Lenovo Flex System FC3171 8Gb SAN Switch and Pass-thru Modules

Product Guide (withdrawn product)

The Lenovo® 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 Flex System configurations, and offers scalability in external SAN size and complexity, and enhanced systems management capabilities. The Lenovo 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 Flex System chassis.

Withdrawn: The FC3171 8Gb Pass-thru is now withdrawn from marketing

The following figure shows the module.

Figure 1. Lenovo Flex System FC3171 8Gb SAN Switch and Pass-thru

Did you know?

The FC3171 Switch is licensed to operate in either full-fabric mode or intelligent pass-thru mode, and the FC3171 Pass-thru operates in the intelligent pass-thru mode.

These modules allow Flex System integration with any open-standards-based SAN, whether the module has enterprise open-system fabric functionality using the full-fabric mode (with the FC3171 Switch only), or the module has transparent switching functionality using the intelligent pass-thru mode (with the FC3171 Switch or Pass-Thru).

Part number information

The part numbers to order the switch and optional upgrades are shown in the following table.

Withdrawn: Both the switch and the pass-thru module are now withdrawn from marketing.

Table 1. Part numbers and feature codes for ordering

Description	Part number	Feature code
Lenovo Flex System FC3171 8Gb SAN Switch	69Y1930	A0TD
Lenovo Flex System FC3171 8Gb SAN Pass-thru	69Y1934	A0TJ

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.

Note: The Pass-thru module cannot be upgraded to a full-fabric switch module.

The part number includes the following items:

- One Lenovo Flex System FC3171 8Gb SAN Switch or Pass-thru module
- Documentation package

The modules do not include a serial management cable; however, the 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 and optical cables for them.

Table 2. Supported SFP+ transceivers

Description	Part number	Feature code	Maximum supported
Transceivers - 8 Gb (operating at 8 Gbps and 4 Gbps)			
8Gb SFP+ SW Optical Transceiver	44X1964	5075	6
Cables for SFP+ transceivers			
Lenovo 0.5m LC-LC OM3 MMF Cable	00MN499	ASR5	6
Lenovo 1m LC-LC OM3 MMF Cable	00MN502	ASR6	6
Lenovo 3m LC-LC OM3 MMF Cable	00MN505	ASR7	6
Lenovo 5m LC-LC OM3 MMF Cable	00MN508	ASR8	6
Lenovo 10m LC-LC OM3 MMF Cable	00MN511	ASR9	6
Lenovo 15m LC-LC OM3 MMF Cable	00MN514	ASRA	6
Lenovo 25m LC-LC OM3 MMF Cable	00MN517	ASRB	6
Lenovo 30m LC-LC OM3 MMF Cable	00MN520	ASRC	6

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+ transceivers supporting 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 SNMP and the Ethernet interface

Supported 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 adapters

The switches are installed in I/O module bays in the rear of the Flex System chassis as shown in the following figure. Switches are normally installed in pairs because ports on the I/O adapter cards installed in the compute nodes are routed to two I/O bays for redundancy and performance.
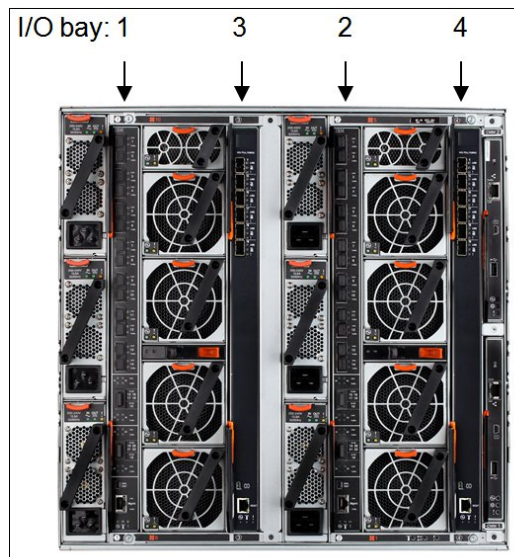

Figure 2. Location of the I/O bays in the Flex System chassis

The Flex System FC3171 8Gb SAN Switch and Pass-thru modules can be installed in I/O bays 1, 2, 3, and 4 of the Flex System chassis. Up to four FC3171 modules supported in a chassis. A supported adapter card must be installed in a corresponding slot of the compute node.

With compute nodes that have an integrated dual-port 10 GbE network interface controller (NIC) the FC3171 modules 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 the slot that is routed to I/O bays 1 and 2. However, when needed, the periscope connector can be replaced with an FC adapter card, in which case integrated NIC will be disabled and FC modules can be used in bays 1 and 2.

