QLogic 4/8 Gb Intelligent Pass-thru Module for IBM
BladeCenter and QLogic 20-Port 4/8 Gb SAN Switch
Module for IBM BladeCenter

IBM

# Installation and User's Guide

QLogic 4/8 Gb Intelligent Pass-thru Module for IBM
BladeCenter and QLogic 20-Port 4/8 Gb SAN Switch
Module for IBM BladeCenter

# Installation and User's Guide

**Note:** Before using this information and the product it supports, read and the general information in .

**Second Edition (June 2011)**

# Contents

# Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

.לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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

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

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

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

Перед установкой продукта прочтите инструкции по
технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

**Important:**

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

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

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

**Statement 1:**



**DANGER**

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

**To avoid a shock hazard:**

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

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

**Statement 2:**



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

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

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

**Statement 3:**



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

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



**DANGER**

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

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



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

**Statement 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. The QLogic 4/8 Gb Intelligent Pass-thru Module and QLogic 20-Port 4/8 Gb SAN Switch Module

This *Installation and User's Guide* contains the following instructions and information:

- Installing, removing, and replacing the following types of I/O modules:
  - QLogic 4/8 Gb Intelligent Pass-thru Module for IBM® BladeCenter®
  - QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter
- Enabling the I/O module and its external ports
- Using the information panel, LEDs, and external ports on the I/O module
- Configuring the I/O module through a Telnet interface
- Configuring the I/O module through a Web browser interface
- Upgrading and expanding the functionality of the I/O module
- Performing basic troubleshooting tasks and solving problems with the I/O module
- Getting help, service, and technical assistance

**Notes:**

1. Throughout this document, including the references to screen contents, the QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter, or QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter, is generically referred to as the I/O module or the switch module. With respect to certain screen contents or titles, an I/O module might be referred to as a switch module or switch, because the term *switch module* or *switch* appears on those screens.

   For the purpose of brevity:

   - The QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter is specifically referred to as the pass-thru module.
   - The QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter is specifically referred to as the full fabric module.

2. Unless otherwise stated, references to the BladeCenter unit apply to all BladeCenter units that support the I/O module. As of the date of this document, the following devices are examples of applicable BladeCenter units:

   - BladeCenter E unit (also known as BladeCenter Type 8677)
   - BladeCenter H unit
   - BladeCenter HT unit
   - BladeCenter S unit
   - BladeCenter T unit

3. Unless otherwise stated, references to the blade server apply to all blade servers that support the I/O module and expansion card.

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

5. The screens that are described or referred to in this document might differ slightly from the screens that are displayed by your system. Screen content varies according to the type of BladeCenter unit and the firmware versions and optional devices that are installed.

6. Unless otherwise stated, references to the management module apply only to the BladeCenter Advanced Management Module, which is the only type of management module that supports the I/O module.

The QLogic Intelligent Pass-thru Module for IBM BladeCenter supports a fully interoperable solution for seamless integration of the Fibre Channel initiators to an existing fabric. The Intelligent Pass-thru Module for IBM BladeCenter uses industry-standard Node port ID virtualization (NPIV) technology to provide a cost-effective connectivity solution for the IBM BladeCenter unit.

The pass-thru module is a Fibre Channel component that contains the following 20 ports:

- 14 internal transparent host (TH) ports to connect to the blade-server bays in the BladeCenter unit
- Six external transparent fabric (TF) Fibre Channel user ports to connect to external Fibre Channel devices

The QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter is a full fabric module and a Fibre Channel component that has expanded functionality and contains 20 ports. The QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter supports a higher speed switch for BladeCenter system configurations and offers scalability in external-storage area network (SAN) size and complexity, and enhanced system-management capabilities.

The QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter has the following ports:

- 14 internal ports to connect to the blade-server bays in the BladeCenter unit
- Six external Fibre Channel user ports to connect to external Fibre Channel devices

**Notes:**

- For additional information about the ports, see "Features, specifications, and standards" on page 5 and Chapter 3, "Information panel LEDs and external Fibre Channel ports," on page 27.
- For additional information about the available optional software features and product upgrades, see Chapter 6, "Upgrading and expanding the functionality of the I/O module," on page 41.

You can manage and configure the I/O module through multiple interfaces.

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

  For additional information, see Chapter 4, "Configuring the I/O module through a Telnet interface," on page 33.

- A Web browser (QuickTools) interface

  For additional information, see Chapter 5, "Configuring the I/O module through the QuickTools Web interface," on page 37.

- The Enterprise Fabric Suite 2007 application

  The Enterprise Fabric Suite 2007 application supports an intuitive graphical interface that you can use to configure multiple I/O modules through other connected storage area network (SAN) devices from a single interface. For additional information, see the *QLogic 4/8 Gb Intelligent Pass-thru Module and 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter Enterprise Fabric Suite 2007 User Guide* at http://support.qlogic.com.

  For additional information about the ports, see Chapter 3, "Information panel LEDs and external Fibre Channel ports," on page 27.

For installation details, see Chapter 2, "Installing, removing, replacing, and enabling an I/O module," on page 15. For details about the status of the I/O module and its external ports and network connections, see Chapter 3, "Information panel LEDs and external Fibre Channel ports," on page 27. For additional information about I/O modules and other BladeCenter components, see the BladeCenter documentation that comes with these devices.

To support each I/O module that you install in the BladeCenter unit, you must also install a compatible expansion card in each blade server that you want to communicate with the I/O module. In this environment, the expansion card operates as a host bus adapter (HBA). For additional information, see "Expansion card requirements" on page 16.

The following types of optional devices are compatible with the QLogic 4/8 Gb I/O modules:

- Fibre Channel expansion cards
- Combo Ethernet and Fibre Channel expansion cards
- 8 Gb SFP+ Short Wave Optic Transceiver, also known as an SFP+ module or short wave optical transceiver

You can obtain up-to-date information about the QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter, QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter, and other IBM products at http://www.ibm.com/systems/support/.

At http://www.ibm.com/support/mysupport/, you can create a personalized support page by identifying IBM products that are of interest to you. From this personalized page, you can subscribe to weekly e-mail notifications about new technical documents, search for information and downloads, and access various administrative services.

If firmware and documentation updates are available, you can download them from the IBM Web site. To check for updates, complete the following steps.

1. Go to http://www.ibm.com/systems/support/.
2. Under **Product support**, click **BladeCenter**.
3. Under **Popular links**, click **Software and device drivers** for firmware updates, or click **Publications lookup** for documentation updates.

**Notes:**

1. Changes are made periodically to the IBM Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.
2. Contact your IBM marketing representative or authorized reseller for information about the types of compatible BladeCenter units, blade servers, expansion cards, and optional compatible devices for the I/O modules, BladeCenter units, and blade servers.
3. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of supported BladeCenter units, blade servers, expansion cards, and optional compatible devices for the I/O modules, BladeCenter units, and blade servers.
4. For details about installation, configuration, and use of compatible devices, see the documentation that comes with these devices.
5. This document might contain references or links to other companies' Web sites, also known as *non-IBM Web sites*. As of the date of this document, the addresses of non-IBM Web sites are correct. However, these addresses might

be updated after this document has been published. Certain conditions apply to the use of non-IBM Web sites. For additional information, see .

6. You can install up to two pass-thru modules or two 20-port full fabric modules in a BladeCenter unit. Do not install a pass-thru module and a full fabric module in the same BladeCenter unit.

7. You can find detailed hardware and software information, including documentation, about IBM products at http://publib.boulder.ibm.com/infocenter/systems/index.jsp.

8. You can find detailed hardware and software information, including documentation, about BladeCenter devices at http://publib.boulder.ibm.com/infocenter/systems/scope/blades/index.jsp or http://publib.boulder.ibm.com/infocenter/systems/scope/bladecenter/index.jsp.

Record information about the I/O module in Table 1. You can find this information on the labels on the I/O module. For an illustration that shows the locations of these labels, see "Major components of the I/O module" on page 13. You will need this information when you register the I/O module with IBM. You can register the I/O module at http://www.ibm.com/support/mysupport/. The product name and serial number are required for registration. Depending on the type of product, additional information might be required for registration.

*Table 1. Product information*

| Product name | ☐ QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter<br><br>or<br><br>☐ QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter |
|---|---|
| **Model number** | _____ |
| **Serial number** | _____ |
| **Worldwide name (WWN)**<br>**Note:** The worldwide name (WWN) is on the same label as the media access control (MAC) address. | _____ |
| **Media access control (MAC) address 1** | _____ |
| **Other MAC addresses** | _____<br><br>_____ |

If you participate in the IBM client reference program, you can share information about your use of technology, best practices, and innovative solutions; build a professional network; and gain visibility for your business. For more information about the IBM client reference program, see http://www.ibm.com/ibm/clientreference/.

## Features, specifications, and standards

This section supports a summary of the features, specifications, and standards that apply to the I/O module.

The I/O module has the following features:

The switch module must provide battery protected real time clock functions. The date and time shall be set during switch manufacturing, and the battery should provide a minimum of 1 year protection of the real time clock.

- Firmware installation

  Use the QuickTools Web interface, Enterprise Fabric Suite 2007 application, or CLI to install and activate new firmware.

- Support for Non-Disruptive Code Load Activation (NDCLA)

  **Note:** This feature is supported only on certain blade server models. For information about the features that apply to your blade server, contact your IBM marketing representative or authorized reseller.

- Registered State Change Notification (RSCN)

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

- Interoperability

  The I/O module supports standards-based FC-SW2 interoperability. Fibre Channel switches that connect to the I/O-module external ports must support Node port ID Virtualization (NPIV).

- NPIV mode

  The pass-thru module is a 20-port Fibre Channel NPIV switch with six external ports and 14 internal ports. The module concentrates multiple blade servers into the external ports. The external ports connect to external Fibre Channel switches that support NPIV. The internal ports connect directly to blade servers through the enclosure backplanes.

  The pass-thru module presents one or more blade servers per port to the fabric. The module expands the fabric, but, unlike a full fabric switch, it does not count against the fabric domain.

  **Note:** A node port is also known as an N_port.

- Error detection

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

- Frame bundling

  The I/O module supports the following frame bundling methods:
  - No frame bundling; - Frames are intermixed from different sources at will.
  - Soft lockdown: The I/O module waits for the sequence to be completed or a gap in the frame traffic to occur before it services requests from a different port.
- Configurable Fabric Address Notification (FAN)

  A FAN, as described in FC-FLA, is sent out by the fabric after an initialization event (usually a loop initialization port) to each attached NL_Port. The purpose of the FAN is to inform the attached NL_Ports of the fabric node name, port name, and fabric address.
- Support for Call Home function
- Support for Domain Name Service (DNS)
- Support for Internet protocol (IP) Version 6
- Support for Internet protocol security (IPsec)
- Support for separate trap community strings for each trap address
- Support for Simple Network Management Protocol (SNMP) Version 3
- Support for vital product data (VPD)

Table 2 contains a summary of the specifications, standards, and protocols that apply to the I/O module.

