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QLogic Virtual Fabric Extension Module for IBM BladeCenter

Installation Guide

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Document Revision History	
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Preface

This *Installation Guide* contains the following instructions and information:

- Installing, removing, and replacing the QLogic Virtual Fabric Extension Module for IBM® BladeCenter®
- Enabling the Fabric Extension Module and its external ports
- Using the information panel, LEDs, and external ports on the Fabric Extension Module
- Configuring the Fabric Extension Module through a Telnet interface
- Configuring the Fabric Extension Module through the QuickTools® Web browser interface
- Performing basic troubleshooting tasks and solving problems with the Fabric Extension Module

NOTE:

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

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

Intended Audience

This guide introduces users to the switch and explains its installation and service. It is intended for users who are responsible for installing and servicing network equipment.

Related Materials

This *Installation Guide* contains instructions for setting up, installing, removing, configuring, and troubleshooting the Fabric Extension Module. This document also contains general information about the Fabric Extension Module.

The most recent versions of this *Installation Guide* and all other Fabric Extension Module documentation are available at http://support.qlogic.com.

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.

Read the *IBM Important Notices* guide before you install the I/O Module in the BladeCenter unit. This document contains important safety information, environmental, and other notices that apply to all class A devices. The *Warranty Information* guide describes the warranty for the I/O module.

The following related IBM documentation comes with the expansion card, Fabric Extension 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/:

- 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 8 Gb I/O modules. These I/O modules contain connectors for the blade servers in which the expansion card is installed.

- 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*.

- *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 Blade 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.

- *IBM 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*

- *Advanced Management Module Command-Line Interface Reference Guide*

- *Advanced Management Module User's Guide*

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**.

QLogic Documentation

The following related QLogic Corporation documentation is available from 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.

- *QLogic Virtual Fabric Extension Module Installation Guide* (this document)
- *QLogic Virtual Fabric Extension Module for IBM BladeCenter QuickTools User Guide*
- *QLogic Virtual Fabric Extension Module for IBM BladeCenter Command Line Interface 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

Terms and References

Consider the following terms and references:

- Throughout this document, including the references to screen contents, the QLogic Virtual Fabric Extension Module for IBM BladeCenter, is generically referred to as the Fabric Extension Module or the I/O module. With respect to certain screen contents or titles, a Fabric Extension Module might be referred to as a switch module or switch, because the term I/O module or switch appears on those screens.
- Unless otherwise stated, references to the BladeCenter unit apply to all BladeCenter units that support the Fabric Extension Module.
- Unless otherwise stated, references to the blade server apply to all blade servers that support the Fabric Extension Module and expansion card.
- 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 Fabric Extension Module.

Documentation Conventions

This guide uses the following documentation conventions:

- Text in blue font indicates a hyperlink (jump) to a figure, table, or section in this guide, and links to Web sites are shown in underlined blue. For example:
  - Table 9-2 lists problems related to the user interface and remote agent.
  - See "Installation Checklist" on page 3-6.
  - For more information, visit www.qlogic.com.
- Text in **bold** font indicates user interface elements such as a menu items, buttons, check boxes, or column headings. For example:
  - Click the **Start** button, point to **Programs**, point to **Accessories**, and then click **Command Prompt**.
  - Under **Notification Options**, select the **Warning Alarms** check box.
- Text in `Courier` font indicates a file name, directory path, or command line text. For example:
  - To connect to a group of hosts listed in a host group file (`.hst`), type `run -g path` and then press ENTER.
  - Enter the following command: `sh ./install.bin`
- Key names and key strokes are indicated with UPPERCASE:
  - Press CTRL+P.
  - Press the UP ARROW key.
- Text in *italics* indicates terms, emphasis, variables, or document titles. For example:
  - For a complete listing of license agreements, refer to the *QLogic Software End User License Agreement*.
  - What are *shortcut keys*?
  - Volume *xxx* (where xxx is 440, 460, 462).
- Topic titles between quotation marks identify related topics either within this manual or in the online help, which is also referred to as *the help system* throughout this document.

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.

NOTE:

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

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.

License Agreements

Refer to the *QLogic Software End User License Agreement* for a complete listing of all license agreements affecting this product.

1 QLogic Virtual Fabric Extension Module for IBM BladeCenter

Product Overview

The QLogic Virtual Fabric Extension Module for IBM BladeCenter is a full-fabric module combining 10-Gbps Ethernet and 8-Gbps Fibre Channel protocols. The Fabric Extension Module 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. In addition, the Fabric Extension Module uses the industry-standard Node port ID virtualization (NPIV) technology to provide a cost-effective connectivity solution for the IBM BladeCenter unit.

Port Types

The QLogic Virtual Fabric Extension Module for IBM BladeCenter for IBM BladeCenter has the following ports:

- Six external ports that connect to external Fibre Channel or Ethernet devices. These ports can be configured as full fabric (GL, G, F, FL) Fibre Channel, transparent fabric (TF) Fibre Channel.
- Eight internal ports, of which four can be active at a time, to connect to the blade-server bays in the BladeCenter unit. These ports can be configured as full-fabric (F_Port) Fibre Channel or transparent host (TH) Fibre Channel.