The following table shows compatibility information for the FC3171 modules and Flex System chassis.

Table 3. Flex System chassis compatibility

Description	Part number	Enterprise Chassis with CMM	Enterprise Chassis with CMM2	Carrier-grade Chassis with CMM2
Lenovo Flex System FC3171 8Gb SAN Switch	69Y1930	Yes	Yes	No
Lenovo Flex System FC3171 8Gb SAN Pass-thru	69Y1934	Yes	Yes	No

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 x440 with four adapters.
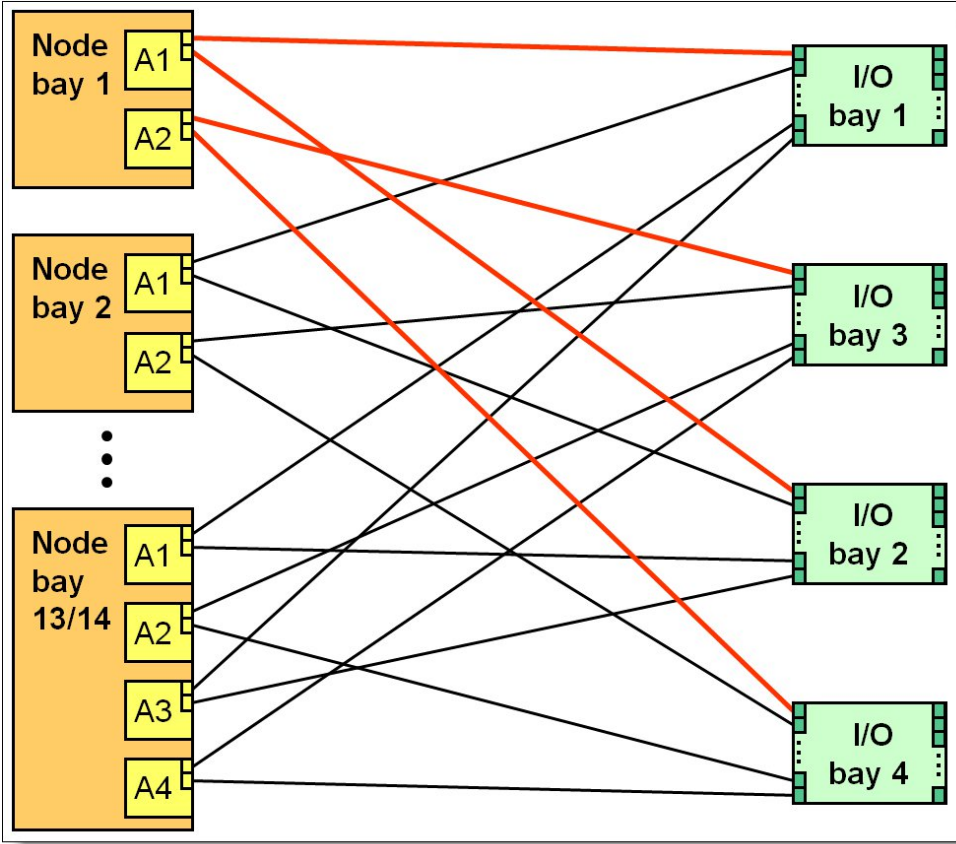

Figure 3. Logical layout of the interconnects between I/O adapters and FC3171 modules

The following table shows the connections between adapters installed in the compute nodes to the switch bays in the chassis with 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 compute node	Port on the adapter	Corresponding I/O module bay in the chassis			
		Bay 1	Bay 2	Bay 3	Bay 4
Slot 1	Port 1	Yes			
	Port 2		Yes		
Slot 2	Port 1			Yes	
	Port 2				Yes
Slot 3 (full-wide compute nodes only)	Port 1	Yes			
	Port 2		Yes		
Slot 4 (full-wide compute nodes only)	Port 1			Yes	
	Port 2				Yes

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

Table 5. Storage adapters

Description	Part number	Feature code
16 Gb Fibre Channel		
Flex System FC5172 2-port 16Gb FC Adapter	69Y1942	A1BQ
8 Gb Fibre Channel		
Flex System FC3172 2-port 8Gb FC Adapter	69Y1938	A1BM
Flex System FC3052 2-port 8Gb FC Adapter	95Y2375	A2N5