*Table 2. I/O-module specifications, standards, and protocols*

| Fibre Channel standards and protocols: |
| --- |
| • **Fibre Channel standards:** |
|   – FC-PH version 4.3 |
|   – FC-PH-2 |
|   – FC-PH-3 |
|   – FC-AL version 4.5 |
|   – FC-AL-2 Rev 7.0 |
|   – FC-FLA |
|   – FC-GS-3 |
|   – FC-FG |
|   – FC-PLDA |
|   – FC-Tape |
|   – FC-VI |
|   – FC-SW-2 |
|   – Fibre Channel Element MIB RFC 2837 |
|   – Fibre Alliance MIB version 4.0 |
| • **Fibre Channel protocols:** |
|   – Fibre Channel service classes: Class 2 and class 3 |
|   – Operation modes**:** Fibre Channel class 2 and class 3, connectionless |
|   – External port type: |
|     - Full fabric mode: Generic loop port (GL_port) |
|     - Transparent mode: Transparent fabric port (TF_port) |
|   – Internal port type: |
|     - Full fabric mode: Fabric port (F_port) |
|     - Transparent mode: Transparent host port/NPIV mode (TH_port) |
|     - Support for up to 44 host NPIV logins |

**Fibre Channel standards and protocols (continued):**

- **Fibre Channel protocols (continued):**
  - Port characteristics:
    - External ports are automatically detected and self- configuring
    - Port LEDs illuminate at startup
  - Number of Fibre Channel ports: 6 external ports and 14 internal ports
  - Scalability: Up to 239 switches maximum depending on your configuration
  - Buffer credits: 16 buffer credits per port
  - Maximum frame size: 2148 bytes (2112 byte payload)
  - Standards-based FC FC-SW2 Interoperability
  - Support for up to a 255 to 1 port-mapping ratio
  - Media type: Small form-factor pluggable plus (SFP+) module
  - 2 Gb fabric port speed: 1.0625 or 2.125 Gbps (gigabits per second)
  - 2 Gb fabric latency: Less than 0.4 μsec
  - 2 Gb fabric aggregate bandwidth: 80 Gbps at full duplex
  - System processor: PowerPC®
  - Fabric point-to-point bandwidth: 2 Gbps or 8 Gbps at full duplex
  - 4 Gb switch speed: 4.250 Gbps
  - 4 Gb switch fabric point-to-point: 4 Gbps at full duplex
  - 4 Gb switch fabric aggregate bandwidth: 160 Gbps at full duplex
  - 8 Gb switch speed: 8.5 Gbps
  - 8 Gb switch fabric point-to-point: 8 Gbps at full duplex
  - 8 Gb switch fabric aggregate bandwidth: 320 Gbps at full duplex
  - Maximum frame size: 2148 bytes (2112 byte payload)
  - Nonblocking architecture to prevent latency

**I/O-module maintainability:**

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

**Fabric management:**

- Management methods:
  - Enterprise Fabric Suite 2007 application
  - Telnet interface and command-line interface (CLI)
  - QuickTools Web interface
- I/O-module simple network management protocol (SNMP) agent: Enables a network management workstation to receive configuration values, traffic information, and Fibre Channel failure data through SNMP and the Ethernet interface

**Dimensions:**

- Width: 118.1 mm (4.65 in.)
- Height: 29.5 mm (1.16 in.)
- Depth: 276.4 mm (10.88 in.)
- Weight: 0.93 kg (2.05 lb)

**Environmental:**

- Temperature and altitude:
  - Operating:
    - 10°C to 52° C (50°F to 125.6° F) at an altitude of
      0 to 914 m (0 to 3000 ft)
    - 10°C to 49° C (50°F to 120.2° F) at an altitude of
      0 to 3000 m (0 to 10 000 ft)
  - Non-operating: -40°C to 65° C (-40°F to 149° F) at an altitude of
    0 to 12 000 m (0 to 39 370 ft)
- Humidity:
  - Operating: 8% to 80%, noncondensing
  - Non-operating: 5% to 80%, noncondensing

**I/O-module regulatory certifications:**

- Electrical:
  - Power source loading: 3.75 amps maximum at 12 V dc
  - Heat output: 35 watts maximum
  - Operating voltage: 12 V dc
  - Circuit protection: Internally fused
- Emissions standards:
  - FCC Title 47 CFR Part 15 Subpart B Class A (USA)
  - VCCI Class A ITE, April 2003 (Japan)
  - ICES-003 issue 3 (Canada)
  - A4EN55022 level A (EC)
  - Voltage fluctuations: EN 61000-3-3
  - Harmonics: EN 61000-3-2
  - Immunity: EN55024: 1998
  - C-Tick - AS/NZS CISPR 22 (Australia/New Zealand)
  - CE Mark - EN55022:1998 + A2:2003 and EN55024:1998 + A1:2001 + A2:2003
  - MIC Notice No. 2001-115 and No. 2001-116 (Korea)
  - GOST 29216-91 (Russia)
  - CISPR 22 Class A
  - BSMI CNS 13438 (Taiwan)
  - Communique No. 2004/9 and No. 2004/22 (Turkey)
  - EMC.CVG, 28 October 2002 (Saudi Arabia)
  - GB 9524:1998 (China)

# Related documentation

This *Installation and User's Guide* contains instructions for setting up, installing, removing, configuring, and troubleshooting the I/O module. This document also contains general information about the I/O module and information about upgrading and expanding the functionality of the I/O module. This document is provided on the IBM *Support* CD that comes with the I/O module. Follow the instructions in this *Installation and User's Guide* after you read the IBM *Important Notices* document that comes with the I/O module.

**Notes:**

*   The most recent versions of this *Installation and User's Guide* and all other BladeCenter documentation are at http://www.ibm.com/systems/support/.
*   The *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD might contain additional information. Use the subdirectories to help you find information quickly.

# IBM documentation

To complete your system installation, configuration, operation, and troubleshooting requirements, you must follow the instructions in the documentation that comes with your BladeCenter components. The following related IBM documentation comes with the expansion card, I/O module, BladeCenter unit, blade server, or other BladeCenter devices that you have purchased. This documentation contains important, useful information to help you with the setup, installation, configuration, operation, and troubleshooting processes for these devices. This documentation is available at http://www.ibm.com/systems/support/:

*   IBM *Important Notices*

    Read this document before you install the I/O module in the BladeCenter unit. This document contains the safety information, and environmental notices that apply to all class A devices. The product-specific documentation is provided on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD that comes with this product.

*   Expansion card *Installation and User's Guide*

    Each type of expansion card has a customized *Installation and User's Guide* that contains detailed information about the expansion card, which is compatible with the 4/8 Gb I/O modules. These I/O modules contain connectors for the blade servers in which the expansion card is installed.

    This document and other related documents are on the *Support* CD that comes with this product.

*   IBM BladeCenter unit *Installation and User's Guide*

    Each type of BladeCenter unit has a customized *Installation and User's Guide*.

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

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

- Before you can use the BladeCenter unit or install I/O modules, blade servers, or other devices in the BladeCenter unit, you must correctly install and configure at least one compatible management module in the BladeCenter unit. To do this, follow the instructions in these documents, in accordance with the type of management module that your BladeCenter unit supports:
  - *Advanced Management Module Installation Guide*
  - *IBM BladeCenter Management Module Command-Line Interface Reference Guide*
  - *IBM BladeCenter Advanced Management Module User's Guide*
  - *Management Module User's Guide* for the BladeCenter unit
- *Multi-Switch Interconnect Module for IBM BladeCenter Installation and User's Guide*

  This document contains instructions for installing a multi-switch interconnect module (MSIM) in a BladeCenter unit. This document also contains instructions for installing an I/O module in an MSIM.
- IBM *BladeCenter SAN Solutions Guide*

  This document provides user-oriented information about how the BladeCenter Fibre Channel optional devices are used to provide different SAN storage solutions for different application requirements.
- IBM *BladeCenter Fibre Channel I/O Interoperability Guide*

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

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

  This document contains information to help you solve problems yourself or to provide helpful information to a service technician.
- *Advanced Management Module Installation Guide*
- *IBM BladeCenter Management Module Command-Line Interface Reference Guide*
- *IBM BladeCenter Advanced Management Module User's Guide*
- *Management Module User's Guide* for the BladeCenter unit

In addition, you might have to review the IBM *Configuration and Options Guide*, which contains information about which small form-factor pluggable (SFP) or small form-factor pluggable plus (SFP+) module and cable are required to connect the I/O module to other network or storage devices. This document is available in both HTML and PDF from http://www.ibm.com/servers/eserver/xseries/cog/.

The updated BladeCenter documentation also is available from the IBM Systems Information Center. To check for updated information, complete the following steps.

1. Go to http://publib.boulder.ibm.com/infocenter/systems/index.jsp.
2. In the Contents pane, select **Combined IBM Systems Information**.
3. Select **Systems hardware**.
4. Select **BladeCenter information**.

For more information about documentation requirements, see "Using the documentation" on page 51.

## QLogic documentation

The following related QLogic Corporation documentation is available from the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD, the main QLogic Web site, http://www.qlogic.com/, or the QLogic Technical Support Web site, http://support.qlogic.com. Additional related documentation also is available from this Web site. See this Web site for the most recent versions of all related QLogic documentation.

**Note:** The titles of certain QLogic Corporation documentation and the names of certain QLogic Corporation software products contain references to the year 2007. However, the QLogic firmware and software have been upgraded to incorporate the features and functions of the pass-thru module and the full fabric module.

- *QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter Command Line Interface Guide*
- *QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter Command Line Interface Guide*
- *QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter QuickTools Switch Management Guide*
- *QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter QuickTools Switch Management Guide*
- *QLogic 4/8 Gb Intelligent Pass-thru Module and 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter Enterprise Fabric Suite 2007 User Guide*
- *QLogic Fibre Channel Switch Event Message Guide*
- *QLogic CIM Agent Reference Guide*
- *QLogic SNMP Reference Guide*
- *End User License Agreement* (EULA)
- Readme files
- Instructions

To obtain relevant QLogic documentation for device drivers, the QuickTools program, and other tools, go to http://www.ibm.com/systems/support/ and enter the search term `QLogic` to list and access the applicable Web sites.

