

# IBM Flex System FC3171 8Gb SAN Switch and Pass-thru

## IBM Redbooks Product Guide

The IBM Flex System™ FC3171 8Gb SAN Switch is a full-fabric Fibre Channel component with expanded functionality. The SAN switch supports high speed traffic processing for IBM Flex System configurations, and offers scalability in external SAN size and complexity, and enhanced systems management capabilities. The IBM Flex System FC3171 8Gb Pass-thru supports a fully interoperable solution for seamless integration of the Fibre Channel initiators to an existing fabric. The pass-thru module uses industry-standard N\_Port ID virtualization (NPIV) technology to provide a cost-effective connectivity solution for the IBM Flex System chassis.

Figure 1 shows the switch module.



Figure 1. IBM Flex System FC3171 8Gb SAN Switch

### Did you know?

These switch modules are licensed to operate in either full-fabric mode or intelligent pass-thru mode. These modules allow IBM Flex System integration with any open-standards-based SAN, whether the module has enterprise open-system fabric functionality using the full-fabric mode, or the module has transparent switching functionality using the intelligent pass-thru mode.

IBM Flex System, a new category of computing and the next generation of Smarter Computing, offers intelligent workload deployment and management for maximum business agility. This chassis delivers high-speed performance complete with integrated servers, storage, and networking for multi-chassis management in datacenter compute environments. Furthermore, its flexible design can meet the needs of varying workloads with independently scalable IT resource pools for higher utilization and lower cost per workload. While increased security and resiliency protect vital information and promote maximum uptime, the integrated, easy-to-use management system reduces setup time and complexity, providing a quicker path to ROI.

## Part number information

The part numbers to order the switch and optional upgrades are shown in Table 1.

Table 1. Part numbers and feature codes for ordering

Description	Part number	Feature codes
IBM Flex System FC3171 8Gb SAN Switch	69Y1930	A0TD / 3595*
IBM Flex System FC3171 8Gb SAN Pass-thru	69Y1934	A0TJ / 3591

\* The first feature code listed is for configurations ordered through IBM System x® sales channels. The second feature code is for configurations ordered through the IBM Power Systems™ sales channel.

Unlike FC3171 8Gb SAN Switch full-fabric operations, the pass-thru module concentrates multiple compute nodes into the external ports. The external ports connect to external Fibre Channel switches that support NPIV. The internal ports connect directly to compute nodes through the chassis backplanes. The pass-thru module presents one or more compute nodes per port to the fabric. The pass-thru module expands the fabric, but, unlike a full-fabric switch, it does not count against the fabric domain.

The part number includes the following items:

- One IBM Flex System FC3171 8Gb SAN Switch or Pass-thru
- Important Notices Flyer
- Warranty Flyer
- Documentation CD-ROM

The switch does not include a serial management cable; however, the IBM Flex System Management Serial Access Cable, 90Y9338, is supported and contains two cables, a mini-USB-to-RJ45 serial cable and a mini-USB-to-DB9 serial cable, either of which can be used to connect to the switch locally for configuration tasks and firmware updates.

The switch comes without any SFP+ transceivers, they must be ordered separately to provide outside connectivity. The following table lists supported SFP+ options.

Table 2. Supported SFP+ transceivers

Part number	Feature code*	Description
44X1964	5075 / 3286	IBM 8Gb SFP+ SW Optical Transceiver
39R6475	4804 / 3238	IBM 4Gb SW SFP Transceiver

\* The first feature code listed is for configurations ordered through System x sales channels. The second feature code is for configurations ordered through the IBM Power Systems sales channel.

## Benefits

The switch offers the following key benefits:

- Easy to install and manage  
On-board GUI – no software to load. Just point a web browser at any switch and manage the entire fabric from that location. No matter what your level of expertise, the web-based QuickTools interface has all you need for basic fabric management.
- Fast, reliable performance  
The switch provides uncontested “wire speed” bandwidth at every port – a total of 320 Gbps per switch with less than 4 ms fabric latency.
- Interoperability  
The switch supports FC-SW-2 interoperability standards and transparent mode of operations to simplify integration into a multi-vendor fabric.
- Investment protection  
The switch provides low total cost of ownership (TCO) with quick set up and easy to manage integrated tools.