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.
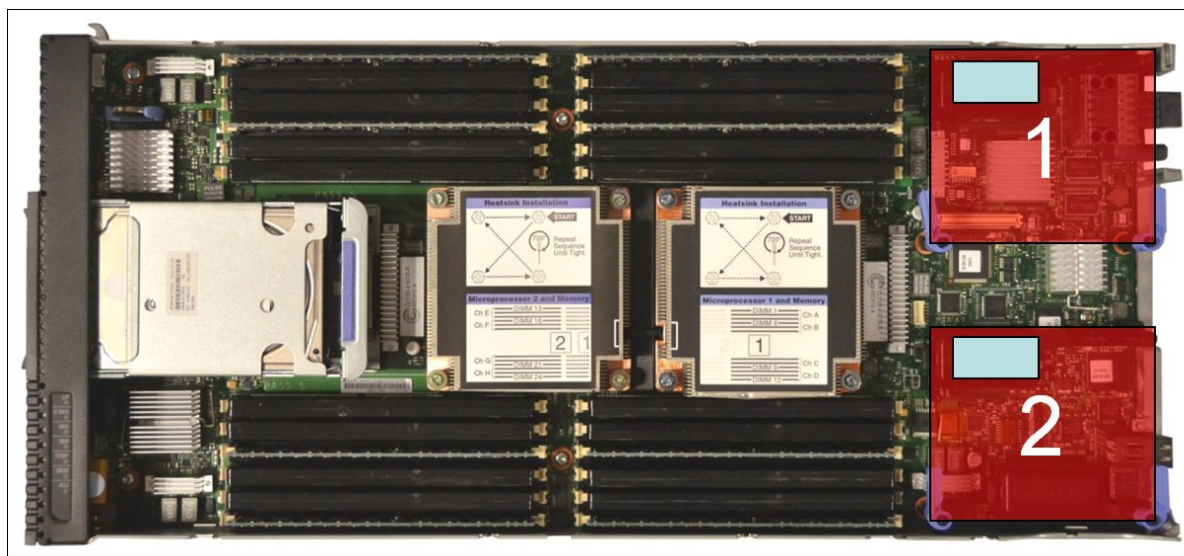

Figure 4. Location of the I/O adapter slots in the Flex System x240 Compute Node

Connectors and LEDs

The following figure shows the front panel of the Flex System FC3171 8Gb SAN Switch and Pass-thru.

Figure 5. Front panel of the 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 Logged-in LED for each external port on the switch

Cabling requirements

The cables that can be used with the FC3171 modules are shown in the following table.

Table 6. CN4093 network cabling requirements

Transceiver	Standard	Cable	Connector
8 Gb Fibre Channel			
8Gb SFP+ SW Optical Transceiver (44X1964)	FC-PI-4 (8GFC, 4GFC)	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 2); 850 nm multimode fiber, 50 µ OM3 (up to 150 m at 8 Gbps; up to 380 m at 4 Gbps) or 62.5 µ (up to 21 m at 8 Gbps; up to 70 m at 4 Gbps)	LC
Management ports			
External Fast Ethernet management port	100BASE-TX	UTP Category 5, 5E, and 6 up to 100 meters	RJ-45
External RS-232 management port	RS-232	DB-9-to-mini-USB or RJ-45-to-mini-USB console cable (comes with optional Management Serial Access Cable, 90Y9338)	Mini-USB

Warranty

The modules carry a 1-year, customer-replaceable unit (CRU) limited warranty. When installed in a chassis, these modules assume your system's base warranty and any Lenovo warranty service 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

Agency approvals

The modules conform to the following regulations:

- 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)

Typical configurations

The following usage scenarios are described in this section:

- Direct-attached FC storage with the FC3171 SAN Switch in the Full Fabric mode
- SAN-attached FC storage with the FC3171 SAN Switch or Pass-thru in the Intelligent Pass-thru mode

Note: For more information about supported FC end-to-end configurations, see the following System Storage Interoperation Center (SSIC) website:
http://ibm.com/systems/support/storage/ssic