# Inventory checklist

Make sure that the shipping carton contains the following items:

- One of the following types of Fibre Channel I/O modules:
    - QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter
    - QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter
- The *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD, which contains the following documents:
    - *QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter and QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter Installation and User's Guide* (this document)
    - The documents listed in "QLogic documentation" on page 11
    - *End User License Agreement* (EULA)
    - *Safety Information*
- IBM *Important Notices* document

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

# Notices and statements in this document

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

The following notices and statements are used in this document:

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

# Major components of the I/O module

The following illustration shows the major components of the I/O module.

**Notes:**

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

2. Your I/O module might have labels that are not shown in the following illustration. For example, the worldwide name (WWN) is on the same label as the media access control (MAC) address.
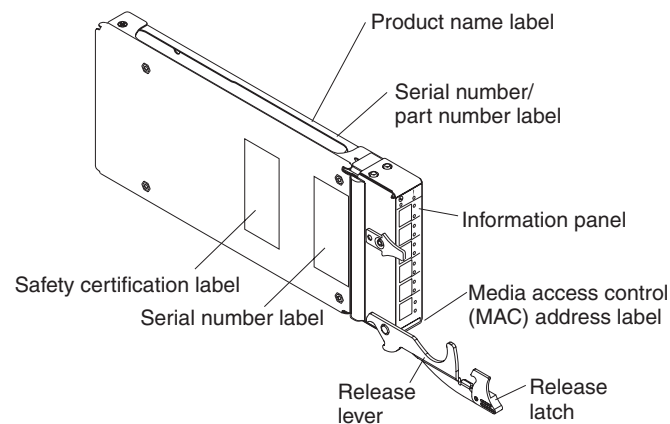


For more information about the components of the information panel, see Chapter 3, "Information panel LEDs and external Fibre Channel ports," on page 27. For more information about the MAC address, see the applicable QuickTools switch management guide on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

# Chapter 2. Installing, removing, replacing, and enabling an I/O module

This chapter provides instructions for installing, removing, replacing, and enabling an I/O module in the BladeCenter unit.

## I/O module preinstallation checklist

The following items are I/O module preinstallation requirements and considerations.

- Make sure that you are using BladeCenter components that are compatible with the I/O modules, BladeCenter units, and blade servers.

  For a list of the types of supported BladeCenter units, see Chapter 1, "The QLogic 4/8 Gb Intelligent Pass-thru Module and QLogic 20-Port 4/8 Gb SAN Switch Module," on page 1. See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of supported blade servers, expansion cards, and optional compatible devices. Contact your IBM marketing representative or authorized reseller for information about the types of compatible BladeCenter units, blade servers, expansion cards, and optional compatible devices for the I/O modules, BladeCenter units, and blade servers.

  For details about installation, configuration, and use of compatible devices, see the documentation that comes with these devices.

- Make sure that you are using the latest version of firmware code for the BladeCenter Advanced Management Module and all other BladeCenter components.

  If necessary, install the latest version of firmware code for the BladeCenter Advanced Management Module or other BladeCenter components. To download the most recent firmware updates, go to http://www.ibm.com/systems/support/ for the latest information about upgrading the firmware code for BladeCenter components. The instructions are in the documentation that comes with the updates.

- Make sure that compatible expansion cards are installed in the blade servers or other blade devices that you want to communicate with the I/O modules. For additional information about the expansion card requirements for I/O modules, see "Expansion card requirements" on page 16.

- The BladeCenter unit supports a maximum of two I/O modules, in I/O-module bays 3, 4, 8, and 10. You can install I/O modules in the following I/O-module bay combinations:

  - You can install an I/O module in I/O-module bay 3 or 4 or in both I/O-module bays 3 and 4 of the BladeCenter unit.

  - You can install an I/O module inside a multi-switch interconnect module (MSIM) in I/O-module bay 8 or 10 or in both I/O-module bays 8 and 10 of the BladeCenter unit.

  - You can install an I/O module in I/O-module bay 3 or 4 of the BladeCenter unit, and another I/O module inside an MSIM in I/O-module bay 8 or 10 of the BladeCenter unit.

  - If you are installing only one I/O module and your expansion card does not require that your I/O module be installed in an MSIM in this system configuration, install the I/O module in I/O-module bay 3 of the BladeCenter unit.

–   If you are installing only one I/O module and your expansion card requires that your I/O module be installed in an MSIM in this system configuration, install the I/O module inside the MSIM in I/O-module bay 8 of the BladeCenter unit.

For details about I/O-module bay requirements and bay locations, see the documentation for your BladeCenter unit, the blade servers, and the applicable device.

- If the I/O modules will be installed in an MSIM in I/O-module bays of the BladeCenter unit, make sure that the I/O modules are in the correct (supported) I/O-module bays, and that a supported expansion card is installed in your blade server. For additional information, see Table 3 on page 17 and the *Installation and User's Guide* that comes with the device.

- When the I/O module is installed in a BladeCenter HT unit, the internal ports operate at 4 Gbps, and the external ports operate at speeds up to 8 Gbps.

- When the I/O module is installed in a BladeCenter T unit, the internal ports operate at 2 Gbps, and the external ports operate at speeds up to 8 Gbps.

- Configuration requirements for the I/O module and the BladeCenter unit might vary. You can obtain up-to-date information about the I/O module and the BladeCenter unit at http://www.ibm.com/systems/bladecenter/.

- The blade servers or BladeCenter units that are described or shown in this document might be different from your blade server or BladeCenter unit. For additional information, see the documentation that comes with your blade server or BladeCenter unit.

- If you encounter a problem with using the BladeCenter components or during the I/O module installation procedure, see "Troubleshooting checklist" on page 46 for additional information.

## Expansion card requirements

A compatible expansion card or host bus adapter (HBA) must be installed in each blade server or other blade device that you want to communicate with the I/O module. The following devices are examples of compatible expansion cards for the I/O module:

- Fibre Channel expansion cards
- Combo Ethernet and Fibre Channel expansion cards

For additional information about these expansion cards, see the applicable *Installation and User's Guide* on the *Support* CD that comes with these products.

Expansion cards determine the BladeCenter unit I/O-module bays that can support each I/O module. The expansion card has two Fibre Channel ports. To enable the I/O module to communicate with a blade server or other blade device, at least one of the previously specified supported types of I/O modules must be installed in the BladeCenter unit. For details about installation, configuration, and use of an expansion card, see the documentation that comes with the expansion card.

If an I/O module is installed in a device, such as an MSIM, in I/O-module bays of the BladeCenter unit, this configuration requires a specific type of expansion card to support the device and to communicate with a blade server or other blade device. The expansion card must be installed in the blade server or other blade device. For additional information, including the applicable I/O-module bays and expansion-card ports, see the documentation that comes with the expansion card and the device in which the I/O module is installed.

Table 3 summarizes the bay and port interconnections for each I/O module and expansion card. In this table, the bay numbers correspond to the I/O-module bays in the BladeCenter unit. Installing a second I/O module enables a redundant path and a separate Fibre Channel connection from the blade server or other blade device to the external devices on the Fibre Channel network and SAN. Thus, the second I/O-module port connection in Table 3 allows for dual paths from the blade server or other blade device to the external Fibre Channel devices.

Installing a second I/O module in the BladeCenter unit provides a backup I/O module in case one I/O module fails. Both I/O modules must be of the same type if I/O modules are installed in both I/O-module bays 3 and 4 of the BladeCenter unit or inside an MSIM in both I/O-module bays 8 and 10 of the BladeCenter unit.

*Table 3. I/O-module bay/expansion-card port correlation*

| Standard I/O-module bay in BladeCenter unit | Fibre Channel I/O-module function |
|---|---|
| 3 (See the notes in this table.) | Port 0 connection on the Fibre Channel expansion card in the BladeCenter unit |
| 4 (See the notes in this table.) | Port 1 connection on the Fibre Channel expansion card in the BladeCenter unit |
| 8 (upper right interconnect-module bay)<br><br>8 – Inside an MSIM in the BladeCenter H or BladeCenter HT unit (in the slots on the right side of the MSIM)<br><br>See the notes in this table. | Port 0 connection on the Fibre Channel expansion card in the BladeCenter unit |
| 10 (lower right interconnect-module bay)<br><br>10 – Inside an MSIM in the BladeCenter H or BladeCenter HT unit (in the slots on the right side of the MSIM)<br><br>See the notes in this table. | Port 1 connection on the Fibre Channel expansion card in the BladeCenter unit |
| **Notes:**<br>1. As of the date of this document, only Fibre Channel I/O modules can be installed in the indicated I/O-module bays that are listed in this table.<br>   The other I/O-module bays do not support the types of 4/8 Gb I/O modules that are discussed in this document.<br>2. For additional information about the applicable I/O-module bays and expansion-card ports, see the documentation that comes with the BladeCenter unit and the expansion card.<br>3. An I/O module can also be installed in other I/O configurations, such as within an MSIM configuration. For additional information about configuration requirements, see the applicable product documentation that comes with the device. ||

# Installation guidelines

Before you install the I/O module in the BladeCenter unit, read the following information:

- Read the safety information that begins on page v, "Handling static-sensitive devices" on page 19, and the safety statements in the BladeCenter unit documentation. This information will help you work safely.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the blade server or BladeCenter unit, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component on the I/O module, blade server, or BladeCenter unit indicates that the component can be hot-swapped, which means that if the BladeCenter unit and operating system support hot-swap capability, you can remove or install the component while the BladeCenter unit is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- You do not have to turn off the BladeCenter unit to install or replace any of the hot-swap modules on the rear of the BladeCenter unit.
- When you install an I/O module in the BladeCenter unit, you must also install a compatible I/O expansion card in the blade server to support the I/O module.
- When you are finished working on the blade server or BladeCenter unit, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the BladeCenter unit and other IBM products, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

# System reliability guidelines

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

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

Cable requirements for the I/O module are described in the IBM *Configuration and Options Guide* at http://www.ibm.com/servers/eserver/xseries/cog/. See the documentation that comes with the blade server for cable-routing information.

# Handling static-sensitive devices

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

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

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

# Installing an I/O module

To install an I/O module, complete the following steps:

1. Make sure that you are using the latest versions of device drivers, utilities, firmware code, and BIOS code for the following devices:
   - The expansion cards in the BladeCenter unit and in the blade servers
   - The blade servers
   - The management module
   - The 4/8 Gb I/O modules and controller that are used by the expansion cards in the BladeCenter unit
   - Other I/O modules that are used by the expansion cards in the blade servers

   If the device drivers, utilities, firmware code, and BIOS code are not current, the BladeCenter unit might not recognize one or more of the following devices, and the BladeCenter unit or these devices might not be able to start.
   - The expansion cards
   - The 4/8 Gb I/O modules
   - Other I/O modules

If necessary, install the latest versions of device drivers, utilities, firmware code, and BIOS code for the previously listed devices.