NOTE:

For additional information about the ports, see “Features” on page 1-3 and Section 3, Information Panel LEDs and External Fibre Channel Ports.

Management Interfaces

You can manage and configure the Fabric Extension Module through multiple interfaces.

- A Telnet connection to the embedded command-line interface (CLI). For additional information, see Section 4, Configuring the Fabric Extension Module through a Telnet Interface.
- A Web browser (QuickTools) interface. For additional information, see Section 5, Configuring the Fabric Extension Module through the QuickTools Web Interface.

Compatible Expansion Cards and Devices

To support each Fabric Extension Module that you install in the BladeCenter unit, you must also install converged network adapter in each blade server that you want to communicate with the Fabric Extension Module. For additional information, see “Expansion Card Requirements” on page 2-2.

The following types of optional devices are compatible with the Fabric Extension Modules:

- Converged network adapters for IBM BladeCenter
- 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 Fabric Extension Module, and other QLogic products at http://support.qlogic.com.

NOTE:

- Changes are made periodically to the QLogic Web site. Procedures for locating firmware and documentation might vary slightly from what is described in this document.
- 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 Fabric Extension 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, expansion cards, and optional compatible devices for the Fabric Extension Modules, BladeCenter units, and blade servers.

NOTE:

- For details about installation, configuration, and use of compatible devices, see the documentation that comes with these devices.
- You can install up to two Fabric Extension Modules in a BladeCenter unit. Do not install a pass-thru module and a full-fabric module in the same BladeCenter unit.
- You can find detailed hardware and software information, including documentation, at http://support.qlogic.com.
- 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.

Features

The Fabric Extension Module has the following features:

- Firmware installation

  Use the QuickTools Web interface or CLI to install and activate new firmware.

- Support for Non-Disruptive Code Load Activation (NDCLA)
- Registered State Change Notification (RSCN)

  The Fabric Extension 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 Fabric Extension Module supports standards-based FC-SW2 interoperability. Fibre Channel switches that connect to the external ports must support NPIV.

- Transparent mode (NPIV)

  Transparent mode 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. In transparent mode, the Fabric Extension 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 Fabric Extension 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 Fabric Extension Module supports the following frame bundling methods:

  - No frame bundling; - Frames are intermixed from different sources at will.
  - Soft lockdown: The Fabric Extension 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)

Inventory Checklist

Make sure that the shipping carton contains the following items:

- QLogic Virtual Fabric Extension Module for IBM BladeCenter
- The Qlogic Virtual Fabric Extension Module *Support* CD, which contains the documents listed in “QLogic Documentation” on page x.
- IBM *Important Notices* document
- *Warranty Flyer*

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

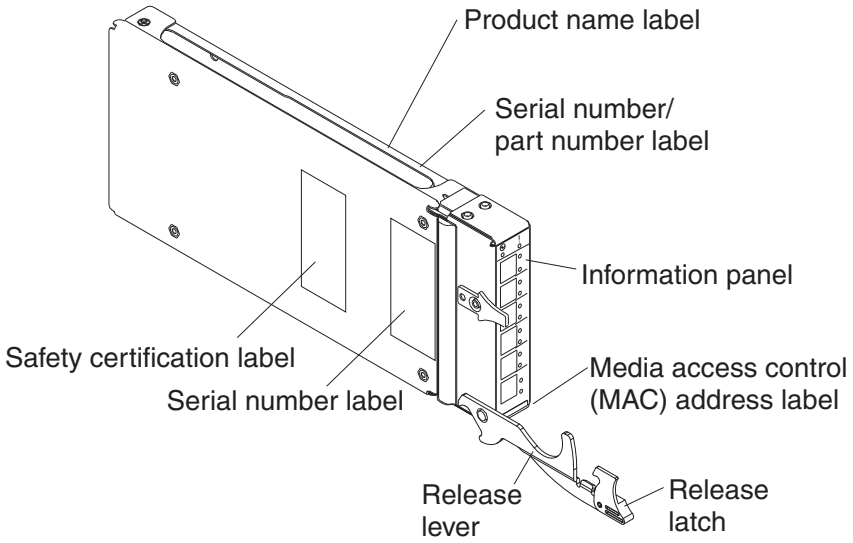
Notices and Statements in this Document

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:** provides additional information.
- ***CAUTION!*** indicates the presence of a hazard that has the potential of causing damage to data or equipment.
- ***DANGER!!*** indicates the presence of a hazard that has the potential of causing personal injury.

Major Components of the Fabric Extension Module

The following illustration shows the major components of the Fabric Extension Module. Your Fabric Extension 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 Section 3, “Information Panel LEDs and External Fibre Channel Ports” on page 3-1. For more information about the MAC address, see the *QLogic Virtual Fabric Extension Module for IBM BladeCenter QuickTools User Guide* on the product *Support* CD or at http://support.qlogic.com.

