Lenovo Flex System SI4091 10Gb System Interconnect Module
Product Guide (withdrawn product)

The Lenovo® Flex System SI4091 10Gb System Interconnect Module enables simplified, low-cost integration of Flex System™ into your networking infrastructure.

The SI4091 requires no management for most data center environments, which eliminates the need to configure each networking device or individual ports, thus reducing the number of management points. It provides a low latency, loop-free interface that does not rely upon spanning tree protocols, which removes one of the greatest deployment and management complexities of a traditional switch. The SI4091 offers administrators a simplified deployment experience while maintaining the performance of intra-chassis connectivity.

The Flex System Fabric SI4091 System Interconnect Module is shown in the following figure.

Figure 1. Lenovo Flex System Fabric SI4091 System Interconnect Module

Did you know?

The SI4091 provides transparent Flex System connectivity to your Cisco, Juniper, or other vendor network. The SI4091 aggregates compute node ports by appearing as a simple pass-thru device. The upstream network sees a "large pipe" of server traffic coming to and from the chassis, with the main difference being that intra-chassis switching is supported. With the SI4091, a network administration team continues to use the same network management tools that are deployed in the network to manage the connectivity from the physical servers in the chassis to the upstream network.

With support for Converged Enhanced Ethernet (CEE), the SI4091 can be used as an FCoE transit device. It also is ideal for network-attached storage (NAS) and iSCSI environments.

Key features

The SI4091 interconnect module is considered particularly suited for the following customers:

- Customers who want simple 10 GbE network connectivity from the chassis to the upstream network, without the complexity of spanning tree and other advanced Layer 2 and Layer 3 features.
- Customers who want to manage physical compute node connectivity in the chassis by using the existing network management tools.
- Customers who want to reduce total cost of ownership (TCO) and improve performance, while maintaining high levels of availability and security.
- Customers who want to minimize oversubscription, which can result in congestion and loss of performance.
- Customers who want to implement a converged infrastructure with NAS, iSCSI, or FCoE. For FCoE implementations, the SI4091 passes through FCoE traffic upstream to other devices (such as the Lenovo RackSwitch™ G8264CS) where the FC traffic is broken out.

The SI4091 offers the following key features and benefits:

- Increased performance
  With the growth of virtualization and the evolution of cloud computing, many of today's applications require low latency and high-bandwidth performance. The SI4091 supports sub-microsecond latency and up to 480 Gbps throughput, while delivering full line rate performance.

  The SI4091 also offers increased security and performance advantage when configured in VLAN-aware mode; it does not force communications upstream into the network, which reduces latency and generates less network traffic.

- Simplified network infrastructure
  The SI4091 simplifies the deployment of a converged LAN and SAN with support for the newest protocols, including Data Center Bridging/Converged Enhanced Ethernet (DCB/CEE), which can be used in a converged iSCSI, Fibre Channel over Ethernet (FCoE) or NAS environment.

  The default configuration of the SI4091 requires little or no management for most data center environments, which eliminates the need to configure each device or individual ports and reduces the number of management points.

- Transparent networking The SI4091 is a transparent network device that is invisible to the upstream network and eliminates network administration concerns of Spanning Tree Protocol configuration and interoperability, VLAN assignments, and avoidance of possible loops.

  By emulating a host NIC to the data center core, it accelerates the provisioning of virtual machines (VMs) by eliminating the need to configure the typical access switch parameters.

Components and connectors

The front panel of the Flex System SI4091 10Gb System Interconnect Module is shown in the following figure.
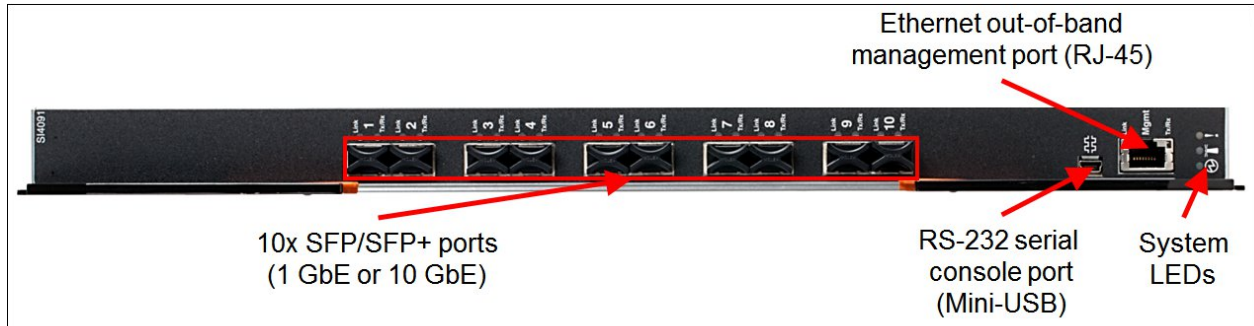