## Features and specifications

The FC3171 8Gb SAN Switch and Pass-thru have the following features and specifications:

- Internal ports:
  - 14 internal full-duplex 8 Gb FC ports
  - Internal ports operate as F\_ports (fabric ports) on the FC3171 8Gb SAN Switch
  - Internal ports operate as TH\_Ports (transparent host ports) on the FC3171 8Gb SAN Pass-thru
  - Two internal full-duplex 1 GbE ports connected to the chassis management module
- External ports:
  - Six external ports for 8 Gb SFP+ or 4 Gb SFP transceivers supporting 2 Gb, 4 Gb, and 8 Gb port speeds (SFP+ modules are not included and must be purchased separately - see Table 2)
  - External ports can operate as F\_ports (fabric ports), FL\_ports (fabric loop ports), or E\_ports (expansion ports) on the FC3171 8Gb SAN Switch
  - External ports operate as TF\_Ports (Transparent Fabric Ports) on the FC3171 8Gb SAN Pass-thru
  - One external 100 Mb Fast Ethernet (100BASE-TX) port with RJ-45 connector for switch configuration and management
  - One RS-232 serial port (mini-USB connector) that provides an additional means to configure the switch module
- Transparent (N\_Port ID Virtualization - NPIV) mode support
- Power-on self-test diagnostics and status reporting
- Support for Non-Disruptive Code Load Activation (NDCLA)
- Registered State Change Notification (RSCN):  
The switch supports RSCN as described in FC-FLA. RSCN enables an agent to register for change

events in the fabric and attached devices.

- Support for standards-based FC-SW2 interoperability
- Error detection:
  - Cyclic redundancy check (CRC)
  - 8-byte and 10-byte conversion
  - Parity
  - Long frame and short frame
  - D\_ID mismatch
  - S\_ID mismatch
- Frame bundling:
  - No frame bundling (frames are intermixed from different source ports)
  - Soft lockdown (the I/O module waits for the sequence to be completed or a gap in the frame traffic to occur before it services requests from a different port)
- Configurable Fabric Address Notification (FAN)
- Supports up to 239 switches depending on configuration
- 8 Gb switch fabric aggregate bandwidth: 320 Gbps at full duplex
- Maximum frame size: 2148 bytes (2112 byte payload)
- Nonblocking architecture to prevent latency
- Fabric Latency: Less than 4 ms
- Support for Call Home function
- Support for Domain Name Service (DNS)
- Support for Internet protocol (IP) Version 4 and 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)
- Easier SAN maintenance, isolation and troubleshooting with SANdoctor that is a part of base firmware
- Optional small form-factor pluggable plus (SFP+) modules

The following software features come with the switch module:

- QuickTools Web interface
- Fabric Security

The switch supports the following management methods:

- Web interface through QuickTools
- Command-line interface through SSH (Telnet is also supported but disabled by default)
- Switch simple network management protocol (SNMP) agent: enables a network management workstation to receive configuration values, traffic information, and Fibre Channel failure data through

## Supported Fibre Channel standards

The switch supports the following Fibre Channel standards:

- C-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

## Supported chassis and adapter cards

The switches are installed in switch bays in the rear of the IBM Flex System Enterprise Chassis as shown in the following figure. Switches are normally installed in pairs because I/O adapter cards installed in the compute nodes route to two switch bays for redundancy and performance.

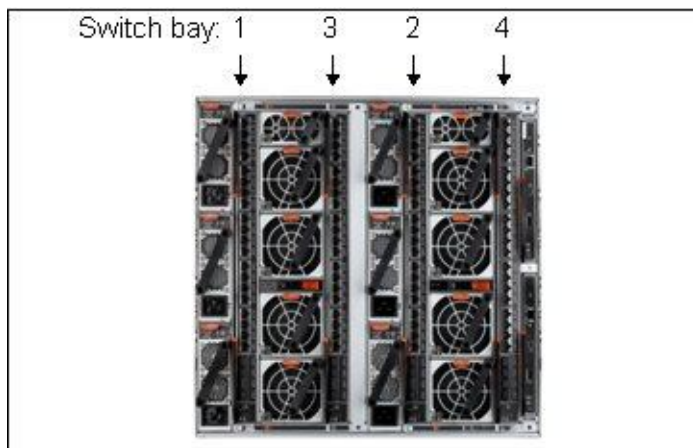


Figure 2. Location of the switch bays in the IBM Flex System Enterprise Chassis

The connections between the adapters installed in the compute nodes to the switch bays in the chassis are shown diagrammatically in the following figure. The figure shows both half-wide servers, such as the x240 with two adapters, and full-wide servers, such as the p460 with four adapters.