2 Installing, Removing, Replacing, and Enabling a Fabric Extension Module

This section provides instructions for installing, removing, replacing, and enabling a Fabric Extension Module in the BladeCenter unit.

Module Preinstallation Checklist

The following items are Fabric Extension Module preinstallation requirements and considerations.

- Make sure that you are using BladeCenter components that are compatible with the Fabric Extension Modules, BladeCenter units, and blade servers.

  For a list of the types of supported BladeCenter units, see Section 1, QLogic Virtual Fabric Extension Module for IBM BladeCenter. 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 Fabric Extension 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 Fabric Extension Modules. For additional information about the expansion card requirements for Fabric Extension Modules, see “Compatible Expansion Cards and Devices” on page 1-2
- The BladeCenter unit supports a maximum of two Fabric Extension Modules in I/O-module bays 3 and 5. 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.
- Configuration requirements for the Fabric Extension Module and the BladeCenter unit might vary. You can obtain up-to-date information about the Fabric Extension 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 Fabric Extension Module installation procedure, see “Troubleshooting Checklist” on page 7-3 for additional information.

Expansion Card Requirements

Install a converged network adapter in each blade server that you want to communicate with the Fabric Extension Module. For additional information about these adapters, 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 Fabric Extension Module. The expansion card has two CEE/FCoE ports. To enable the Fabric Extension Module to communicate with a blade server or other blade device, at least one of the previously specified supported types of Fabric Extension 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 a Fabric Extension Module is installed in an I/O-module bay 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 Fabric Extension Module is installed.

Table 2-1 summarizes the bay and port interconnections for each Fabric Extension Module and expansion card. In this table, the bay numbers correspond to the I/O-module bays in the BladeCenter unit. Installing a second Fabric Extension 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 2-1 allows for dual paths from the blade server or other blade device to the external Fibre Channel devices.

Installing a second Fabric Extension Module in the BladeCenter unit provides a backup Fabric Extension Module in case one Fabric Extension Module fails. Both Fabric Extension Modules must be of the same type if Fabric Extension Modules are installed in both I/O-module bays 3 and 5 of the BladeCenter unit.

Table 2-1. I/O-Module Bay/Adapter Port Correlation

Standard I/O-Module Bay In BladeCenter Unit	Fibre Channel I/O-Module Function
3	Connection to HSSM module in slot 9 (See the notes in this table.)
4	Not supported
5	Connections to HSSM in slot 7 and/or 9
6	Not supported
7 (upper right interconnect-module bay)	Port 0 connection on the converged network adapter in the BladeCenter unit
9 (lower right interconnect-module bay)	Port 1 connection on the converged network adapter in the BladeCenter unit

Notes:

- For additional information about the applicable I/O-module bays and adapter ports, see the documentation that comes with the BladeCenter unit and the adapter.
- A Fabric Extension Module can also be installed in other I/O configurations. For additional information about configuration requirements, see the applicable product documentation that comes with the device.

Installation Guidelines

Before you install the Fabric Extension Module in the BladeCenter unit, read the following information:

- Read the safety information that begins on page xii, "Handling Static-sensitive Devices" on page 2-5, 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 Fabric Extension 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 a Fabric Extension Module in the BladeCenter unit, you must also install a compatible I/O expansion card in the blade server to support the Fabric Extension 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 Fabric Extension 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

CAUTION!

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 a Fabric Extension Module

To install a Fabric Extension 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
   - HSSM in bays 7 and/or 9
   - Fabric Extension Modules
   - Other Fabric Extension 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
   - Fabric Extension 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 xii and "Installation Guidelines" on page 2-4.
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 a Fabric Extension Module. For information about the supported I/O-module bays, see “Module Preinstallation Checklist” on page 2-1.

NOTE:

If you plan to use a blade server or other blade device to communicate with a Fabric Extension Module, a compatible expansion card must be installed in that blade server or blade device. For additional information about the expansion card requirements for Fabric Extension Modules, see “Expansion Card Requirements” on page 2-2.

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 Fabric Extension 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 Fabric Extension Module for at least 2 seconds.
8. Remove the Fabric Extension Module from its static-protective package.
9. Make sure that the release latch on the Fabric Extension Module is in the open position (perpendicular to the Fabric Extension 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 Fabric Extension Module. The following example shows a vertical orientation for installing a Fabric Extension Module in the BladeCenter unit. For information about installing a Fabric Extension 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.