To download the most recent device drivers, utilities, firmware updates, BIOS code updates, and expansion card boot code updates, go to http://www.ibm.com/systems/support/ for the latest information about upgrading the device drivers, firmware, and BIOS code for BladeCenter components. The instructions are in the documentation that comes with the updates. Also see the *Installation and User's Guide* for your blade server for additional information.

2. Read the safety information that begins on page v and "Installation guidelines" on page 18.

3. Remove the acoustic attenuation module, if one is installed, from the BladeCenter unit.

   Depending on the type of BladeCenter unit that you are using, the acoustic attenuation module is on the front or rear of the BladeCenter unit. For more information, see the documentation that comes with the BladeCenter unit.

4. Make sure that the BladeCenter unit is turned on, the green dc power LED on each power module is lit, and the green OK LED on the management module is lit.

5. Select one or two I/O-module bays in which to install an I/O module. For information about the supported I/O-module bays, see "I/O module preinstallation checklist" on page 15.

   **Note:** If you plan to use a blade server or other blade device to communicate with an I/O module, a compatible expansion card must be installed in that blade server or blade device. For additional information about the expansion card requirements for I/O modules, see "Expansion card requirements" on page 16.

6. Remove the filler module from the selected bay. Store the filler module for future use.

7. If you have not already done so, touch the static-protective package that contains the I/O module to an *unpainted* metal surface of the BladeCenter chassis or an *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the I/O module for at least 2 seconds.

8. Remove the I/O module from its static-protective package.

9. Make sure that the release latch on the I/O module is in the open position (perpendicular to the I/O module), as shown in the following illustration.

Depending on the type of BladeCenter unit that you are using, the installation procedure requires either a vertical or horizontal orientation for the I/O module. The following example shows a vertical orientation for installing an I/O module in the BladeCenter unit. For information about installing an I/O module in your BladeCenter unit, see the documentation that comes with the BladeCenter unit.

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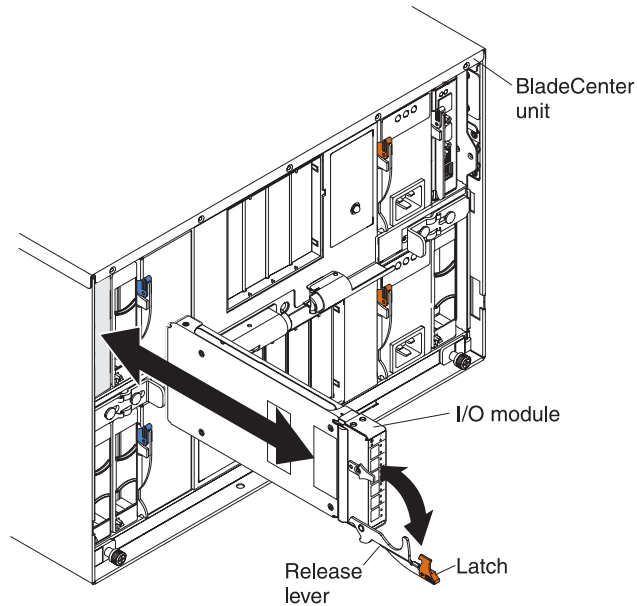


10. Slide the I/O module into the applicable I/O-module bay until it stops.

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

    **Notes:**

    a. The I/O module takes approximately 90 seconds to complete the POST. When the I/O module is turned on, an LED test occurs. All LEDs are lit and remain lit for approximately 5 seconds; then, all the LEDs except the OK LED turn off. The OK LED is lit at startup; then, POST proceeds as described in the next step.

    b. If an external port on a full fabric module is disabled, the corresponding LED continues to flash synchronously until the port is enabled through the management module.

    c. To maintain proper airflow, make sure that the ventilation areas on the sides of the blade server are not blocked.

12. Make sure that the LEDs on the I/O module indicate that it is operating correctly. (For LED locations, see "Information LEDs" on page 28.)

    • When the POST starts, make sure that the green OK LED on the I/O module is on during the startup process. The POST tests the condition of firmware, memory, data paths, and switch logic and uses the amber fault LED on the I/O module to indicate pass or fail conditions.

- Make sure that the green OK LED and the fault LED on the I/O module are both off, to indicate that the switch logic has successfully completed the POST.

  **Note:** If the fault LED on the I/O module continues to be lit, the POST has failed. Make sure that the BladeCenter unit is powered on and the BladeCenter unit LEDs are lit. If POST has failed, see the *QLogic Fibre Channel Switch Event Message Guide* for diagnostic information. You can find this document on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

  An amber LED on the BladeCenter unit is lit when a system error or event has occurred. To identify the error or event, check the other LEDs on the I/O module, and check the BladeCenter management-module event log or the switch system log.

13. If you have a second I/O module to install, repeat step 6 on page 20 through step 12 on page 21; otherwise, go to step 14.

14. If you are using the external I/O-module ports, you can connect an SFP+ module to external Fibre Channel port 0 and Fibre Channel ports 15 through 19. For SFP+ module installation instructions, see the documentation that comes with the SFP+ module.

   **Note:** An SFP+ module does not come with the I/O module but is required if you want to use external I/O-module ports.

15. Use LC-LC or LC-SC fiber-optic cables to connect the I/O-module external ports to external Fibre Channel devices. For more information, see the documentation that comes with the cables.

   **Note:** You can remove and replace an SFP+ module while the I/O module is operating without damaging the I/O module or the SFP+ module. However, transmission on the affected port is interrupted until the SFP+ module and cables are installed. See the documentation that comes with the connected Fibre Channel device for information about installation, configuration, and startup sequence.

16. Replace the acoustic attenuation module, if you removed it in step 3 on page 20.

17. Enable the new I/O module and its external ports through the management module, as described in "Enabling the I/O module and its external ports" on page 25.

   For additional information about the management module and enabling ports through the management module, see the following documents at http://www.ibm.com/systems/support/:
   - BladeCenter unit *Installation and User's Guide*
   - *BladeCenter Management Module Installation Guide*
   - *IBM BladeCenter Management Module User's Guide*

# Removing or replacing an I/O module

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**CAUTION:**
**If the I/O module is defective, remove it and replace it as described in this section. Then, remove the battery from the defective I/O module as described in Appendix A, "Removing the battery," on page 49. The I/O module battery contains lithium and can explode if the battery and I/O module are not properly used, handled, or disposed of.**

**Recycle or dispose of the battery and defective I/O module as required by local ordinances or regulations. For additional information, see and .**

To remove or replace an I/O module, complete the following steps:

1. Read the safety information that begins on page v and "Installation guidelines" on page 18.
2. If the BladeCenter unit has an acoustic attenuation module, remove it. See the documentation for the BladeCenter unit for instructions.
3. Disconnect the LC-LC or LC-SC cables from the two external ports on the SFP+ module. Removing these cables disrupts the network connection from the external Fibre Channel port to any connected external Fibre Channel devices. For removal instructions, see the documentation that comes with the cables.
4. Remove any SFP+ modules from the I/O-module external Fibre Channel ports. For removal instructions, see the documentation that comes with the SFP+ module.

5. Pull the release latch toward the bottom of the I/O module. The I/O module moves out of the bay approximately 0.6 cm (0.25 inch). Make sure that the release latch on the I/O module is in the open position (perpendicular to the I/O module), as shown in the following illustration.

   Depending on the type of BladeCenter unit that you are using, the removal procedure requires either a vertical or horizontal orientation for the I/O module. The following example shows a vertical orientation for removing an I/O module in the BladeCenter unit. For information about removing an I/O module in your BladeCenter unit, see the documentation that comes with the BladeCenter unit.

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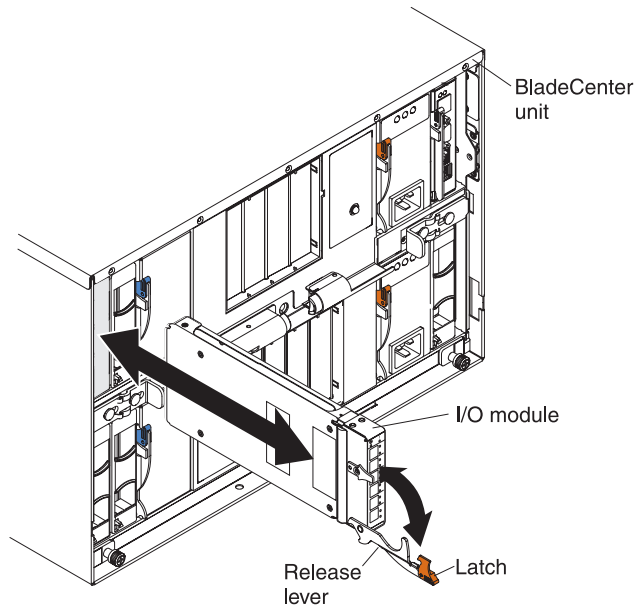


6. Slide the I/O module out of the bay and set it aside.
7. Place either another I/O module or a filler module in the bay.

   **Important**: Complete this step within 1 minute (see steps 11 and 12 on page 21 for more information).
8. If you placed another I/O module into the bay and if you are using the external I/O-module ports, insert any SFP+ modules that you removed (in step 4 on page 23) into external Fibre Channel port 0 and Fibre Channel ports 15 through 19. For installation instructions, see the documentation that comes with the SFP+ module.
9. Use LC-LC or LC-SC fiber-optic cables to connect the I/O-module external ports to external Fibre Channel devices. For more information, see the documentation that comes with the cables.
10. Replace the acoustic attenuation module, if you removed it in step 2 on page 23.

11. Enable the new I/O module and its external ports through the management module, as described in "Enabling the I/O module and its external ports."

    For additional information about the management module and enabling ports through the management module, see the following documents at http://www.ibm.com/systems/support/:

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

# Enabling the I/O module and its external ports

After you install an I/O module, you must make sure that the I/O module and its six external ports are enabled before you can configure the Fibre Channel fabric through the I/O module. To do this, use the BladeCenter Advanced Management Module.

**Notes:**

- For additional information about the management module and its configuration requirements, including the requirements for enabling ports, see the following documents at http://www.ibm.com/systems/support/:
  - BladeCenter unit *Installation and User's Guide*
  - *BladeCenter Management Module Installation Guide*
  - *IBM BladeCenter Management Module User's Guide*
  - *IBM BladeCenter Management Module Command-Line Interface Reference Guide*
- The contents of all management-module Web-interface pages vary according to the type of BladeCenter unit that you are using and the firmware versions and optional devices that are installed.
- The 14 internal I/O-module ports correspond to the connectors for the blade servers that you can attach to the BladeCenter unit.
- For the location of the six external ports, see the illustrations in Chapter 3, "Information panel LEDs and external Fibre Channel ports," on page 27.