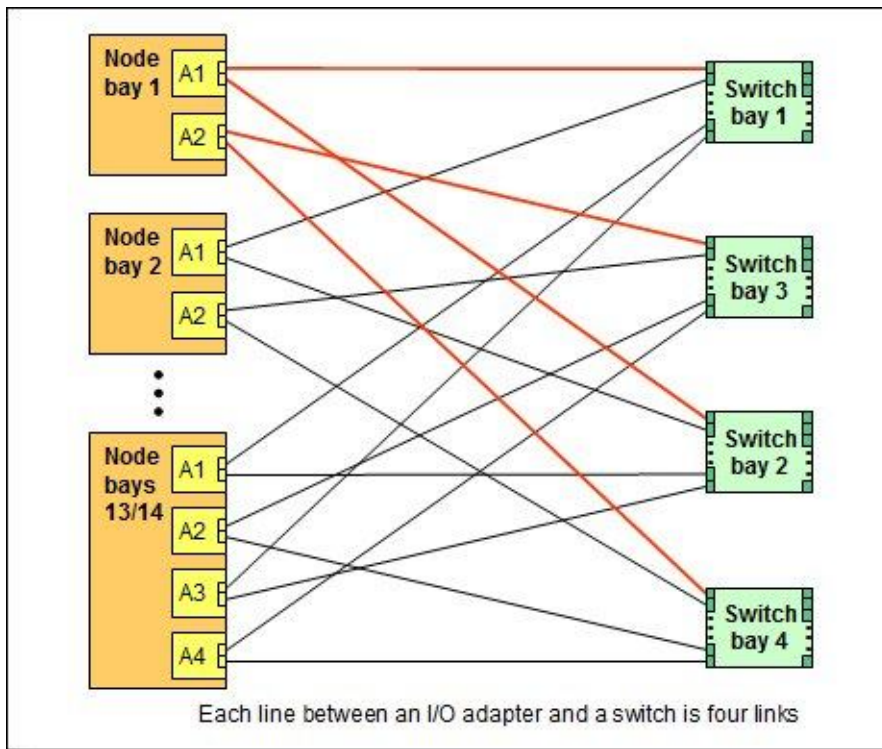


Figure 3. Logical layout of the interconnects between I/O adapters and I/O modules

The IBM Flex System FC3171 8Gb SAN Switch and Pass-thru can be installed in bays 1, 2, 3, and 4 of the Enterprise chassis. Supported adapter card must be installed in a corresponding slot of the compute node (slot A1 when switches are installed in bays 1 and 2 or slot A2 when switches are in bays 3 and 4).

With compute nodes that have an integrated dual-port 10 GbE network interface controller (NIC) these switches can only be installed in bays 3 and 4 because integrated NICs ports are routed to bays 1 and 2 with a specialized periscope connector and the FC adapter card cannot be installed in slot A1. However, when needed, the periscope connector can be replaced with an FC adapter card, in which case integrated NIC will be disabled and FC switches can be used in bays 1 and 2.

The following table shows the connections between adapters installed in the compute nodes to the switch bays in the chassis with IBM Flex System FC3171 8Gb SAN switches or Pass-thru modules and supported dual-port FC adapters.

Table 4. Adapter to I/O bay correspondence

I/O adapter slot in the server	Port on the adapter	Corresponding I/O module bay in the chassis
Slot 1	Port 1	Module bay 1
	Port 2	Module bay 2
Slot 2	Port 1	Module bay 3
	Port 2	Module bay 4
Slot 3 (full-wide compute nodes only)	Port 1	Module bay 1
	Port 2	Module bay 2
Slot 4 (full-wide compute nodes only)	Port 1	Module bay 3
	Port 2	Module bay 4

The following table lists the storage I/O adapters supported by the FC3171 8Gb SAN Switch and SAN Pass-thru.

Table 5. Storage adapters

Description	Part number	System x feature code	Power Systems feature code	Support for FC3171 switch and pass-thru
<b>16 Gb Fibre Channel</b>				
IBM Flex System FC5022 2-port 16Gb FC Adapter	88Y6370	A1BP	None	No
<b>8 Gb Fibre Channel</b>				
IBM Flex System FC3172 2-port 8Gb FC Adapter	69Y1938	A1BM	1764	Yes
IBM Flex System FC3052 2-port 8Gb FC Adapter	95Y2375	A2N5	None	Yes

The adapters are installed in slots in each compute node. The following figure shows the locations of the slots in the x240 Compute Node. The positions of the adapters in the other supported servers are similar.