Figure 2. Front panel of the Lenovo Flex System SI4091 10Gb System Interconnect Module

The front panel includes the following components:

- 10x SFP/SFP+ ports to attach SFP/SFP+ transceivers for 1 GbE or 10 GbE connections or SFP+ DAC cables for 10 GbE connections.
- One mini-USB RS-232 console port that provides another means to configure the interconnect module.
- 1x RJ-45 1 GbE port for out-of-band management.
- System LEDs that display the status of the interconnect module and the network.

System specifications

The following table lists the SI4091 system specifications.

Table 1. System specifications

Component	Specification
Form factor	Flex System embedded I/O module
Ports	- Internal ports: 14x 10 Gb Ethernet ports - External ports: 10x SFP/SFP+ ports
Media types (external ports)	10 Gb Ethernet SFP+: 10 GbE short-range (SR) SFP+ transceivers 10 GbE long-range (LR) SFP+ transceivers 10 GbE extended-range (ER) SFP+ transceivers 10 GbE RJ-45 SFP+ transceivers 10 GbE SFP+ active optical cables (AOCs) 10 GbE SFP+ DAC cables 1/10 Gb Ethernet SFP+: 1/10 GbE SX/SR SFP+ transceivers 1 Gb Ethernet SFP: 1 GbE short-wavelength (SX) SFP transceivers 1 GbE long-wavelength (LX) SFP transceivers 1 GbE RJ-45 SFP transceivers
Port speeds	- Internal 10 GbE ports: 1 Gbps or 10 Gbps 10 GbE SFP+ transceivers, DAC cables and AOCs: 10 Gbps 1/10 GbE SFP+ transceivers: 1 Gbps or 10 Gbps 1 GbE SFP transceivers: 1 Gbps
Switching method	Cut-through.
Data traffic types	Unicast, multicast, broadcast.

Component	Specification
Software features	Lenovo Networking OS: Layer 2 switching, virtual local area networks (VLANs), VLAN tagging, link aggregation (trunk) groups (LAGs), Hot Links, Layer 2 failover, Quality of Service (QoS), IPv4/IPv6 management, Converged Enhanced Ethernet, Fibre Channel over Ethernet (FCoE) transit switch operations.
Performance	Non-blocking architecture with wire-speed forwarding of traffic: • Up to 480 Gbps aggregated throughput • 100% line rate performance with sub-microsecond switching latency • Up to 360 Million packets per second (Mpps) • Up to 9,216-byte jumbo frames
Scalability	• MAC address forwarding database entries: 16,000 • VLANs: 4,095 • Link aggregation groups: 24 • Ports in a link aggregation group: 16
Hot-swap parts	SFP/SFP+ transceivers, SFP+ DAC cables.
Management ports	2x GbE internal ports connected to the chassis management module; 1x 10/100/1000 Mb Ethernet external port (RJ-45); 1x RS-232 external port (Mini-USB).
Management interfaces	Industry standard command line interface (isCLI); SNMP v1 and v3. Optional Lenovo Switch Center. Optional Lenovo XClarity.
Security features	Secure Shell (SSH); Secure FTP (sFTP); user level security; LDAP, RADIUS, and TACACS+ authentication; access control lists (ACLs).
Warranty	One-year customer-replaceable unit limited warranty. When installed in a supported chassis, the module assumes the chassis' base warranty and any warranty service upgrade; warranty includes Networking OS software upgrades.
Mean Time Between Failures	261,636 hours with ambient operating temperature of 40° C.
Dimensions	Height: 30 mm (1.2 in.); width: 401 mm (15.8 in.); depth: 317 mm (12.5 in.)
Weight	3.7 kg (8.1 lb).