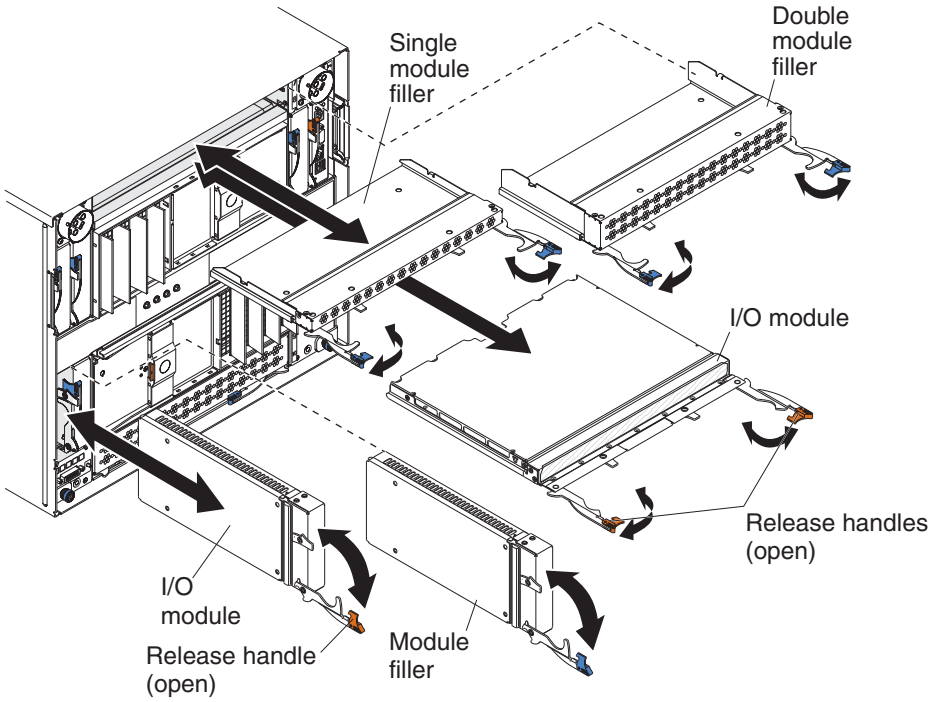


Figure 2-1 Installing the Fabric Extension Module

10. Slide the Fabric Extension Module into the applicable I/O-module bay until it stops.
11. Push the release latch on the front of the Fabric Extension Module to the closed position. After you insert and lock the Fabric Extension Module, it is turned on, and a power-on self-test (POST) occurs to verify that the Fabric Extension Module is operating correctly.

NOTE:

- The Fabric Extension Module takes about 90 seconds to complete the POST. When the Fabric Extension Module is turned on, an LED test occurs. All LEDs are lit and remain lit for about 5 seconds; then, the green OK LED will start flashing to indicate that the POST is in progress. During the POST, the port LEDs and the Fault LED will still be lit. When the POST completes successfully, the green OK LED is lit, and the amber fault LED and port LEDs go off.
- 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.
- 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 Fabric Extension Module indicate that it is operating correctly. For LED locations, see “Information LEDs” on page 3-3.
    - When the POST starts, make sure that the green OK LED on the Fabric Extension 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 Fabric Extension Module to indicate pass or fail conditions.
    - Make sure that the I/O module fault LED on the Fabric Extension Module is off, to indicate that the switch logic has successfully completed the POST.

    NOTE:

    If the fault LED on the Fabric Extension 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 Virtual Fabric Extension Module 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 Fabric Extension Module, and check the BladeCenter management-module event log or the switch system log.

13. If you have a second Fabric Extension Module to install, repeat steps 6 through 12; 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 ports 0–5. For SFP+ module installation instructions, see the documentation that comes with the SFP+ module.

    NOTE:

    An SFP+ module does not come with the Fabric Extension 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 Fabric Extension Module is operating without damaging the Fabric Extension 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.
17. Enable the new Fabric Extension Module and its external ports through the management module, as described in “Enabling the Fabric Extension Module and its External Ports” on page 2-13.

    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 a Fabric Extension Module

To remove or replace a Fabric Extension Module, complete the following steps:

1. Read the safety information that begins on page xii and “Installation Guidelines” on page 2-4.
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 Fabric Extension Module. The Fabric Extension Module moves out of the bay approximately 0.6 cm (0.25 inch). Make sure that the release latch on the Fabric Extension Module is in the open position (perpendicular to the Fabric Extension Module), as shown in Figure 2-2.

   Depending on the type of BladeCenter unit that you are using, the removal procedure requires either a vertical or horizontal orientation for the Fabric Extension Module. The following example shows a vertical orientation for removing a Fabric Extension Module in the BladeCenter unit. For information about removing a Fabric Extension 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.

