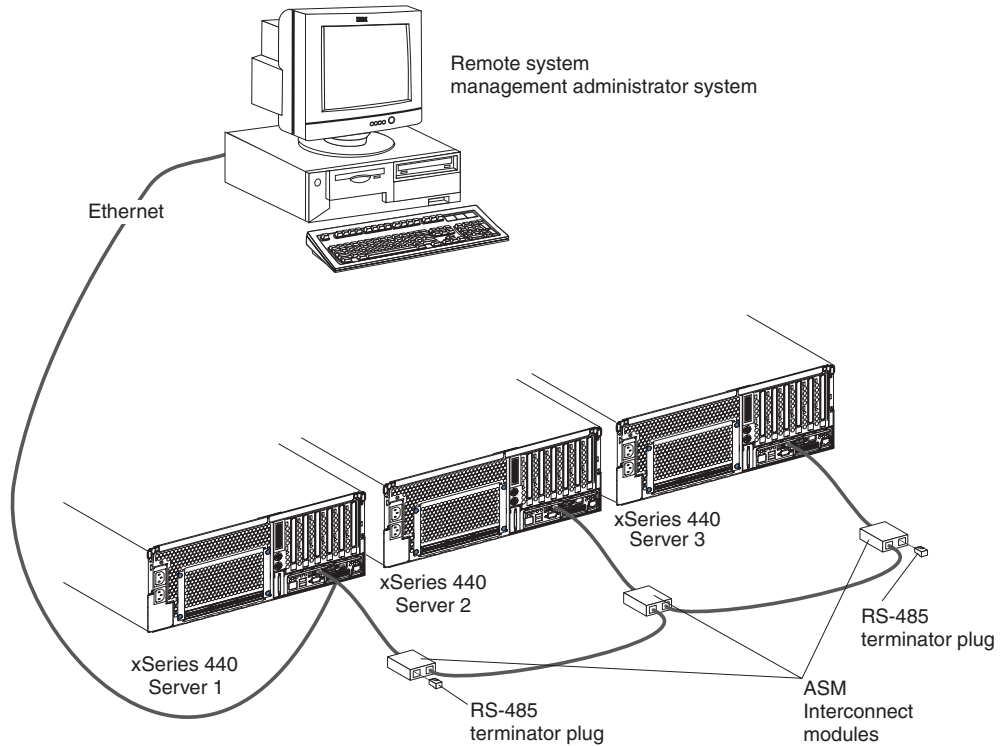


**Note:** The ASM Interconnect module is connected to the RS485 port on the back panel of the Remote Supervisor Adapter in each server.