Models

The part number and feature code for ordering the SI4091 module are listed in the following table.

Withdrawn: The SI4091 10Gb System Interconnect Module is now withdrawn from marketing.

Table 2. Part number and feature code for ordering

Part number	Feature code	Description
00FE327	ARZM	Lenovo Flex System SI4091 10Gb System Interconnect Module

The part number for the interconnect module includes the following items:

• One Lenovo Flex System SI4091 10Gb System Interconnect Module
• Documentation package

Note: SFP/SFP+ transceivers and DAC cables are not included and should be ordered together with the interconnect module (see Transceivers and cables for details).

The interconnect module does not include a serial management cable; the optional Flex System Management Serial Access Cable (part number 90Y9338) is supported and includes 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 interconnect module locally for configuration tasks and firmware updates.

Transceivers and cables

With the flexibility of the SI4091 module, customers can choose the following connectivity technologies:

- For 1 GbE links, customers can use RJ-45 SFP transceivers with UTP cables up to 100 meters. Customers that need longer distances can use a 1000BASE-SX transceiver, which can drive distances up to 220 meters with 62.5 μ multimode fiber (OM1) and up to 550 meters with 50 μ multimode fiber (OM2), or the 1000BASE-LX transceivers that support distances up to 10 kilometers with single-mode fiber (1310 nm).

- For 10 GbE links, customers can use SFP+ direct-attached copper (DAC) cables for in-rack cabling for distances up to 7 meters or SFP+ active optical cables (AOCs) for distances up to 20 meters. These cables have SFP+ connectors on each end, and they do not need separate transceivers. For distances up to 30 meters, the 10GBASE-T SFP+ transceiver can be used with Category 6a or 7 RJ-45 UTP cables.

   For longer distances, the 10GBASE-SR transceiver supports distances up to 300 meters over OM3 multimode fiber or up to 400 meters over OM4 multimode fiber. The 10GBASE-LR transceivers can support distances up to 10 kilometers on single mode fiber. For extended distances, the 10GBASE-ER transceivers can support distances up to 40 kilometers on single mode fiber.

The supported transceivers and cables are listed in the following table.

Table 3. Supported transceivers and DAC cables

Part number	Feature code	Description	Maximum supported
Serial console cables			
90Y9338	A2RR	Flex System Management Serial Access Cable Kit	1
SFP transceivers - 1 GbE			
00FE333	A5DL	Lenovo 1000BASE-T (RJ-45) SFP Transceiver (no 10/100 Mbps support)	10
81Y1622	3269	Lenovo 1000BASE-SX SFP Transceiver	10
90Y9424	A1PN	Lenovo 1000BASE-LX SFP Transceiver	10
SFP+ transceivers - 10 GbE			
00MY034	ATTJ	Lenovo Dual Rate 1/10Gb SX/SR SFP+ Transceiver	10
46C3447	5053	Lenovo 10GBASE-SR SFP+ Transceiver	10
00FE331	B0RJ	10GBASE-LR SFP+Transceiver	10
90Y9412	A1PM	Lenovo 10GBASE-LR SFP+ Transceiver	10
90Y9415	A1PP	Lenovo 10GBASE-ER SFP+ Transceiver	10
7G17A03130	AVV1	Lenovo 10GBASE-T SFP+ Transceiver	10
Optical cables for 1 GbE SX SFP and 10 GbE SR SFP+ transceivers			
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable	10
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable	10
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable	10
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable	10
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable	10
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable	10
00MN520	ASRC	Lenovo 30m LC-LC OM3 MMF Cable	10
SFP+ active optical cables - 10 GbE			
00YL634	ATYX	Lenovo 1m SFP+ to SFP+ Active Optical Cable	10
00YL637	ATYY	Lenovo 3m SFP+ to SFP+ Active Optical Cable	10
00YL640	ATYZ	Lenovo 5m SFP+ to SFP+ Active Optical Cable	10
00YL643	ATZ0	Lenovo 7m SFP+ to SFP+ Active Optical Cable	10