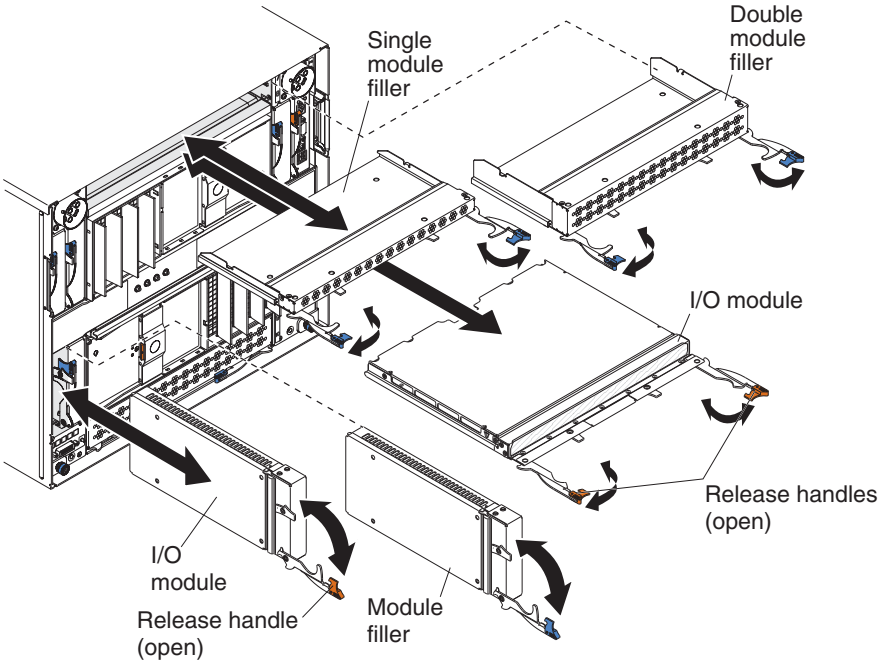


Figure 2-2 Removing the Fabric Extension Module

6. Slide the Fabric Extension Module out of the bay and set it aside.
7. Place either another Fabric Extension Module or a filler module in the bay. Complete this step within 1 minute (see steps 11 and 12 on page 2-8 for more information).

8. If you placed another Fabric Extension 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 2-10) into external Fibre Channel ports 0 through 5. 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 2-10.
11. Enable the new Fabric Extension Module and its external ports through the management module, as described in "Enabling the Fabric Extension Module and its External Ports" on page 2-13.

    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 Fabric Extension Module and its External Ports

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

NOTE:

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.

For the location of the six external ports, see the illustrations in Section 3, "Information Panel LEDs and External Fibre Channel Ports" on page 3-1.

To enable a Fabric Extension 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 Fabric Extension Module Power/Restart window opens.
   - If the Fabric Extension Module is not powered on, continue with step 3.
   - If the Fabric Extension Module is powered on, continue with step 5 on page 2-14.
3. In the main window, select the Fabric Extension 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 Fabric Extension 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 Section 7.
   c. The green OK LED on the Fabric Extension Module is lit. For additional information about LEDs, see Section 3.
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 Fabric Extension 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 Fabric Extension Module and its external ports are now fully operational, and you can configure the Fibre Channel fabric through the Fabric Extension Module.

3 Information Panel LEDs and External Fibre Channel Ports

This chapter describes the information panel and LEDs on the Fabric Extension Module and identifies the external Fibre Channel ports on the information panel. For additional information about the ports, see Appendix A, Specifications and Standards.

Information Panel and Internal Connectors

The front panel of the Fabric Extension Module contains the following components, as shown in the following illustration:

- Information LEDs that display the status of the Fabric Extension Module and its network connections. For additional information, see “Information LEDs” on page 3-3.
- Six external Fibre Channel ports to connect Fibre Channel devices and switches. These ports are identified as ports 0–5 in the I/O-module configuration menus and are labeled 0, 1, 2, 3, 4, and 5 (from top to bottom) on the Fabric Extension Module.