To enable an I/O module and its external ports, complete the following steps:

1. Start a management-module session by using a Web browser to connect to the BladeCenter Advanced Management Module. To do this, use the Advanced Management Module Internet protocol (IP) address. The BladeCenter management-module Web-interface page opens.
2. In the Advanced Management Module window, under **I/O Module Tasks** (in the left pane), click **Admin/Power/Restart**. The I/O Module Power/Restart window opens.
   - If the I/O module is not powered on, continue with step 3.
   - If the I/O module is powered on, continue with step 5 on page 26.
3. In the main window, select the I/O module that you want to turn on by selecting the check box in the first column.

4. Click **Power On Module(s)** at the bottom of the table. The I/O module is powered on, and a power-on self-test (POST) is performed. This might take several moments. At the end of the process, the following actions occur:

   a. In the table, the power (**PWR**) status column changes to ON.

   b. In the table, the **Power On Self Test (POST) Status** column displays: [POST results available: FF: Module completed POST successfully.] For additional POST values, see Chapter 8, "Solving problems," on page 45.

   c. The green OK LED on the I/O module is lit. For additional information about LEDs, see Chapter 3, "Information panel LEDs and external Fibre Channel ports," on page 27.

5. In the Advanced Management Module main window, scroll down to the **I/O Module Advanced Setup** choice.

6. From the drop-down menus, select the applicable I/O module.

   **Important:** Do not skip step 7. If you skip step 7, the ports will not operate.

7. Select **Enable** for the external ports.

8. Click **Save**. The I/O module and its external ports are now fully operational, and you can configure the Fibre Channel fabric through the I/O module.

# Chapter 3. Information panel LEDs and external Fibre Channel ports

This chapter describes the information panel and LEDs on the I/O module and identifies the external Fibre Channel ports on the information panel. For additional information about the ports, see "Features, specifications, and standards" on page 5.

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

## Information panel and internal connectors

The front panel of the I/O module contains the following components, as shown in the following illustration:

- Information LEDs that display the status of the I/O module and its network connections. For additional information, see "Information LEDs" on page 28.
- Six external Fibre Channel ports to connect Fibre Channel devices and switches. These ports are identified as ports 0, 15, 16, 17, 18, and 19 in the I/O-module configuration menus and are labeled 0, 15, 16, 17, 18, and 19 (from top to bottom) on the I/O module.
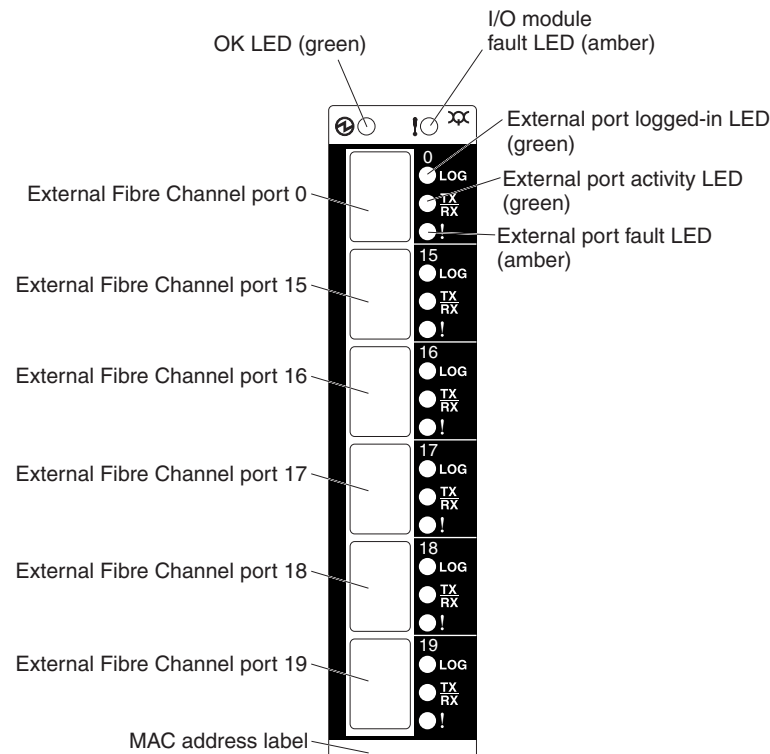
In the I/O-module configuration menus, the internal connectors are numbered 1 through 14 on the pass-thru module and the full fabric module.

**Notes:**

- The information panel is also known as the front panel.
- In the pass-thru module, the internal ports are logically mapped to the external ports. Use the QLogic management tools to view and modify the default internal

to external logical port mapping. For additional information, see the applicable
QLogic management guide for your I/O module.

- An IBM BladeCenter H unit has 14 internal ports. All licensed internal ports are
  accessible.
- An IBM BladeCenter HT unit has 12 internal ports. Ports 13 and 14 are not
  available on the I/O module. All other licensed internal ports are accessible.
- An IBM BladeCenter T Type 8720 or 8730 unit has eight internal ports. Ports 9
  through 14 are not available on the I/O module. All other licensed internal ports
  are accessible.
- An IBM BladeCenter S unit has 6 internal ports. Ports 7 through 14 are not
  available on the I/O module. All other licensed internal ports are accessible.

# Information LEDs

The front panel of the I/O module has multiple sets of LEDs. The OK and **!** (I/O
module fault) LEDs at the top of the I/O module represent I/O-module status. The
other sets of LEDs represent the status of each external Fibre Channel port. The
port LEDs are external port logged-in (LOG), external port activity (TX/RX), and
external port fault (**!**). The following illustration shows the locations of these LEDs
on the I/O module.
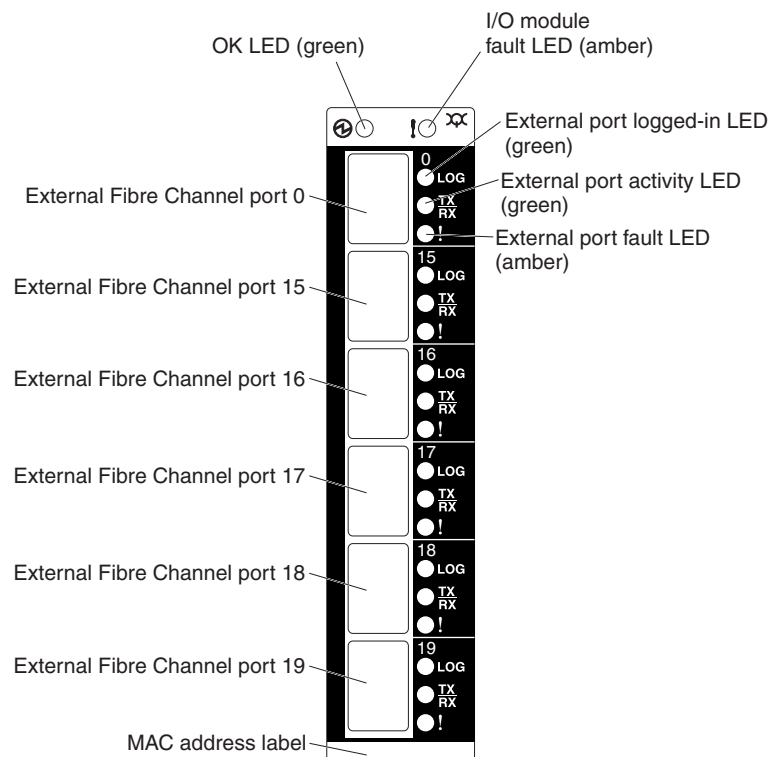
**Notes:**

- An amber LED on the BladeCenter unit is lit when a system error or event has occurred. To identify the error or event, check the other LEDs on the I/O module, and check the BladeCenter management-module event log or the switch system log.

- When the I/O module is turned on, an LED test occurs. All LEDs are lit and remain lit for approximately 5 seconds; then, all the LEDs except the OK LED turn off. The OK LED is lit at startup; then, POST proceeds as described in step 12 on page 21.

- Before you can use the I/O module and its external ports, you must make sure that these devices are enabled. For additional information, see "Enabling the I/O module and its external ports" on page 25.

- If an external port on a full fabric module is disabled, the corresponding LED continues to flash synchronously until the port is enabled through the management module.

  For additional information about the management module and enabling ports through the management module, see the following documents at http://www.ibm.com/systems/support/:

  – BladeCenter unit *Installation and User's Guide*

  – *BladeCenter Management Module Installation Guide*

  – *IBM BladeCenter Advanced Management Module User's Guide*

- For additional information about diagnostics, see the applicable documentation at http://www.ibm.com/systems/support/, on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com:

  – *BladeCenter Installation and User's Guide*

  – *Problem Determination and Service Guide*

  – *Hardware Maintenance Manual and Troubleshooting Guide*

  – *QLogic Fibre Channel Switch Event Message Guide*

  – *QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter QuickTools Switch Management User Guide*

  – *QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter QuickTools Switch Management Guide*

## LED states and colors

After you install the I/O module in the BladeCenter unit, the I/O-module LEDs become active. There are four possible LED states: off, lit, flickering, and flashing. The lit (steady) LEDs and flashing LEDs can be green or amber. A flickering LED can only be green.

The LEDs might display any of these states and colors during startup, POST, or other diagnostic tests. This is typical and does not indicate a problem, unless the LEDs indicate a problem after all the startup (boot) processes and diagnostic tests have been completed.

Any errors that are detected during POST are written to the system log. This log is accessible through the **show logging logfile** command in the switch CLI. For information about this command, see the applicable command-line interface guide on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

For information about error messages, see the *QLogic Fibre Channel Switch Event Message Guide* on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

**Note:** You can also use the management module to make sure that the I/O module is operating correctly. For more information, see the documentation for the BladeCenter unit.

## System status LEDs

The two LEDs in the first row at the top of the I/O module represent the I/O module status. These LEDs are the green OK LED and the amber I/O module fault LED. Table 4 contains a description of each system status LED on the information panel of the I/O module.

*Table 4. I/O-module system status LED descriptions*

| LED name | LED description |
|----------|----------------|
| OK | This green LED is at the top left of the I/O module on the front panel. This LED is lit at startup. <br><br>**Note:** When this LED is lit, the following LEDs are also lit: <br>• The green dc power LED on each power module in the BladeCenter unit <br>• The green OK LED on the management module |
| ! (I/O module fault) | This amber LED is at the top right of the I/O module on the front panel. This LED indicates that the I/O module has a fault. If the I/O module fails the POST, this fault LED is lit. <br>**Note:** This LED is also known as the system-error LED or the switch fault LED. |

## Fibre Channel external port status LEDs

There are three port LEDs directly to the right of each of the six Fibre Channel external ports on the front panel of the I/O module. These LEDs indicate the logged-in, activity, and fault status of that Fibre Channel external port.