The following illustration shows a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 440 on the left, a modem connected to the serial port of the Remote Supervisor Adapter in the xSeries 440 on the right, and a modem connected to the remote administrator system. Placing modems at opposite ends of the ASM interconnect network bus ensures that if an ASM interconnect connection in the bus fails, all of the servers on the ASM interconnect network have access to a modem to forward system-management data to the remote system-management administrator.
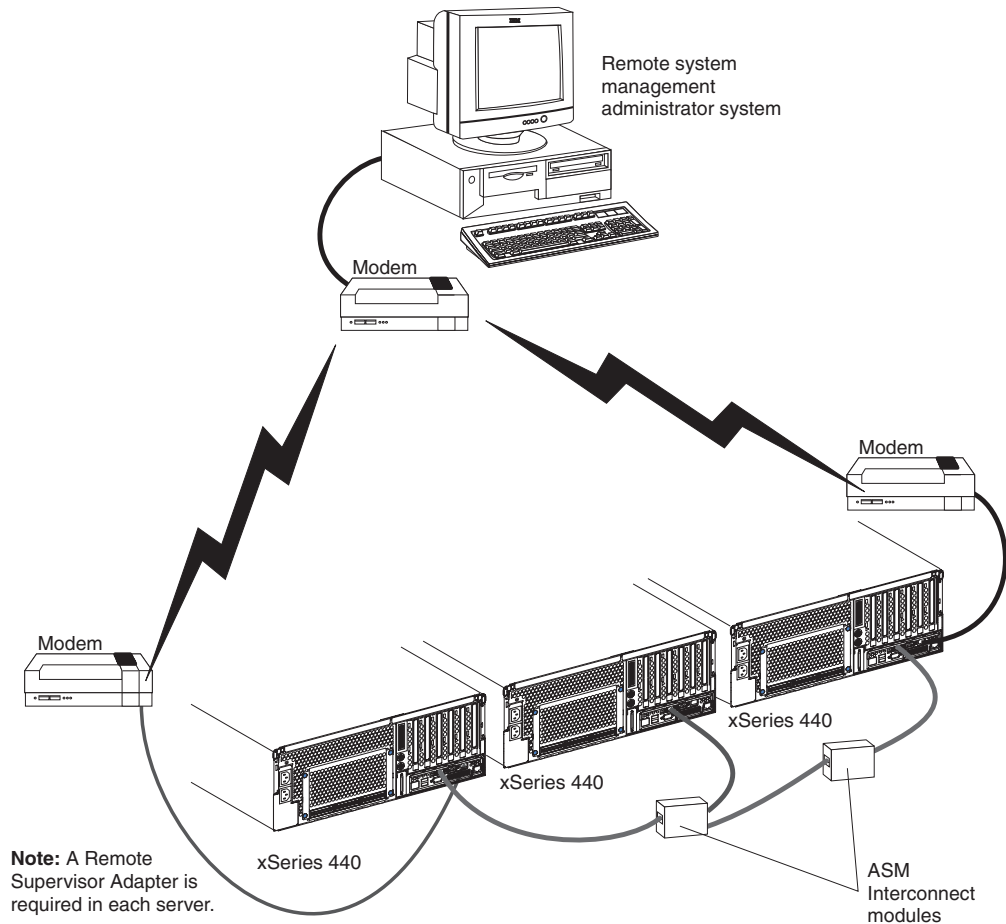


Remote system management administrator system

Modem

Modem

Modem

xSeries 440

xSeries 440

xSeries 440

**Note:** A Remote Supervisor Adapter is required in each server.

ASM Interconnect modules

**Note:** The ASM Interconnect module is connected to the RS485 port on the back panel of the Remote Supervisor Adapter in each server.

# Configuring the Gigabit Ethernet controller

The server comes with an integrated Ethernet controller. This controller provides an interface for connecting to 10-Mbps, 100-Mbps, or 1000-Mbps networks and provides full duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local area network (LAN).

When you connect your server to the network, the Ethernet controller automatically detects the data-transfer rate (10-Mbps, 100-Mbps, or 1000-Mbps) on the network and then sets the controller to operate at the appropriate rate. In addition, if the Ethernet ports that your server is connected to support auto-negotiation, the Gigabit Ethernet controller will set the appropriate duplex state. That is, the Ethernet controller will adjust to the network data rate, whether the data rate is standard Ethernet (10BASE-T), Fast Ethernet (100BASE-TX/1000BASE-T), half duplex (HDX), or full duplex (FDX). The controller supports half-duplex (HDX) and full-duplex (FDX) modes at both speeds.

# High-performance Ethernet modes

Your Ethernet controller supports optional modes, such as teaming, load balancing, fault tolerance, and virtual LANs, which provide higher performance, security, and throughput for your server. These modes apply to the integrated Ethernet controller and to the controllers on supported Ethernet adapters, such as the IBM 10/100/1000 Ethernet Adapter or the IBM 10/100/1000 EtherJet™ PCI family of adapters.

## Teaming mode
Your Ethernet controller provides options, called *teaming options*, that apply to supported Ethernet controllers. A team can consist of two or more Ethernet controllers, two Ethernet adapters, or a mix of integrated Ethernet controllers and Ethernet adapters. These options increase throughput and fault tolerance when running with Windows 2000, Windows NT 4.0, Linux, or NetWare 4.1x or later.