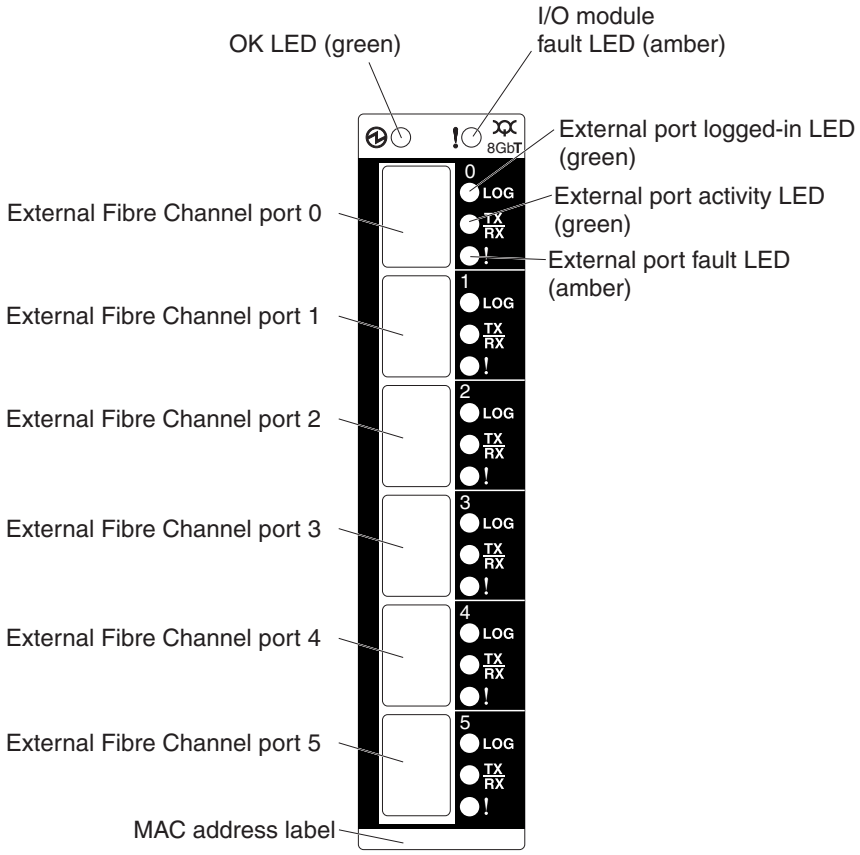


Figure 3-1 Fabric Extension Module Front Panel Components

In the I/O-module configuration menus, the internal connectors are numbered 6 through 13 on the pass-thru module and the full fabric module.

NOTE:

- 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 QuickTools or CLI management tools to view and modify the default internal to external logical port mapping. For additional information, see the *QLogic Virtual Fabric Extension Module for IBM BladeCenter QuickTools User Guide* or the *QLogic Virtual Fabric Extension Module for IBM BladeCenter Command Line Interface Guide*.
- A Fabric Extension Module has 8 internal ports. All licensed internal ports are accessible.

Information LEDs

The front panel of the Fabric Extension Module has multiple sets of LEDs. The OK and **!** (I/O module fault) LEDs at the top of the Fabric Extension 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 Fabric Extension Module.

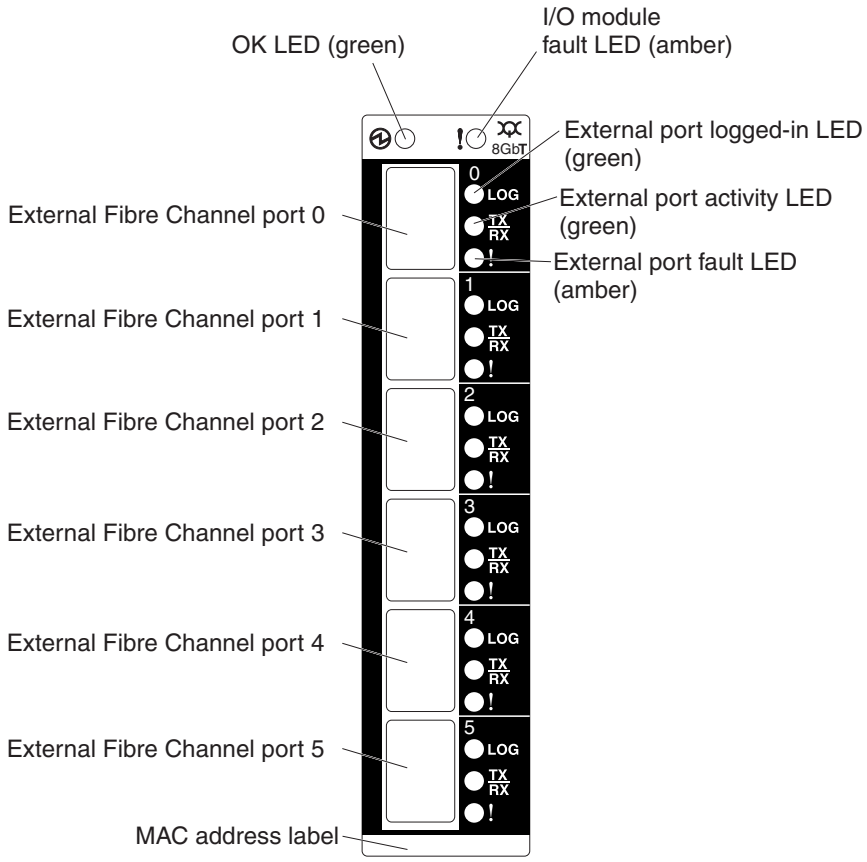


Figure 3-2 Fabric Extension Module LEDs

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 Fabric Extension Module, and check the BladeCenter management-module event log or the switch system log.

When the Fabric Extension Module is turned on, an LED test occurs. All LEDs are lit and remain lit for about 5 seconds; then, the green OK LED will start flashing to indicate that the POST is in progress. During the POST, the port LEDs and the amber Fault LED will still be lit. When the POST completes successfully, the green OK LED is lit, and the Fault LED and port LEDs go off.

Before you can use the Fabric Extension Module and its external ports, you must make sure that these devices are enabled. For additional information, see "Enabling the Fabric Extension Module and its External Ports" on page 2-13.

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 Virtual Fabric Extension Module 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 Virtual Fabric Extension Module for IBM BladeCenter QuickTools User Guide*

LED States and Colors

After you install the Fabric Extension 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 postlog` command in the switch CLI. For information about this command, see the *QLogic Virtual Fabric Extension Module for IBM BladeCenter Command Line Interface Guide* on the *QLogic Virtual Fabric Extension Module 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 product CD or at http://support.qlogic.com.