Direct-attached FC storage with the FC3171 SAN Switch in the Full Fabric mode

The FC3171 direct-attached FC storage solution is based on the Flex System chassis with a 8 Gb Fibre Channel infrastructure and 8 Gb or 16 Gb FC Host Bus Adapters (HBAs) that are installed in each compute node. In the Full Fabric mode, the FC3171 SAN Switch can be directly connected to the Storwize V3700/V5000/V7000 storage systems with FC interfaces by using the external 8 Gb FC ports, as shown in the following figure.
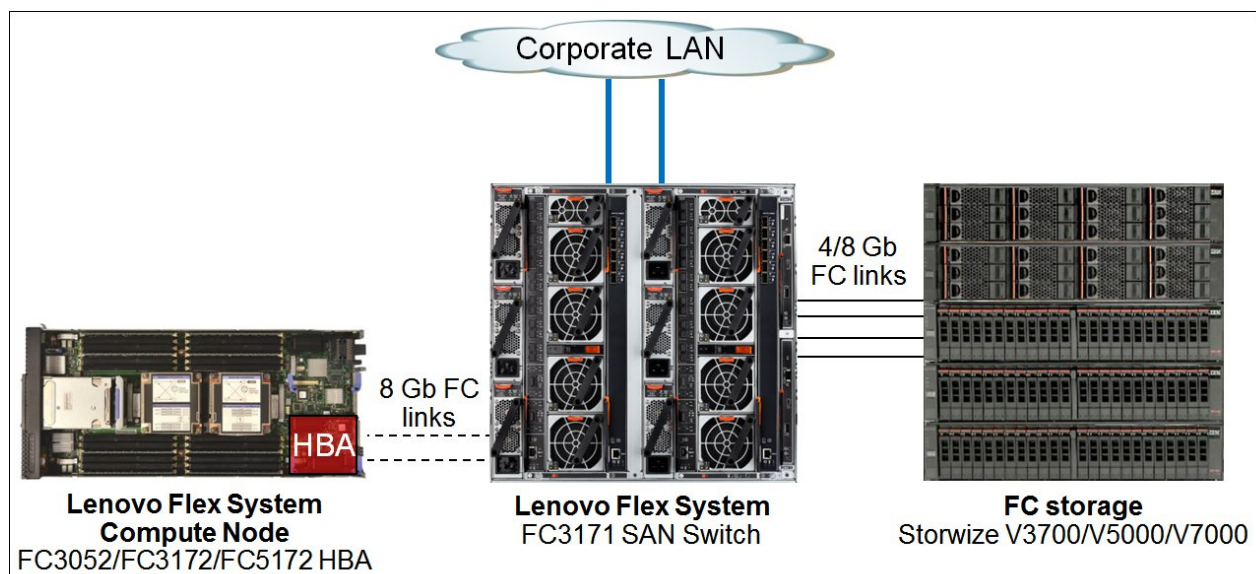

Figure 6. Direct-attached FC storage with the FC3171 SAN Switch

SAN-attached FC storage with the FC3171 SAN Switch or Pass-thru in the Intelligent Pass-thru mode