Part number	Feature code	Description	Maximum supported
00YL646	ATZ1	Lenovo 15m SFP+ to SFP+ Active Optical Cable	10
00YL649	ATZ2	Lenovo 20m SFP+ to SFP+ Active Optical Cable	10
SFP+ direct-attach cables - 10 GbE			
90Y9427	A1PH	Lenovo 1m Passive SFP+ DAC Cable	10
00AY764	A51N	Lenovo 1.5m Passive SFP+ DAC Cable	10
00AY765	A51P	Lenovo 2m Passive SFP+ DAC Cable	10
90Y9430	A1PJ	Lenovo 3m Passive SFP+ DAC Cable	10
90Y9433	A1PK	Lenovo 5m Passive SFP+ DAC Cable	10
00D6151	A3RH	Lenovo 7m Passive SFP+ DAC Cable	10

The network cables that can be used with the SI4091 are listed in the following table.

Table 4. SI4091 network cabling requirements

Transceiver	Standard	Cable	Connector
10 Gb Ethernet			
10Gb SR SFP+ (46C3447) 1/10Gb SFP+ (00MY034)	10GBASE-SR	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 3); up to 300 m with OM3 multimode fiber or up to 400 m with OM4 multimode fiber.	LC
10Gb LR SFP+ (90Y9412)	10GBASE-LR	1310 nm single-mode fiber cable up to 10 km.	LC
10Gb ER SFP+ (90Y9415)	10GBASE-ER	1310 nm single-mode fiber cable up to 40 km.	LC
10Gb RJ-45 SFP+ (7G17A03130)	10GBASE-T	UTP Category 6a or 7 up to 30 meters.	RJ-45
Active optical cable	10GBASE-SR	SFP+ active optical cables up to 20 m (see Table 3)	SFP+
Direct attach copper cable	10GSFP+Cu	SFP+ DAC cables up to 7 m (see Table 3).	SFP+
1 Gb Ethernet			
1Gb RJ-45 SFP (00FE333)	1000BASE-T	UTP Category 5, 5E, or 6 up to 100 meters.	RJ-45
1Gb SX SFP (81Y1622) 1/10Gb SFP+ (00MY034)	1000BASE-SX	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 3); 850 nm multimode fiber cable 50 μ (OM2) up to 550 m or 62.5 μ (OM1) up to 220 m.	LC
1Gb LX SFP (90Y9424)	1000BASE-LX	1310 nm single-mode fiber cable up to 10 km.	LC
Management ports			
1 GbE management port	1000BASE-T	UTP Category 5, 5E, or 6 up to 100 meters.	RJ-45
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

Software features

Note: The features and specifications that are listed in this section are based on Networking OS version 8.4.

The Flex System Fabric SI4091 System Interconnect Module includes the following software features:

- Modes of operations:
  - Transparent (or VLAN-agnostic) mode
    In VLAN-agnostic mode (default configuration), the SI4091 transparently forwards VLAN tagged frames without filtering on the customer VLAN tag, which provides an end host view to the upstream network. The interconnect module provides traffic consolidation in the chassis to minimize TOR port utilization. It also enables compute node-to-compute node communication for optimum performance (for example, vMotion). It can be connected to the FCoE transit switch or FCoE gateway (FC Forwarder) device.

  - Local Domain (or VLAN-aware) mode
    In VLAN-aware mode (optional configuration), the SI4091 provides more security for multi-tenant environments by extending client VLAN traffic isolation to the interconnect module and its external ports. VLAN-based access control lists (ACLs) can be configured on the SI4091. When FCoE is used, the SI4091 operates as an FCoE transit switch, and it should be connected to the FCF device.

- Scalability and performance:
  - Media access control (MAC) address learning with automatic updates
  - Static and LACP (IEEE 802.3ad) link aggregation

- Availability and redundancy:
  - Layer 2 Trunk Failover to support active/standby configurations of NIC teaming on compute nodes.
  - Hot Links provide basic link redundancy and fast recovery for network topologies without a need for Spanning Tree protocol.

- VLAN support
  - Up to 4,095 VLANs supported, with VLAN numbers 1 - 4095 (4095 is used for management network.)
  - 802.1Q VLAN tagging support on all ports
  - Full private VLANs

- Security:
  - VLAN-based access control lists (ACLs) (VLAN-aware mode).
  - Multiple user IDs and passwords.
  - User access control.
  - Radius, TACACS+, and LDAP authentication and authorization.
  - NIST 800-131A Encryption.
  - Selectable encryption protocol.