- **Adapter fault tolerance** (AFT) provides automatic redundancy for your Ethernet controllers. You can configure either one of the integrated Ethernet controllers or an Ethernet adapter as the primary Ethernet controller. If the primary link fails, the secondary controller takes over. When the primary link is restored to an operational state, the Ethernet traffic switches back to the primary Ethernet controller. Adapter fault tolerance supports from two to four controllers per team.

- **Adaptive load balancing** (ALB) enables you to balance the transmission data flow among two to four controllers. ALB also includes the AFT option. You can use ALB with any 100BASE-TX/1000BASE-T switch.

- **Cisco Fast EtherChannel** (FEC) creates a team of two to four controllers to increase transmission and reception throughput. FEC also includes the AFT option. You can use FEC only with a switch that has FEC capability.

If you use supported Ethernet adapters in your server, refer to the documentation that comes with the adapters for more information about the teaming modes.

## Virtual LAN mode
A virtual LAN (VLAN) is a logical grouping of network devices put together as a LAN, regardless of their physical grouping or collision domains. Using VLANs increases network performance and improves network security.

VLANs offer you the ability to group users and devices together into logical workgroups. This can simplify network administration when connecting clients to servers that are geographically dispersed across a building, campus, or enterprise network.

Typically, VLANs are configured at the switch and any computer can be a member of one VLAN per installed network adapter. Your Ethernet controller supersedes this by communicating directly with the switch, enabling multiple VLANs on a single network adapter (up to 64 VLANs).

To set up VLAN membership, your Ethernet controller must be attached to a switch that has VLAN capability.

To join a VLAN from Microsoft Windows NT 4.0:

1. Create a VLAN on the switch. Use the parameters you assign there to join the VLAN from the server. See your switch documentation for more information.
2. Double-click the **Network** icon in the Control Panel window.
3. On the Adapters page, select the adapter you want to be on the VLAN and click **Properties**.
4. Select the **Load Balance/Virtual LAN** tab.
5. Type the VLAN ID and VLAN name. The VLAN ID must match the VLAN ID of the switch. The ID range is from 1 to 1000. The VLAN name is for information only and does not need to match the name on the switch.
6. Click **OK**. Repeat steps 3 through 5 for each VLAN that you want the server to join. The VLANs that you add are listed on the Configuration page.
7. Click **Close** and restart the computer.

## Priority Packet mode

Priority Packet is a traffic-prioritization utility that enables you to set up filters to process high-priority traffic before normal traffic. You can send information from critical nodes or applications with an indicated priority. Because you set this priority at the host or entry point of the network, the network devices can base forwarding decisions on priority information defined in the packet.

IEEE 802.1p is an IEEE standard for tagging, or adding additional bytes of information to packets with different priority levels. Packets are tagged with 4 additional bytes, which increase the packet size and indicate a priority level. When you send these packets out on the network, the higher priority packets are transferred first. Priority packet tagging (also known as Traffic Class Expediting) enables the Ethernet controller to work with other elements of the network (such as switches and routers) to deliver priority packets first. You can assign values to packets based on their priorities when you use the IEEE 802.1p standard for packet tagging. This method requires a network infrastructure that supports packet tagging. The routing devices receiving and transferring these packets on your network must support 802.1p for tagging to be effective.

To enable support for priority packets, you must go to the integrated Ethernet controller Properties **Advanced** tab and enable the **802.1p QOS** feature.

# Ethernet port connector

The following illustration shows the pin-number assignments for the RJ-45 connector. These assignments apply to both 10BASE-T and 100/1000BASE-TX devices.

Activity LED (green)  Link LED (green)

1  8
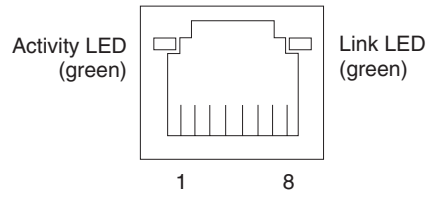
# Chapter 3. Getting help and service

This section provides information on how to get help and service.

If you cannot locate and correct the problem using the information in the "Troubleshooting Guide" on the *IBM Documentation* CD; then, use the information provided in this section to get help and service.