Table 5 contains a description of each port LED on the information panel.

*Table 5. I/O-module Fibre Channel external port status LED descriptions*

| LED name | LED description |
|----------|----------------|
| External port logged-in (LOG) | There are six green external port logged-in (LOG) LEDs. The external port logged-in LED is the top LED directly to the right of the corresponding port. When one of these LEDs is lit, it indicates that there is a connection (or link) to a device on that port. |
| External port activity (TX/RX) | There are six green external port activity (TX/RX) LEDs. The external port activity LED is the middle LED directly to the right of the corresponding external port. When one of these LEDs flashes, it indicates that data is being received or transmitted (that is, activity is occurring) on that port. The flash frequency is proportional to the amount of traffic on that port. |

| LED name | LED description |
|---|---|
| External port fault (!) | There are six amber external port fault (!) LEDs. The external port fault LED is the bottom LED directly to the right of the corresponding external port. When an external port fault LED is lit, it indicates that the external port has failed the internal, external, or online port diagnostics tests that are performed with the QuickTools interface application or CLI. |

## LED activities and diagnostic flash patterns

Table 6 contains descriptions of the activities and corresponding diagnostic flash patterns for the I/O-module LEDs.

*Table 6. I/O-module LED activities and diagnostic flash patterns*

| LED name | LED activity/diagnostic flash pattern |
|---|---|
| OK | This LED is lit at startup. |
| ! (I/O module fault) | • The LED is off during initialization or when the I/O module is in normal operation.<br>• The LED is lit during LED test or to indicate a system fault during a POST failure, thermal fault, or other critical I/O module fault.<br>• The LED does not flash. |
| External port logged-in (LOG) | • The LED is off when the corresponding external port is not logged in.<br>• The LED is lit when the corresponding external port is logged in or during the LED test.<br>• The LED pattern indicates the following conditions:<br>  – Logged in: The LED is lit.<br>  – Logging in: The LED flashes at 1-second intervals.<br>  – Beacon location: The LED flashes at 1-second intervals.<br>  – Error: The LED flashes two times per second.<br>  – The corresponding external port is disabled: The LED flashes at 1-second intervals. |
| External port activity (TX/RX) | • The LED is off when the corresponding external port is not logged in or when the port is logged in and there is no external port activity.<br>• The LED is lit during the LED test.<br>• The LED flashes when external port activity performs a normal send or receive operation. |
| External port fault (!) | • The LED is off when external port diagnostics starts and is completed without error.<br>• The LED is lit when external port diagnostics discovers an external port error.<br>• The LED does not flash. |

# Chapter 4. Configuring the I/O module through a Telnet interface

The I/O module contains a Telnet server. This server enables a Telnet client to establish a Telnet session with the I/O module to retrieve information or to configure parameters through the command-line interface (CLI). You can perform a variety of fabric and switch-management tasks through an Ethernet connection by using the CLI.

You can access a Telnet interface in two ways:

- In the BladeCenter unit management-module Web interface
- Through a terminal emulator program on a network-management workstation

For you to access the I/O module through a Telnet interface, the IP address and subnet masks must be compatible with the network-management workstation, and the network-management workstation must be connected to an external BladeCenter unit management-module Ethernet port.

Before you can configure the Fibre Channel fabric through the I/O module, the following configuration settings must be enabled in the management module:

- External ports
- External management over all ports

To enable the configuration settings in the management-module Web interface, click **I/O Module Tasks** → **Admin/Power/Restart**.

**Important:** Before you configure the I/O module, make sure that the management modules in the BladeCenter unit are correctly configured. The management module and the I/O module must be on the same IP subnet. For more information, see the applicable *BladeCenter Installation and User's Guide* documents on the at http://www.ibm.com/systems/support/. For more detailed information about configuring the I/O module, see the applicable QuickTools switch management guide on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

**Notes:**

- Throughout this document, the management-module Web-based user interface is also known as the BladeCenter management-module Web interface.
- Throughout this document, the user name is also known as the login name or user ID for logging on to interfaces or programs.
- The screens that are described or referred to in this document might differ slightly from the screens that are displayed by your system. Screen content varies according to the type of BladeCenter unit and the firmware versions and options that are installed.
- When you are using a Telnet interface to configure the I/O module, be sure to configure your I/O module with the correct date and time information. See steps 5 through 7 on page 36 for additional information about setting the date and time of the I/O module.

# Connecting to the I/O module

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

# Establishing a Telnet session through the management module

To establish a Telnet session through the BladeCenter unit management module, complete the following steps:

1. In your browser, in the address bar, type *xxx.xxx.xxx.xxx*

   where *xxx.xxx.xxx.xxx* is the IP address of the BladeCenter unit management-module interface.

   **Note:** The default IP address for the BladeCenter unit management module is 192.168.70.125. If a new IP address has been assigned to the management module, use the new IP address instead of the default IP address.

2. Click **GO** or press Enter.

   The Enter Network Password window opens.

3. At the login prompt, type the management-module user name. At the password prompt, type the management-module password. The user name and password are case sensitive and are the same as those that are used for management-module Web access. The default management-module user name is USERID, and the default password is PASSW0RD. (Note that the sixth character in PASSW0RD is a zero, not the letter *O*.)

   The management-module Welcome window opens.

4. In the **Inactive session timeout value** field, select the timeout value for the Web session and click **Continue** or **Start Session**.

   **Note:** If a user is logged in under the user name that you have entered, you are given the option to start a new session. Clicking **Start Session** terminates the existing session.

   The management-module main window opens.

5. In the left navigation pane, under **I/O Module Tasks**, click **Configuration**.

   The I/O Module Management window opens.

6. Depending on which I/O-module bay contains the installed I/O module, click the link for either I/O-module 3 or 4, or the applicable I/O-module bay (8 or 10) in a device, such as an MSIM.

   The BladeCenter Management window opens.

7. Make sure that the IP address is the same in the **Current IP Configuration** and **New Static IP Configuration** areas.

8. Click **Advanced Configuration**.

   The BladeCenter Switch Management window opens.

9. To start a Telnet session, scroll down to the **Start Telnet/Web Session** area and click **Start Telnet Session**.

10. At the login prompt, type the management-module user name. At the password prompt, type the management-module password. The user name and password are case sensitive and are the same as those that are used for management-module Web access. The default management-module user

name is USERID, and the default password is PASSW0RD. (Note that the sixth character in PASSW0RD is a zero, not the letter *O*.)

The Command Line Interface Shell window opens.

To open online help to view the available commands, type `help` and press Enter.

**Note:** For more information about password requirements and using the CLI, see the applicable documentation that is listed in "CLI command format" on page 36.

Continue with "CLI command format" on page 36.

## Establishing a Telnet session through a terminal emulator program

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

- *Installation and User's Guide* for the BladeCenter unit
- *Advanced Management Module Installation Guide*
- *IBM BladeCenter Management Module Command-Line Interface Reference Guide*
- *IBM BladeCenter Advanced Management Module User's Guide*

To establish a Telnet session through a terminal emulator program, complete the following steps:

1. Open a command-line window on the network-management workstation.

   **Note:** The IP addresses in the following step are the default IP addresses of the I/O modules. If new IP addresses have been assigned to the I/O modules, use the new IP addresses instead of the default IP addresses.

2. Type one of the following commands, depending on which I/O-module bay contains the installed I/O module.

   If the I/O module is installed in I/O-module bay 3:

   `telnet 192.168.70.129`

   If the I/O module is installed in I/O-module bay 4:

   `telnet 192.168.70.130`

   If the I/O module is installed in a device, such as an MSIM, in I/O-module bay 8:

   `telnet 192.168.70.134`

   If the I/O module is installed in a device, such as an MSIM, in I/O-module bay 10:

   `telnet 192.168.70.136`

3. Press Enter.

   A Telnet command-prompt window opens.

4. At the login prompt, type the management-module user name. At the password prompt, type the management-module password. The user name and password are case sensitive and are the same as those that are used for management-module Web access. The default management-module user name is USERID, and the default password is PASSW0RD. (Note that the sixth character in PASSW0RD is a zero, not the letter *O*.)

   The Command Line Interface Shell window opens.

5. Type `admin start` and press Enter to obtain administrator privileges.
6. Set the date and time of the I/O module by typing `date` *[MMDDhhmmCCYY]*
   where:

   *[MM]* is the month

   *[DD]* is the day

   *[hh]* is the hour in 24-hour format

   *[mm]* is the minute

   *[CC]* represents the century identifier

   *[YY]* represents the last two numbers of the year

   For example, the format for 28 March 28 2008 8:46 p.m. is `date 032820462008`.
   Press Enter.
7. Type `admin end` and press Enter to exit from the administrator operating mode
   and return to the standard operating mode.

**Note:** For more information about password requirements and using the CLI, see
the applicable documentation that is listed in "CLI command format."

## CLI command format

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

For detailed information about using CLI commands, see the applicable
documentation at http://www.ibm.com/systems/support/, on the *QLogic 4/8 Gb
Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or
at http://support.qlogic.com:

- *IBM BladeCenter Management Module Command-Line Interface Reference
  Guide*
- *QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter Command Line
  Interface Guide*
- *QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter Command Line
  Interface Guide*

A command is followed by one or more keywords. The following rules apply when
you type keywords:

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

The CLI command syntax is as follows:

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

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

# Chapter 5. Configuring the I/O module through the QuickTools Web interface

The I/O module contains a Web server interface known as QuickTools. This server enables a Web-based client to establish a Web-interface session with the I/O module to retrieve information or to configure parameters through a Web browser. You can perform a variety of fabric and switch-management tasks through an Ethernet connection through a Web browser.

You can access the management-module Web interface in two ways:
- In the BladeCenter management-module Web interface
- Through a Web browser on a network-management workstation

QuickTools is a graphical interface that requires a Web browser to view and manage the switch. For information about system requirements and supported Web browsers, see the following documents at http://www.ibm.com/systems/support/:
- *Advanced Management Module Installation Guide*
- *IBM BladeCenter Management Module Command-Line Interface Reference Guide*
- *IBM BladeCenter Advanced Management Module User's Guide*

For you to access the I/O module through the Web interface, the IP address and subnet masks must be compatible with the network-management workstation, and the network-management workstation must be connected to an external BladeCenter unit management-module Ethernet port.

Before you can configure the Fibre Channel fabric through the I/O module, the following configuration settings must be enabled in the management module:
- External ports
- External management over all ports

To enable the configuration settings in the management-module Web interface, click **I/O Module Tasks** → **Admin/Power/Restart**.