In the Intelligent Pass-thru mode, the FC3171 SAN Switches and Pass-thru modules can be transparently connected to the Brocade and Cisco MDS FC SAN switches and Storwize V3700/V5000/V7000 storage systems, as shown in Figure 7 and Figure 8.
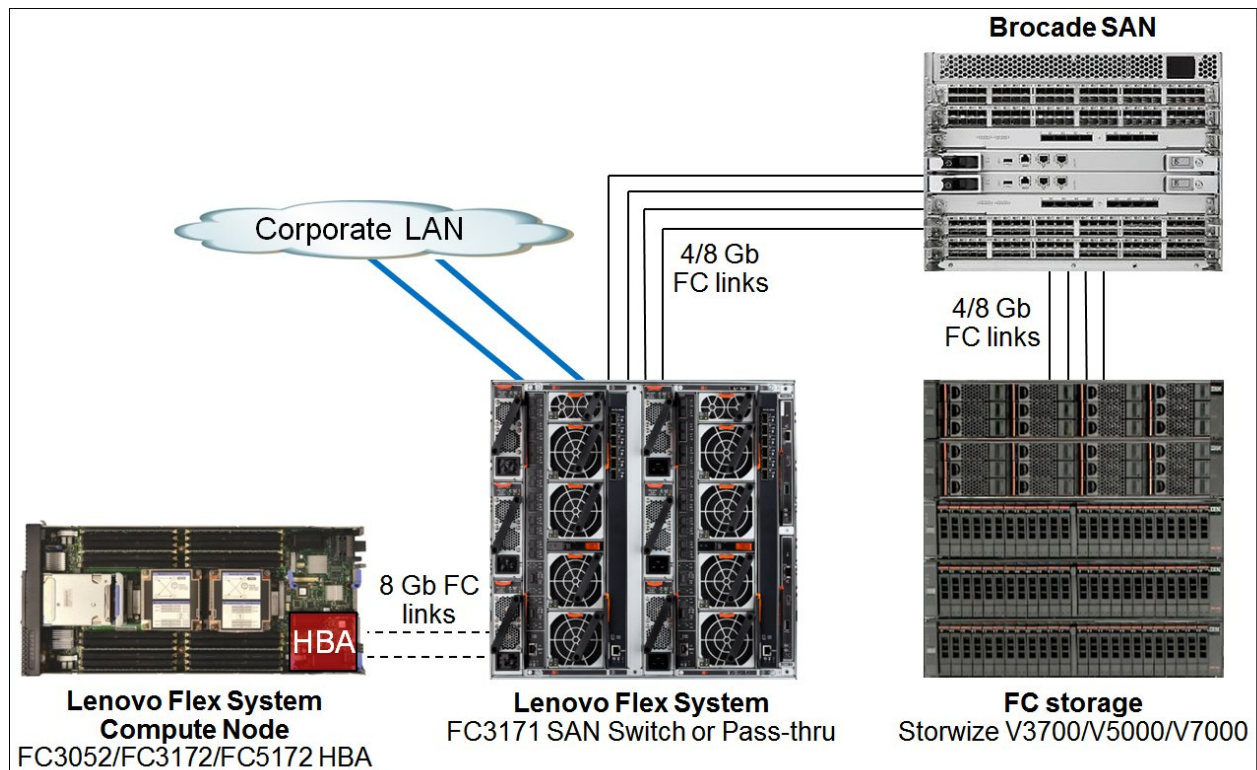
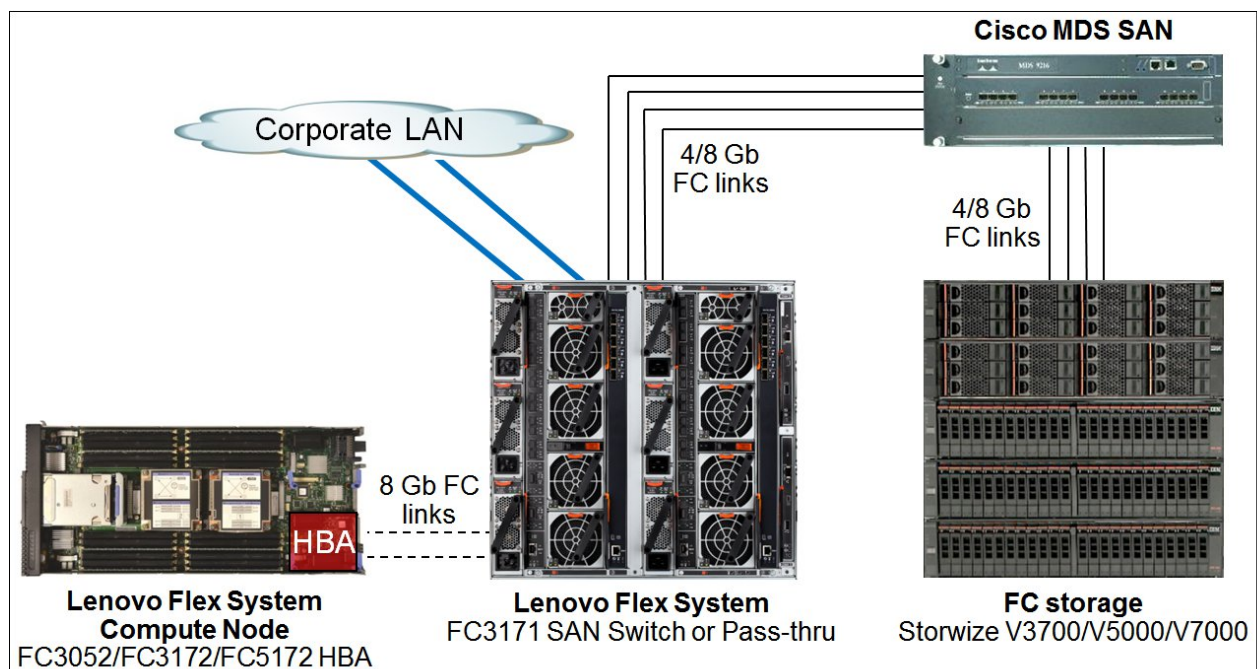Figure 7. SAN-attached FC storage with the FC3171 SAN Switch or Pass-thru and Brocade SAN switches

Figure 8. SAN-attached FC storage with the FC3171 SAN Switch or Pass-thru and Cisco MDS switches

Related publications and links

For more information see the following Flex System FC3171 8Gb SAN Switch and Pass-thru product publications, available from the 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
- *Flex System Products and Technology*, SG24-8255
  http://lenovopress.com/sg248255
- Product Guides for Flex System servers and options
  http://lenovopress.com/flexsystem
- Flex System Interoperability Guide
  http://lenovopress.com/redpfsig

Related product families

Product families related to this document are the following:

- Blade Storage Modules
- Embedded SAN Switches

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