## Getting information, help, and service

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

## Getting information

Information about your IBM server product and preinstalled software, if any, is available in the documentation that comes with your server. That documentation includes printed books, online books, README files, and help files. In addition, information about IBM products is available on the World Wide Web and through the IBM Automated Fax System.

### Using the World Wide Web
On the World Wide Web, the IBM Web site has up-to-date information about IBM products and support. The address for the IBM Personal Computing home page is http://www.ibm.com/pc/.

You can find support information for your IBM products at http://www.ibm.com/pc/support/.

If you click **Profile** from the support page, you can create a customized support page that is specific to your hardware, complete with Frequently Asked Questions, Parts Information, Technical Hints and Tips, and Downloadable Files. In addition, you can choose to receive e-mail notifications whenever new information becomes available about your registered products.

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

### Getting information by fax
If you have a touch-tone telephone and access to a fax machine, in the U.S. and Canada, you can receive, by fax, marketing and technical information on many topics, including hardware, operating systems, and local area networks (LANs).

You can call the IBM Automated Fax System 24 hours a day, 7 days a week. Follow the recorded instructions, and the requested information will be sent to your fax machine. In the U.S. and Canada, to access the IBM Automated Fax System, call 1-800-426-3395.

## Getting help and service

If you have a problem with your server product, you will find a wide variety of sources available to help you.

## Using the documentation and diagnostic programs

Many problems can be solved without outside assistance. If you experience a problem with your server product, the first place to start is the troubleshooting information in your IBM documentation. If you suspect a software problem, see the documentation, including README files and online help, that comes with the operating system or application program.

Most IBM server products come with a set of diagnostic programs that you can use to help you identify hardware problems. See the troubleshooting information in your IBM documentation for instructions on 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.

## Calling for service

If you have tried to correct the problem yourself and still need help, during the warranty period, you can get help and information by telephone through the IBM HelpCenter®. The following services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been sold. IBM or your reseller, if authorized by IBM, will make selected Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered:
- Replacement or use of non-IBM parts or nonwarranted IBM parts. All warranted parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of software problem sources.
- Configuration of BIOS as part of an installation or upgrade.
- Changes, modifications, or upgrades to device drivers.
- Installation and maintenance of network operating systems (NOS).
- Installation and maintenance of application programs.

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

In the U.S. and Canada, these services are available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9:00 a.m. to 6:00 p.m.

**Note:** Response times vary; may exclude some holidays.

Please have the following information ready when you call:
- Machine type and model
- Serial numbers of your IBM hardware products
- Description of the problem
- Exact wording of any error messages

- Hardware and software configuration information

## Telephone numbers

Phone numbers are subject to change without notice. For the most up-to-date phone numbers, go to http://www.ibm.com/pc/support/ and click **Support Phone List**.

| Country | | Telephone number |
|---|---|---|
| Austria | Österreich | 01-24 592 5901 |
| Belgium - Dutch | Belgie | 02-210 9820 |
| Belgium - French | Belgique | 02-210 9800 |
| Canada | Toronto only | 416-383-3344 |
| Canada | Canada - all other | 1-800-565-3344 |
| Denmark | Danmark | 45 20 82 00 |
| Finland | Suomi | 09-22 931 840 |
| France | France | 02 38 55 74 50 |
| Germany | Deutschland | 07032-1549 201 |
| Ireland | Ireland | 01-815 9202 |
| Italy | Italia | 02-7031 6101 |
| Luxembourg | Luxembourg | 298-977 5063 |
| Netherlands | Nederland | 020-514 5770 |
| Norway | Norge | 23 05 32 40 |
| Portugal | Portugal | 21-791 51 47 |
| Spain | España | 91-662 49 16 |
| Sweden | Sverige | 08-477 4420 |
| Switzerland | Schweiz/Suisse/Svizzera | 058-333 0900 |
| United Kingdom | United Kingdom | 01475-555 055 |
| U.S.A. and Puerto Rico | U.S.A. and Puerto Rico | 1-800-772-2227 |

In all other countries or regions, contact your IBM reseller or IBM marketing representative.