**Important:** Before you configure the I/O module, make sure that the management modules in the BladeCenter unit are correctly configured. The management module and the I/O module must be on the same IP subnet. For more information, see the applicable *BladeCenter Installation and User's Guide* documents on the at http://www.ibm.com/systems/support/. For more detailed information about configuring the I/O module, see the applicable QuickTools switch management guide on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

**Notes:**
- Throughout this document, the management-module Web-based user interface is also known as the BladeCenter management-module Web interface.
- Throughout this document, the user name is also known as the login name or user ID for logging on to interfaces or programs.
- The screens that are described or referred to in this document might differ slightly from the screens that are displayed by your system. Screen content varies according to the type of BladeCenter unit and the firmware versions and options that are installed.

# Connecting to the I/O module

To use the QuickTools Web interface to access and control the I/O module, you must know the IP address for the I/O module and have an existing network connection. If you have to obtain the IP address of the I/O module or establish a network connection, contact your system or network administrator.

# Establishing a Web-interface session through the management module

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

1. In your browser, in the address bar, type *xxx.xxx.xxx.xxx*

   where *xxx.xxx.xxx.xxx* is the IP address of the BladeCenter unit management-module interface.

   **Note:** The default IP address for the BladeCenter unit management module is 192.168.70.125. If a new IP address has been assigned to the management module, use the new IP address instead of the default IP address.

2. Click **GO** or press Enter.

   The Enter Network Password window opens.

3. At the login prompt, type the management-module user name. At the password prompt, type the management-module password. The user name and password are case sensitive and are the same as those that are used for management-module Web access. The default management-module user name is USERID, and the default password is PASSW0RD. (Note that the sixth character in PASSW0RD is a zero, not the letter *O*.)

   The management-module Welcome window opens.

4. In the **Inactive session timeout value** field, select the timeout value for the Web session and click **Continue** or **Start Session**.

   **Note:** If a user is logged in under the user name that you have entered, you are given the option to start a new session. Clicking **Start Session** terminates the existing session.

   The management-module main window opens.

5. In the left navigation pane, under **I/O Module Tasks**, click **Configuration**.

   The I/O Module Management window opens.

6. Depending on which I/O-module bay contains the installed I/O module, click the link for either I/O module 3 or 4, or the applicable I/O-module bay (8 or 10) in a device, such as an MSIM.

   The BladeCenter Management window opens.

7. Make sure that the IP address is the same in the **Current IP Configuration** and **New Static IP Configuration** areas.

8. Click **Advanced Configuration**.

   The BladeCenter Switch Management window opens.

9. To start a Web-interface session, scroll down to the **Start Telnet/Web Session** section and click **Start Web Session**.

   The QuickTools Web interface security certificate check window opens.

   **Note:** The QuickTools Web interface supports only single-switch management per session.

10. Click **Yes** to accept the security certificate.

    The QuickTools Web interface Add a New Fabric window opens.

11. At the login name prompt, type the management-module user name. At the password prompt, type the management-module password. The login name and password are case sensitive and are the same as the user name and password that are used for management-module Web access. The default management-module user name is USERID, and the default password is PASSW0RD. (Note that the sixth character in PASSW0RD is a zero, not the letter *O*.)

12. Click the **Add Fabric** button.

13. If you receive a message indicating that the I/O module failed to respond to a request for a secure connection, click **Yes** to establish a nonsecure connection.

    The QuickTools Web interface topology window opens.

    In the I/O-module pane, a faceplate graphic is displayed. This graphic shows the BladeCenter chassis and the I/O-module external ports. In this graphic, a green square under a blade server indicates that a Fibre Channel HBA is logged in to the I/O module.

For more information about using the QuickTools Web interface and the CLI, see the applicable documentation at http://www.ibm.com/systems/support/, on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com:

- *IBM BladeCenter Management Module Command-Line Interface Reference Guide*
- *QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter Command Line Interface Guide*
- *QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter Command Line Interface Guide*
- *QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter QuickTools Switch Management Guide*
- *QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter QuickTools Switch Management Guide*

## Establishing a Web-interface session through a Web browser

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

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

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

1. Open a supported Web browser on the network-management workstation.

    **Note:** The IP addresses in the following step are the default IP addresses of the I/O modules. If new IP addresses have been assigned to the I/O modules, use the new IP addresses instead of the default IP addresses.

2. Type one of the following Web addresses in the address field, depending on which I/O-module bay contains the installed I/O module.

   If the I/O module is installed in I/O-module bay 3:

   `http://192.168.70.129`

   If the I/O module is installed in I/O-module bay 4:

   `http://192.168.70.130`

   If the I/O module is installed in a device, such as an MSIM, in I/O-module bay 8:

   `http://192.168.70.134`

   If the I/O module is installed in a device, such as an MSIM, in I/O-module bay 10:

   `http://192.168.70.136`

3. Press Enter.

4. Click **Yes** to accept the security certificate.

   The QuickTools Web interface Add a New Fabric window opens.

5. At the login name prompt, type the management-module user name. At the password prompt, type the management-module password. The login name and password are case sensitive and are the same as the user name and password that are used for management-module Web access. The default management-module user name is `USERID`, and the default password is `PASSW0RD`. (Note that the sixth character in `PASSW0RD` is a zero, not the letter *O*.)

6. Click the **Add Fabric** button.

7. If you receive a message indicating that the I/O module failed to respond to a request for a secure connection, click **Yes** to establish a nonsecure connection.

   The QuickTools Web interface topology window opens.

   In the I/O-module pane, a faceplate graphic is displayed. This graphic shows the BladeCenter chassis and the I/O-module external ports. In this graphic, a green square under a blade server indicates that a Fibre Channel HBA is logged in to the I/O module.

For more information about using the QuickTools Web interface and the CLI, see the applicable documentation at http://www.ibm.com/systems/support/, on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com:

- *IBM BladeCenter Management Module Command-Line Interface Reference Guide*
- *QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter Command Line Interface Guide*
- *QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter Command Line Interface Guide*
- *QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter QuickTools Switch Management Guide*
- *QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter QuickTools Switch Management Guide*

# Chapter 6. Upgrading and expanding the functionality of the I/O module

You can upgrade and expand the functionality of the I/O module by purchasing and installing optional software features. These features require a license.

There are several types of optional software features. As of the date of this document, these features have the names that are listed in Table 7. However, the names of these features are subject to change. Except where indicated in Table 7, these features are available for both the pass-thru module and the full fabric module. For additional information about these features, see the *QLogic 4/8 Gb Intelligent Pass-thru Module and 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter Enterprise Fabric Suite 2007 User Guide* and the other applicable documents that are listed in "QLogic documentation" on page 11.

**Note:** The titles of certain QLogic Corporation documentation and the names of certain QLogic Corporation software products contain references to the year 2007. However, the QLogic firmware and software have been upgraded to incorporate the features and functions of the pass-thru module and the full fabric module.

*Table 7. Optional features*

| Optional feature | Description |
|---|---|
| QLogic SAN Doctor for IBM BladeCenter | This feature provides fabric troubleshooting and repairs for one I/O module. |
| QLogic Enterprise Fabric Suite 2007 for IBM BladeCenter | This feature provides an optional workstation graphical interface for all the I/O modules that are connected to the workstation. |
| QLogic Fabric Manager Support Renewal for IBM BladeCenter | This feature entitles users to the latest version of Enterprise Fabric Suite management software. |
| QLogic Enterprise Fabric Suite Major Release Upgrade for IBM BladeCenter | This feature is a future upgrade for QLogic Enterprise Fabric Suite 2007 for IBM BladeCenter. |

## Purchasing the optional software features

To activate and use the optional software features, you must purchase the corresponding software license. For information about the availability of these features, contact your IBM reseller or authorized IBM representative.

To purchase and obtain an optional software license, go to http://www.ibm.com/systems/bladecenter/ and click **I/O modules**, or call IBM. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378). For all other countries, go to http://www.ibm.com/planetwide/ for support telephone numbers. After you purchase the feature, you will receive a license key and activation instructions.

Before you can expand the functionality of the I/O module and install a new software license, you must determine the product serial number of the I/O module. Use Telnet to log in to the I/O module as described in Chapter 4, "Configuring the I/O module through a Telnet interface," on page 33, and run the **show version** command to determine the value of the **Chassis Serial Number** data field. Record the serial number for future reference. For information about the **show version** command, see the applicable command-line interface guide on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

## Installing the optional software feature

To install an optional software feature on the switch, you must add the corresponding software license to the list of software features for the switch by using one of the following methods:

- Use a Telnet interface to log in to the I/O module as described in Chapter 4, "Configuring the I/O module through a Telnet interface," on page 33, and run the **feature add** *[license key]* command, where *[license key]* is the license key for the new feature. For information about this command, see the applicable command-line interface guide on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

  To make sure that the software license has been successfully added to the switch key, run the **feature log** command. For information about this command, see the applicable command-line interface guide on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

- Use the Web-based QuickTools interface to log in to the I/O module, as described in Chapter 5, "Configuring the I/O module through the QuickTools Web interface," on page 37. Then, follow the instructions in the applicable QuickTools switch management guide on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

For additional information about the license key requirements, see the applicable QuickTools switch management guide on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

# Chapter 7. Parts listing

Replaceable components are of three types:

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

The replaceable components in Table 8 are Tier 1 CRUs.

*Table 8. Replaceable components and corresponding CRU/FRU identifiers*

| Name of component | CRU/FRU identifier |
|---|---|
| QLogic 4/8 Gb Intelligent Pass-thru Module for IBM BladeCenter | - 88Y6410 (Option)<br>- 88Y6412 (Tier 1 CRU, assembly)<br>- 88Y6413 (FRU) |
| QLogic 20-Port 4/8 Gb SAN Switch Module for IBM BladeCenter | - 88Y6406 (Option)<br>- 88Y6408 (Tier 1 CRU, assembly)<br>- 88Y6409 (FRU) |
| I/O module filler, single high | 31R3303 (Tier 1 CRU) |
| IBM 8 Gb SFP+ Short Wave Optic Transceiver | 44X1964 (Tier 1 CRU) |

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

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

**Notes:**

1. The latest versions of these documents are at http://www.ibm.com/systems/support/.
2. Cable requirements for the I/O module are described in the IBM *Configuration and Options Guide* at http://www.ibm.com/servers/eserver/xseries/cog/. See the documentation that comes with the blade server for cable-routing information.