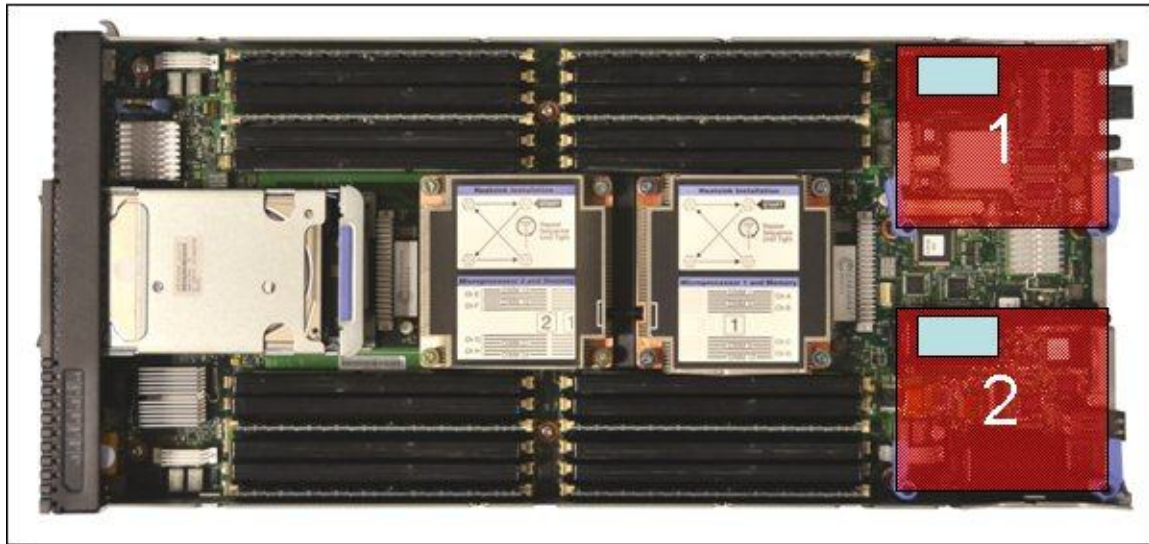


Figure 4. Location of the I/O adapter slots in the IBM Flex System x240 Compute Node

## Connectors and LEDs

Figure 5 shows the front panel of the IBM Flex System FC3171 8Gb SAN Switch and Pass-thru.



Figure 5. Front panel of the IBM Flex System FC3171 8Gb SAN Switch and Pass-thru

The front panel contains the following components:

- LEDs that display the status of the switch module and the fabric:
  - OK LED indicates that the switch module has passed the power-on self-test (POST) with no critical faults and is operational.
  - Identify: This Blue LED can be used to identify the switch physically, by illuminating via the management software.
  - Error LED (switch module error) indicates that the switch module has failed the POST or detected an operational fault.
- One mini-USB RS-232 console port that provides an additional means to configure the switch module. This mini-USB-style connector enables connection of a special serial cable. (The cable is optional and it is not included with the switch; see the Part number information section for details).



- One 100 Mb Fast Ethernet RJ-45 port for switch configuration and management
- Six external SFP+ port connectors to attach SFP+ modules for 8 Gb or 4 Gb connections to external Fibre Channel devices
- An FC link error LED, an FC Tx/Rx LED, and FC Loggen-in LED for each external port on the switch

## Cabling requirements

The cables required for the switch are as follows:

- 8 Gb FC SW SFP+ transceivers (see Table 2)
  - 850 nm communication using multimode fiber cable (50  $\mu$  or 62.5  $\mu$ ) up to 150 m at 8 Gbps, LC duplex connector
- 4 Gb FC SW SFP transceivers (see Table 2)
  - 850 nm communication using multimode fiber cable (50  $\mu$  or 62.5  $\mu$ ) up to 300 m at 4 Gbps speed, LC duplex connector
- 100BASE-TX (external 100 Mb Fast Ethernet management port)
  - UTP Category 5 (100 meters maximum)
  - EIA/TIA-568B 100-ohm STP (100 meters maximum)
- RS-232 serial cable: Console cable DB-9-to-mini-USB or RJ-45-to-mini-USB (nonstandard use of USB connector) that come with optional IBM Flex System Management Serial Access Cable, 90Y9338

## Warranty

There is a 1-year, customer-replaceable unit (CRU) limited warranty. When installed in a chassis, these switches assume your system's base warranty and any IBM ServicePac® upgrade.