# International Warranty Service

If you travel with your server product or relocate it to a country where your server machine type is sold and serviced by IBM or by IBM resellers who are authorized to perform warranty service, International Warranty Service is available for your server product.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your server product is eligible for International Warranty Service and to view a list of the countries where service is available, go to http://www.ibm.com/pc/support/, and click **Warranty Lookup**. Eligible IBM server

products are identified by their four-digit machine types. For more information about International Warranty Service, see Service Announcement 601-034 at http://www.ibm.com/. Click **Support & downloads**, click **Announcement letters**, and click **Announcements search**. In the **Search by letter number only** field, type `601-034`, and click **Search**.

# Purchasing additional services

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

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

# Appendix A. Product warranty and notices

This appendix contains the warranty period for your product, information about obtaining warranty service and support, and the IBM Statement of Limited Warranty.

## Warranty period

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

> **Machine** - IBM @server xSeries 440 Type 8687
>
> **Warranty period** - One year

## Warranty service and support

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

The following services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- **IBM hardware repair** - If the problem is determined to be caused by IBM hardware under warranty, trained service personnel are available to provide the applicable level of service, either on-site or at an IBM service center as determined by IBM.
- **Engineering Change management** - Occasionally, there might be changes that are required after a product has been shipped from IBM. In those instances, IBM will make Engineering Changes (ECs) available that apply to your hardware.

The following items are not covered under warranty service:

- Replacement or use of non-IBM parts. All IBM parts contain a 7-character identification in the format IBM FRU XXXXXXX.
- Identification of non-IBM software problem sources.
- Installation of customer replaceable units (CRUs).
- Installation and configuration of machine code or licensed internal code that is designated as customer installable.

If you do not register your server with IBM, you might be required to present proof of purchase to obtain warranty service.

## Before you call for service

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 server and software.

Most computers, operating systems, and application programs come with information that contains troubleshooting procedures and explanations of error

messages and error codes. The information that comes with your server also describes the diagnostic tests that you can perform.

If you suspect a software problem, refer to the information for the operating system or application program.

# Calling for service

Please have the following information ready:
- Machine type, model, and serial number
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information

To find the telephone number for the HelpCenter nearest you, see "Telephone numbers" in Chapter 3, "Getting help and service" on page 47.

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

This warranty statement consists of two parts: Part 1 and Part 2. Be sure to read Part 1 and the country-unique terms in Part 2 that apply to your country or region.

# Part 1 - General Terms

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

**The IBM Warranty for Machines**

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

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

**Extent of Warranty**

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

**THESE WARRANTIES ARE YOUR EXCLUSIVE WARRANTIES AND REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT, SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.**

**Items Not Covered by Warranty**

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

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

**Warranty Service**

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

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

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

When warranty service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item. Many features, conversions, or upgrades involve the removal of parts and their return to IBM. A part that replaces a removed part will assume the warranty service status of the removed part.

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

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

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

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

**Limitation of Liability**

Circumstances may arise where, because of a default on IBM's part or other liability, you are entitled to recover damages from IBM. In each such instance, regardless of the basis on which you are entitled to claim damages from IBM (including fundamental breach, negligence, misrepresentation, or other contract or tort claim), except for any liability that cannot be waived or limited by applicable laws, IBM is liable for no more than

1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages, up to the charges (if recurring, 12 months' charges apply) for the Machine that is subject of the claim. For purposes of this item, the term "Machine" includes Machine Code and Licensed Internal Code.

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

**UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES, LOST PROFITS OR LOST SAVINGS, EVEN IF IBM, ITS SUPPLIERS OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.**

**Governing Law**

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

# Part 2 - Country-unique Terms

<u>AMERICAS</u>

**BRAZIL**

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

<u>NORTH AMERICA</u>

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

**CANADA**

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

**UNITED STATES**

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

<u>**ASIA PACIFIC**</u>

**AUSTRALIA**

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

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

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

**CAMBODIA, LAOS, AND VIETNAM**

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

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

All proceedings shall be conducted, including all documents presented in such proceedings, in the English language. The number of arbitrators shall be three, with each side to the dispute being entitled to appoint one arbitrator.