# Chapter 8. Solving problems

This chapter provides basic troubleshooting information to help you solve some problems that might occur while you are setting up the I/O module. For more detailed information about troubleshooting the I/O module, see the applicable command-line interface guide and the *QLogic Fibre Channel Switch Event Message Guide* on the *QLogic 4/8 Gb Intelligent Pass-thru and SAN Switch Modules for IBM BladeCenter Support* CD or at http://support.qlogic.com.

If you cannot locate and correct a problem by using the information in this section, see Appendix B, "Getting help and technical assistance," on page 51.

## Running POST

To ensure that it is fully operational, the I/O module processes a series of tests during power-up or a restart (power-on self-test, or POST). These tests take approximately 90 seconds to complete. The management module reads the test results and displays them for you. The green OK LED is lit at startup; then, POST proceeds and continues until all of the required tests are completed. If the I/O module fails POST, the amber I/O-module error LED and the system-error LED on the BladeCenter unit are lit. An event is stored in the event log in the system status panel of the management module. The specific failure is displayed on the system status I/O-module panel of the management module.

**Note:** For the locations and descriptions of the I/O-module LEDs, see Chapter 3, "Information panel LEDs and external Fibre Channel ports," on page 27.

## POST errors

There are two types of errors: noncritical and critical. A noncritical error applies to one port, and the I/O module is operational. You can continue to operate the I/O module; however, you must replace it as soon as possible. When a critical error occurs, the I/O module does not operate. To view POST results, complete the following steps:

1. Log on to the management module as described in the *IBM BladeCenter Management Module Command-Line Interface Reference Guide*. If necessary, obtain the IP address of the management module from your system administrator. The login window opens.

   **Note:** For the latest version of the *IBM BladeCenter Management Module Command-Line Interface Reference Guide*, go to http://www.ibm.com/systems/support/

2. After POST is completed, the management module displays the results. Refresh the window to view the POST results. If a critical error occurs, replace the I/O module. If a noncritical error occurs, see the I/O-module error log for additional details.

Table 9 describes the basic critical and noncritical failures. This abbreviated list is representative; it is not an exhaustive list. An error code is associated with each failure. Error codes are displayed on the Management Module Switch Information window. Be sure to note the applicable error code and corresponding failure. You might have to provide this information when you call for service. For details, see Appendix B, "Getting help and technical assistance," on page 51.

*Table 9. Abbreviated list of error codes for I/O-module critical and noncritical failures*

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

# Troubleshooting checklist

To reduce problems during system installation, configuration, and operation, observe the following guidelines:

- Make sure that the BladeCenter unit supports the 4/8 Gb I/O modules and the types of blade servers that support the expansion cards.

  **Notes:**
  - Contact your IBM marketing representative or authorized reseller for information about the types of compatible BladeCenter units, blade servers, and optional devices for the I/O modules, BladeCenter units, and blade servers.
  - See http://www.ibm.com/servers/eserver/serverproven/compat/us/ for a list of supported BladeCenter units, blade servers, and optional devices for the I/O modules, BladeCenter units, and blade servers.
  - For details about installation, configuration, and use of compatible devices, see the documentation that comes with these devices.

- Before you install an expansion card in a blade server, make sure that you are using a blade server that supports the expansion card.

  **Note:** If the expansion card is installed in a supported BladeCenter blade server, see the documentation that comes with the blade server for information about displaying attached Fibre Channel devices.

- Make sure that the 4/8 Gb I/O modules are compatible with the target expansion cards that you want to communicate with the 4/8 Gb I/O modules. Where applicable, the 4/8 Gb I/O modules in the BladeCenter unit must support the target expansion cards in the blade server.

- Make sure that the other I/O modules are compatible with the target expansion cards that you want to communicate with these I/O modules. Where applicable, certain other I/O modules in the BladeCenter unit must support the target expansion cards in the blade server.

- Make sure that the 4/8 Gb I/O modules and all other I/O modules are correctly installed in the supported I/O-module bays of the BladeCenter unit. For detailed instructions and additional information about installing I/O modules into the BladeCenter unit, see your BladeCenter documentation and Chapter 2, "Installing, removing, replacing, and enabling an I/O module," on page 15.

- Make sure that all expansion cards are installed correctly in a supported blade server. For instructions and additional information, see the *Installation and User's Guide* that comes with the blade server and the documentation that comes with the expansion cards.
- Make sure that the blade server is correctly installed in the BladeCenter unit. For instructions and additional information, see the *Installation and User's Guide* that comes with the blade server and the *Installation and User's Guide* that comes with the BladeCenter unit.
- Make sure that you are using the latest versions of device drivers, utilities, firmware code, and BIOS code for the following devices. If these items are not at the latest levels, the BladeCenter unit might not recognize one or more of the following devices, and the BladeCenter unit or these devices might not be able to start.
  - The expansion cards in the BladeCenter unit and in the blade servers
  - The blade servers
  - The management module
  - The 4/8 Gb I/O modules and controller that are used by the expansion card in the BladeCenter unit
  - Other I/O modules that are used by other expansion cards in the blade servers

  If necessary, install the latest versions of device drivers, utilities, firmware code, and BIOS code for these devices.

  To download the most recent device drivers, utilities, firmware updates, BIOS code updates, and expansion-card boot code updates, go to http://www.ibm.com/systems/support/ for the latest information about upgrading the device drivers, firmware, and BIOS code for BladeCenter components. The instructions are in the documentation that comes with the updates. Also see the *Installation and User's Guide* for your blade server for additional information.

  **Note:** For the latest version of the *IBM BladeCenter Management Module Command-Line Interface Reference Guide*, go to http://www.ibm.com/systems/support/.
- Make sure that the BladeCenter unit, blade server, and all other BladeCenter components are correctly configured. Also determine whether the system board in the blade server requires a special configuration.

  When you are using a Telnet interface to configure the I/O module, be sure to configure your I/O module with the correct date and time information. See steps 5 through 7 on page 36 for additional information about setting the date and time of the I/O module.

  For additional information about configuration requirements, see the documentation that comes with your BladeCenter unit, blade server, and other BladeCenter components.
- Make sure that all parameters, internal devices, and external devices have been enabled, where required. These devices include the I/O module and its external ports (see "Enabling the I/O module and its external ports" on page 25).

  For additional information, see the documentation that comes with the management module and the applicable utility programs and devices.
- Make sure that all peripheral devices are correctly connected to the I/O modules, turned on, and operating correctly.

  **Note:** For additional information, see the documentation that comes with the peripheral devices.

# Appendix A. Removing the battery

This appendix contains instructions for removing the battery from an I/O module in the BladeCenter unit.

The I/O module contains a battery that is not a field replaceable or customer replaceable component. However, when the I/O module is no longer needed, remove the battery from the I/O module and recycle or properly dispose of both the I/O module and battery according to applicable local and national ordinances or regulations.



**CAUTION:**
**If the I/O module is defective, remove it and replace it as described in "Removing or replacing an I/O module" on page 23. Read and observe the precautions for handling batteries in Safety Statement 2 on page viii. Then, remove the battery from the defective I/O module as described in this section. The I/O module battery contains lithium and can explode if the battery and I/O module are not properly used, handled, or disposed of.**

To remove the battery from the I/O module, complete the following steps:
1. Read the safety information that begins on page v and "Installation guidelines" on page 18.
2. If you have not already done so, remove the I/O module from the BladeCenter unit (see "Removing or replacing an I/O module" on page 23).
3. Remove the screws at the back of the I/O module that attach the switch cover to the switch base.
4. Remove the screws that attach the upper circuit board to the switch base.
5. Locate the round battery on the underside of the upper circuit board.
6. Remove the battery from the connector by inserting your fingertip under the battery and lifting the battery out of the connector. (If necessary, use a small flat-tip screwdriver to loosen the battery.)
7. Recycle or dispose of the battery and other I/O module components as required by local ordinances or regulations. For additional information, see and .

# Appendix B. Getting help and technical assistance

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

## Before you call

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

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

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

## Using the documentation

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

## Getting help and information from the World Wide Web

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

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

## Software service and support

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

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

## Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To
locate a reseller authorized by IBM to provide warranty service, go to
http://www.ibm.com/partnerworld/ and click **Find a Business Partner** on the right
side of the page. For IBM support telephone numbers, see http://www.ibm.com/
planetwide/. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

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

## IBM Taiwan product service

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

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

# Appendix C. Notices

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

## Important notes

This product is not intended to be connected directly or indirectly by any means whatsoever to interfaces of public telecommunications networks nor is it intended to be used in a public services network.

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

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1,048,576 bytes, and GB stands for 1,073,741,824 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 can 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 that are available from IBM.

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

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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 might differ from its retail version (if available) and might not include user manuals or all program functionality.

# Product recycling and disposal

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

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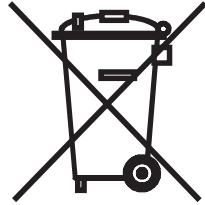


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This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout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

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

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

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

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

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

# Battery return program

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

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

**For Taiwan:** Please recycle batteries.



**For the European Union:**
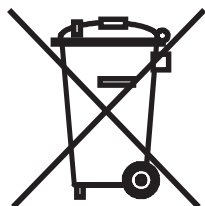


**Notice:** This mark applies only to countries within the European Union (EU).

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

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

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

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

This notice is provided in accordance with Royal Decree 106/2008 of Spain: The retail price of batteries, accumulators, and power cells includes the cost of the environmental management of their waste.

**For California:**

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

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

# Particulate contamination

**Attention:** Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the device, IBM may condition provision of repair or replacement of device or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

*Table 10. Limits for particulates and gases*

| Contaminant | Limits |
|---|---|
| Particulate | • The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1].<br>• Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282.<br>• The deliquescent relative humidity of the particulate contamination must be more than 60%[2].<br>• The room must be free of conductive contamination such as zinc whiskers. |
| Gaseous | • Copper: Class G1 as per ANSI/ISA 71.04-1985[3]<br>• Silver: Corrosion rate of less than 300 Å in 30 days |
| [1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. ||
| [2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction. ||
| [3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A. ||

# Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

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## Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

## 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.

## European Union EMC Directive conformance statement

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

**Attention:** This is an EN 55022 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.

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# Germany Class A statement

**Deutschsprachiger EU Hinweis:**

**Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit**

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der IBM gesteckt/eingebaut werden.

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

## Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

## Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
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Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
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    Technical Regulations, Department M456
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    Email: tjahn@de.ibm.com

**Generelle Informationen:**

**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.**

## VCCI Class A statement

この装置は、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。　　　　　　　　　VCCI-A

This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

## Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로
서 판매자 또는 사용자는 이 점을 주의하시기
바라며, 가정외의 지역에서 사용하는 것을 목
적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

## Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для
снижения которых необходимы дополнительные меры

## People's Republic of China Class A electronic emission statement

中华人民共和国 "A类" 警告声明

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

## Taiwan Class A compliance 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。

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