NOTE:

You can also use the management module to make sure that the Fabric Extension 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 Fabric Extension Module represent the Fabric Extension Module status. These LEDs are the green OK LED and the amber I/O module fault LED. Table 3-1 contains a description of each system status LED on the information panel of the Fabric Extension Module.

Table 3-1. System Status LED Descriptions

LED Name	LED Description
OK	This green LED is at the top left of the Fabric Extension Module on the front panel. This LED is lit at startup. When this LED is lit, the following LEDs are also lit: ■ The green DC power LED on each power module in the BladeCenter unit ■ The green OK LED on the management module
! (I/O module fault)	This amber LED is at the top right of the Fabric Extension Module on the front panel. This LED indicates that the Fabric Extension Module has a fault. If the Fabric Extension Module fails the POST, this fault LED is lit.This LED is also known as the system-error LED or the switch fault LED.

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 Fabric Extension Module. These LEDs indicate the logged-in, activity, and fault status of that Fibre Channel external port.

Table 3-2 contains a description of each port LED on the information panel.

Table 3-2. External Port Status LEDs

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.
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 3-3 contains descriptions of the activities and corresponding diagnostic flash patterns for the Fabric Extension Module LEDs.

Table 3-3. 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 Fabric Extension Module is in normal operation. The LED is lit during LED test or to indicate a system fault during a POST failure, thermal fault, or other critical Fabric Extension Module fault. The LED does not flash.
External port logged-in (LOG)	The LED is off when the corresponding external port is not logged in. The LED is lit when the corresponding external port is logged in or during the LED test. The LED pattern indicates the following conditions: ■ Logged in: The LED is lit. ■ Logging in: The LED flashes at 1-second intervals. ■ Beacon location: The LED flashes at 1-second intervals. ■ Error: The LED flashes two times per second. ■ 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. The LED is lit during the LED test. 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. The LED is lit when external port diagnostics discovers an external port error. The LED does not flash.

Notes

4 Configuring the Fabric Extension Module through a Telnet Interface

The Fabric Extension Module contains a Telnet server. This server enables a Telnet client to establish a Telnet session with the Fabric Extension 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 Fabric Extension 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 Fabric Extension 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**.

Before you configure the Fabric Extension Module, make sure that the management modules in the BladeCenter unit are correctly configured. The management module and the Fabric Extension 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 Fabric Extension Module, see the *QLogic Virtual Fabric Extension Module for IBM BladeCenter QuickTools User Guide* on the *QLogic Virtual Fabric Extension Module for IBM BladeCenter Support* CD or at http://support.qlogic.com.

NOTE:

- 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 Fabric Extension Module, be sure to configure your Fabric Extension Module with the correct date and time information. See steps 5 through 7 on page 4-5 for additional information about setting the date and time of the Fabric Extension Module.

Connecting to the Fabric Extension Module

To use a Telnet interface (in VT100 compatible terminal mode) to access and control the Fabric Extension Module, you must know the IP address of the Fabric Extension Module and have an existing network connection. If you have to obtain the IP address for the Fabric ExtensionModule 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 Fabric Extension Module, click the link for either I/O-module 3 or 5, or the applicable I/O-module bay (8 or 10) in a device.

   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 4-7.

Continue with “CLI Command Format” on page 4-7.

Establishing a Telnet Session through a Terminal Emulator Program

You can access the Fabric Extension 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 Fabric Extension Modules. If new IP addresses have been assigned to the Fabric Extension 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 Fabric Extension Module.
   - If the Fabric Extension Module is installed in I/O-module bay 3:

     ```
     telnet 192.168.70.129
     ```

   - If the Fabric Extension Module is installed in I/O-module bay 5:

     ```
     telnet 192.168.70.131
     ```

   - If the Fabric Extension Module is installed in a device in I/O-module bay 8:

     ```
     telnet 192.168.70.134
     ```

   - If the Fabric Extension Module is installed in a device 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 Fabric Extension 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” on page 4-7.

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 *QLogic Virtual Fabric Extension Module for IBM BladeCenter Command Line Interface Guide* on the *QLogic Virtual Fabric Extension Module for IBM BladeCenter Support* CD or at http://support.qlogic.com.

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 Delete keyword can be abbreviated as Del.

The CLI command syntax is as follows:

command

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.

Notes

5 Configuring the Fabric Extension Module through the QuickTools Web Interface

The Fabric Extension Module contains a Web server interface known as QuickTools. This server enables a Web-based client to establish a Web-interface session with the Fabric Extension 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 *QLogic Virtual Fabric Extension Module for IBM BladeCenter QuickTools User Guide* on the *QLogic Virtual Fabric Extension Module for IBM BladeCenter Support* CD or at http://support.qlogic.com.

For you to access the Fabric Extension 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 Fabric Extension 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**.

Before you configure the Fabric Extension Module, make sure that the management modules in the BladeCenter unit are correctly configured. The management module and the Fabric Extension 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 Fabric Extension Module, see the applicable *QLogic Virtual Fabric Extension Module for IBM BladeCenter QuickTools User Guide* on the *QLogic Virtual Fabric Extension Module for IBM BladeCenter Support* CD or at http://support.qlogic.com.