The two arbitrators appointed by the parties shall appoint a third arbitrator before proceeding upon the reference. The third arbitrator shall act as chairman of the proceedings. Vacancies in the post of chairman shall be filled by the president of the ICC. Other vacancies shall be filled by the respective nominating party. Proceedings shall continue from the stage they were at when the vacancy occurred.

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

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

**HONG KONG AND MACAU**

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

**INDIA**

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

**JAPAN**

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

**NEW ZEALAND**

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

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

**PEOPLE'S REPUBLIC OF CHINA (PRC)**

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

Any disputes arising from or in connection with this Agreement will first be resolved by friendly negotiations, failing which either of us has the right to submit the dispute to the China International Economic and Trade Arbitration Commission in Beijing, the PRC, for arbitration in accordance with its arbitration rules in force at the time. The arbitration tribunal will consist of three arbitrators. The language to be used therein will be English and Chinese. An arbitral award will be final and binding on all the parties, and will be enforceable under the Convention on the Recognition and Enforcement of Foreign Arbitral Awards (1958).

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

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

**EUROPE, MIDDLE EAST, AFRICA (EMEA)**

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

**Warranty Service:**

If you purchase an IBM Machine in Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland or United Kingdom, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM. If you purchase an IBM Personal Computer Machine in Albania, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Hungary, Kazakhstan, Kirghizia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia (FYROM), Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, or Ukraine, you may obtain warranty service for that Machine in any of those countries from either (1) an IBM reseller approved to perform warranty service or (2) from IBM.

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

**Governing Law:**

The applicable laws that govern, interpret and enforce rights, duties, and obligations of each of us arising from, or relating in any manner to, the subject matter of this Statement, without regard to conflict of laws principles, as well as Country-unique terms and competent court for this Statement are those of the country in which the warranty service is being provided, except that in 1) Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Hungary, Former Yugoslav Republic of Macedonia, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan, the laws of Austria apply; 2) Estonia, Latvia, and Lithuania, the laws of Finland apply; 3) Algeria, Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Djibouti, Democratic Republic of Congo, Equatorial Guinea, France, Gabon, Gambia, Guinea, Guinea-Bissau, Ivory Coast, Lebanon, Mali, Mauritania, Morocco, Niger, Senegal, Togo, and Tunisia, this Agreement will be construed and the legal relations between the parties will be determined in accordance with the French laws and all disputes arising out of this Agreement or related to its violation or execution, including summary proceedings, will be settled exclusively by the Commercial Court of Paris; 4) Angola, Bahrain, Botswana, Burundi, Egypt, Eritrea, Ethiopia, Ghana, Jordan, Kenya, Kuwait, Liberia, Malawi, Malta, Mozambique,

Nigeria, Oman, Pakistan, Qatar, Rwanda, Sao Tome, Saudi Arabia, Sierra Leone, Somalia, Tanzania, Uganda, United Arab Emirates, United Kingdom, West Bank/Gaza, Yemen, Zambia, and Zimbabwe, this Agreement will be governed by English Law and disputes relating to it will be submitted to the exclusive jurisdiction of the English courts; and 5) in Greece, Israel, Italy, Portugal, and Spain any legal claim arising out of this Statement will be brought before, and finally settled by, the competent court of Athens, Tel Aviv, Milan, Lisbon, and Madrid, respectively.

***THE FOLLOWING TERMS APPLY TO THE COUNTRY SPECIFIED:***

**AUSTRIA AND GERMANY**

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

*The following paragraphs are added to this Section:*

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

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

**Warranty Service:** *The following is added to this Section:* During the warranty period, transportation for delivery of the failing Machine to IBM will be at IBM's expense.

**Limitation of Liability:** *The following paragraph is added to this Section:* The limitations and exclusions specified in the Statement of Limited Warranty will not apply to damages caused by IBM with fraud or gross negligence and for express warranty.