## Physical specifications

The approximate dimensions and weight of the switch are as follows:

- Height: 30 mm (1.2 in.)
- Width: 401 mm (15.8 in.)
- Depth: 317 mm (12.5 in.)
- Weight: 3.0 kg (6.6 lb)

Shipping dimensions and weight (approximate):

- Height: 114 mm (4.5 in.)
- Width: 508 mm (20.0 in.)
- Depth: 432 mm (17.0 in.)
- Weight: 3.4 kg (7.6 lb)

## Operating environment

- Temperature and altitude

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

## Regulatory compliance

The switch conforms to the following 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)

## Popular configurations

The following figure shows use of the IBM Flex System FC3171 8Gb SAN Switch to route two ports on the adapter card installed in slot 2 of the compute node. Each compute node has two 8 Gb FC ports, and two FC3171 switches are installed in bays 3 and 4 of the Enterprise Chassis. The connections between the adapter card and the switches are internal to the chassis. No cabling is needed.

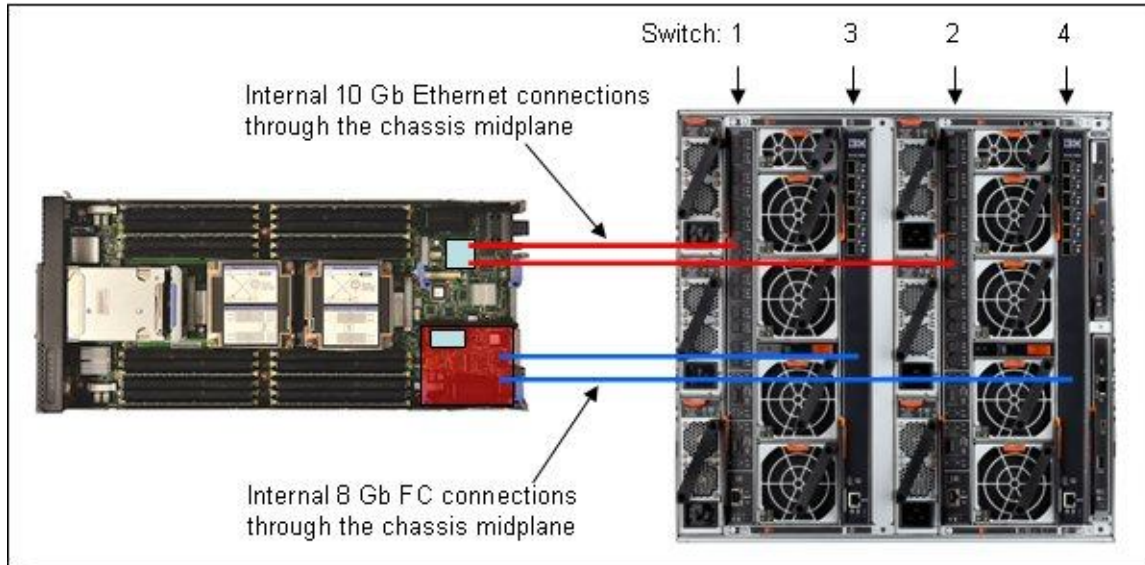


Figure 5. Using FC3171 8Gb SAN Switches with FC3172 8Gb FC adapters installed in compute nodes

Table 6. Components used when connecting the 8 Gb FC adapters to the 8 Gb FC switches

Part number/machine type	Description	Quantity
8737-x2x	IBM Flex System x240 Compute Node with Embedded 10Gb Virtual Fabric Adapter	1 to 14
69Y1938	IBM Flex System FC3172 2-port 8Gb FC Adapter	1 per server
8721-A1x	IBM Flex System Enterprise Chassis	1
49Y4294	IBM Flex System Fabric EN4093 10Gb Scalable Switch	2
69Y1930	IBM Flex System FC3171 8Gb SAN Switch	2

Refer to the IBM System Storage® Interoperation Center (SSIC) for a list of supported Fibre Channel configurations:

<http://ibm.com/systems/support/storage/ssic>

## Related publications

For more information see the following IBM Flex System FC3171 8Gb SAN Switch and Pass-thru product publications, available from the IBM Flex System Information Center:

<http://publib.boulder.ibm.com/infocenter/flexsys/information/index.jsp>

- *SAN Switch and SAN Pass-thru User's Guide*
- *Quick Tools User's Guide*
- *Command Line Interface User's Guide*
- *CIM Agent Reference Guide*
- *Event Message Reference Guide*
- *Simple Network Management Protocol Reference Guide*

Other documents:

- US Announcement Letter 112-053  
<http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-053>
- IBM Flex System Enterprise Chassis Product Guide  
<http://www.redbooks.ibm.com/abstracts/tips0865.html>
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