NOTE:

- 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 Fabric Extension Module

To use the QuickTools Web interface to access and control the Fabric Extension Module, you must know the IP address for the Fabric Extension Module and have an existing network connection. If you have to obtain the IP address of the Fabric Extension 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 Fabric Extension Module, click the link for either I/O module 3 or 5, or the applicable I/O-module bay (8 or 10) in a device.

   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 Fabric Extension 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 adapter is logged in to the Fabric Extension Module.

For more information about using the QuickTools Web interface, see the *QLogic Virtual Fabric Extension Module for IBM BladeCenter QuickTools User Guide* on the *QLogic Virtual Fabric Extension Module for IBM BladeCenter Support* CD or at http://support.qlogic.com.

Establishing a Web-interface Session through a Web Browser

You can access the Fabric Extension 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 Fabric Extension Modules. If new IP addresses have been assigned to the Fabric Extension 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 Fabric Extension Module.
   - If the Fabric Extension 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 5:

     `http://192.168.70.131`

   - If the Fabric Extension Module is installed in a device in I/O-module bay 8:

     `http://192.168.70.134`

   - If the I/O module is installed in a device 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 Fabric Extension 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 adapter is logged in to the Fabric Extension Module.

For more information about using the QuickTools Web interface, see the *QLogic Virtual Fabric Extension Module for IBM BladeCenter QuickTools User Guide* on the *QLogic Virtual Fabric Extension Module for IBM BladeCenter Support* CD or at http://support.qlogic.com

6 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 6-1 are Tier 1 CRUs.

Table 6-1. Replaceable Components and Corresponding CRU Identifiers

Part	CRU Number (Tier 1)
QLogic Virtual Fabric Extension Module for IBM BladeCenter assembly	46M6183
I/O module filler, single high	31R3303

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*

NOTE:

- The latest versions of these documents are at http://www.ibm.com/systems/support/.
- 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.

7 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*QLogic Virtual Fabric Extension Module for IBM BladeCenter Command Line Interface Guide* and the *QLogic Fibre Channel Switch Event Message Guide* on the *QLogic Virtual Fabric Extension Module 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 “Getting Help and Technical Assistance” on page B-1.

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. For the locations and descriptions of the I/O-module LEDs, see Section 3, “Information Panel LEDs and External Fibre Channel Ports” on page 3-1.

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 7-1 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.

Table 7-1. 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 8-Gbps I/O modules and the types of blade servers that support the expansion cards.

  NOTE:

  - 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 8 Gb I/O modules are compatible with the target expansion cards that you want to communicate with the 8 Gb I/O modules. Where applicable, the 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 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 Section 2, “Installing, Removing, Replacing, and Enabling a Fabric Extension Module” on page 2-1.

- 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 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 4-5 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 Fabric Extension Module and its External Ports” on page 2-13).

  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.

Notes

A Specifications and Standards

Table A-1 contains a summary of the specifications, standards, and protocols that apply to the Fabric Extension Module.

Table A-1. Standards and Specifications

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 service classes	Class 2 and class 3
Operation modes.....	Fibre Channel class 2 and class 3, connectionless
External port type:	
■ FC full fabric.....	Generic loop port (GL_Port)
■ FC transparent	Transparent fabric port (TF_Port)

Table A-1. Standards and Specifications (Continued)

Internal port type: ■ FC full fabric..... ■ FC transparent	 Fabric port (F_Port) Transparent host port (TH_Port)
Port characteristics.....	External ports are automatically detected and self- configuring Port LEDs illuminate at startup
Number of Fibre Channel ports	6 external; 8 internal
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)
Interoperability.....	FC-SW2
Port-mapping ratio.....	Up to a 255 to 1
Media type.....	Small form-factor pluggable plus (SFP+) module
2 Gb fabric port speed.....	1.0625 or 2.125 Gbps
2 Gb fabric latency	Less than 0.4 msec
2 Gb fabric aggregate bandwidth ..	56 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	112 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	224 Gbps at full duplex
Maximum frame size	2148 bytes (2112 byte payload)

Table A-1. Standards and Specifications (Continued)

Architecture	Nonblocking architecture to prevent latency
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	■ Telnet interface and command-line interface (CLI) ■ QuickTools Web interface
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)
Environment:	
■ Operating temperature	10°C to 52° C (50°F to 125.6° F) at 0 to 914 m (0 to 3000 ft)
■ Non-operating temperature	-40°C to 65° C (-40°F to 149° F) at 0 to 12,000 m (0 to 39,370 ft)
■ Operating humidity	8% to 80%, noncondensing
■ Non-operating humidity	5% to 80%, noncondensing

Table A-1. Standards and Specifications (Continued)

Electrical:	
Power source loading.....	3.75 amps maximum at 12 V dc
Heat output.....	35 watts maximum
Operating voltage	12 Vdc
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)

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 diagnosticprograms. 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
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Taipei, Taiwan
Telephone: 0800-016-888

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