*The following sentence is added to the end of item 2:* IBM's liability under this item is limited to the violation of essential contractual terms in cases of ordinary negligence.

**EGYPT**

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

*Applicability of suppliers and resellers (unchanged).*

**FRANCE**

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

**IRELAND**

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

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

*Applicability of suppliers and resellers (unchanged).*

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

**ITALY**

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

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

**SOUTH AFRICA, NAMIBIA, BOTSWANA, LESOTHO AND SWAZILAND**

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

**UNITED KINGDOM**

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

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

*Applicability of suppliers and resellers (unchanged).*

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

# Appendix B. Notices

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

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

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:
> IBM Director of Licensing
> IBM Corporation
> North Castle Drive
> Armonk, NY 10504-1785
> U.S.A.

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

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

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

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

## Edition notice

# Trademarks

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

| | |
|---|---|
| Alert on LAN | Predictive Failure Analysis |
| Active PCI-X | ServeRAID |
| Active PCI | ServerGuide |
| Active Memory | ServerProven |
| Chipkill | TechConnect |
| EtherJet | Tivoli |
| e-business logo | Tivoli Enterprise |
| HelpCenter | Update Connector |
| HelpWare | Wake on LAN |
| IBM | X-Architecture |
| Light Path Diagnostics | XA-32 |
| Memory ProteXion | XceL4 |
| NetBAY | XpandOnDemand |
| OS/2 WARP | xSeries |

Lotus and Domino are trademarks of Lotus Development Corporation and/or IBM Corporation in the United States, other countries, or both.

Intel, Celeron, MMX, LANDesk, Pentium, Pentium II Xeon, and Pentium III Xeon are trademarks of Intel Corporation in the United States, other countries, or both.

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

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

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

Linux is a registered trademark of Linus Torvalds.

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

# Important notes

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

CD-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 1000000 bytes, and GB stands for approximately 1000000000 bytes.

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

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

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

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

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

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

# 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.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The Limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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

## Taiwan electrical emission statement

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

## Japanese Voluntary Control Council for Interference (VCCI) statement

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

# Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

| IBM power cord part number | Used in these countries and regions |
|---|---|
| 13F9940 | Argentina, Australia, China (PRC), New Zealand, Papua New Guinea, Paraguay, Uruguay, Western Samoa |
| 13F9979 | Afghanistan, Algeria, Andorra, Angola, Austria, Belgium, Benin, Bulgaria, Burkina Faso, Burundi, Cameroon, Central African Rep., Chad, China (Macau S.A.R.), Czech Republic, Egypt, Finland, France, French Guiana, Germany, Greece, Guinea, Hungary, Iceland, Indonesia, Iran, Ivory Coast, Jordan, Lebanon, Luxembourg, Malagasy, Mali, Martinique, Mauritania, Mauritius, Monaco, Morocco, Mozambique, Netherlands, New Caledonia, Niger, Norway, Poland, Portugal, Romania, Senegal, Slovakia, Spain, Sudan, Sweden, Syria, Togo, Tunisia, Turkey, former USSR, Vietnam, former Yugoslavia, Zaire, Zimbabwe |
| 13F9997 | Denmark |
| 14F0015 | Bangladesh, Burma, Pakistan, South Africa, Sri Lanka |
| 14F0033 | Antigua, Bahrain, Brunei, Channel Islands, China (Hong Kong S.A.R.), Cyprus, Dubai, Fiji, Ghana, India, Iraq, Ireland, Kenya, Kuwait, Malawi, Malaysia, Malta, Nepal, Nigeria, Polynesia, Qatar, Sierra Leone, Singapore, Tanzania, Uganda, United Kingdom, Yemen, Zambia |
| 14F0051 | Liechtenstein, Switzerland |
| 14F0069 | Chile, Ethiopia, Italy, Libya, Somalia |
| 14F0087 | Israel |
| 1838574 | Thailand |

| IBM power cord part number | Used in these countries and regions |
|---|---|
| 6952301 | Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Japan, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela |

# Index