- Quality of service (QoS): Support for IEEE 802.1p traffic classification and processing.

- Converged Enhanced Ethernet:
  - Priority-Based Flow Control (PFC) (IEEE 802.1Qbb) extends 802.3x standard flow control to allow the module to pause traffic that is based on the 802.1p priority value in each packet's VLAN tag.
  - Enhanced Transmission Selection (ETS) (IEEE 802.1Qaz) provides a method for allocating link bandwidth that is based on the 802.1p priority value in each packet's VLAN tag.
  - Data Center Bridging Capability Exchange Protocol (DCBX) (IEEE 802.1AB) allows neighboring network devices to exchange information about their capabilities.

- Fibre Channel over Ethernet (FCoE):
  - FC-BB5 FCoE specification compliant
  - FCoE transit switch operations
  - FCoE Initialization Protocol (FIP) snooping support

- Manageability:
    - IPv4 and IPv6 host management
    - Simple Network Management Protocol (SNMP V1 and V3)
    - Industry standard command-line interface (IS-CLI) through Telnet, SSH, and serial port
    - Secure FTP (sFTP)
    - Service Location Protocol (SLP)
    - Firmware image update (TFTP and FTP/sFTP)
    - Network Time Protocol (NTP) for clock synchronization
    - Switch Center support
    - Lenovo XClarity support

- Monitoring:
    - LEDs for external port status and module status indication
    - Change tracking and remote logging with syslog feature
    - POST diagnostic tests

Ethernet standards

The SI4091 supports the following Ethernet standards:

- IEEE 802.1AB Data Center Bridging Capability Exchange Protocol (DCBX)
- IEEE 802.1p Class of Service (CoS) prioritization
- IEEE 802.1Q Tagged VLAN (frame tagging on all ports when VLANs are enabled)
- IEEE 802.1Qbb Priority-Based Flow Control (PFC)
- IEEE 802.1Qaz Enhanced Transmission Selection (ETS)
- IEEE 802.3 10BASE-T Ethernet
- IEEE 802.3ab 1000BASE-T copper twisted pair Gigabit Ethernet
- IEEE 802.3ad Link Aggregation Control Protocol
- IEEE 802.3ae 10GBASE-SR short range fiber optics 10 Gb Ethernet
- IEEE 802.3ae 10GBASE-LR long range fiber optics 10 Gb Ethernet
- IEEE 802.3ae 10GBASE-ER extended range fiber optics 10 Gb Ethernet
- IEEE 802.3ap 10GBASE-KR backplane 10 Gb Ethernet
- IEEE 802.3u 100BASE-TX Fast Ethernet
- IEEE 802.3x Full-duplex Flow Control
- IEEE 802.3z 1000BASE-SX short range fiber optics Gigabit Ethernet
- IEEE 802.3z 1000BASE-LX long range fiber optics Gigabit Ethernet
- SFF-8431 10GSFP+Cu SFP+ Direct Attach Cable

Warranty

The SI4091 carries a 1-year, customer-replaceable unit (CRU) limited warranty. When installed in a supported chassis, these I/O modules assume your system's base warranty and any warranty service upgrade.

Physical specifications

The SI4091 features the following approximate dimensions and weight :

- Height: 30 mm (1.2 in.)
- Width: 401 mm (15.8 in.)
- Depth: 317 mm (12.5 in.)
- Weight: 3.7 kg (8.1 lb)

The SI4091 features the following approximate shipping dimensions and weight:

- Height: 114 mm (4.5 in.)
- Width: 508 mm (20.0 in.)
- Depth: 432 mm (17.0 in.)
- Weight: 4.1 kg (9.1 lb)

Agency approvals

The SI4091 conforms to the following regulations:

- United States FCC 47 CFR Part 15, Subpart B, ANSI C63.4 (2003), Class A
- IEC/EN 60950-1, Second Edition
- Canada ICES-003, issue 4, Class A
- Japan VCCI, Class A
- Australia/New Zealand AS/NZS CISPR 22:2006, Class A
- Taiwan BSMI CNS13438, Class A
- CE Mark (EN55022 Class A, EN55024, EN61000-3-2, EN61000-3-3)
- CISPR 22, Class A
- China GB 9254-1998
- Turkey Communiqué 2004/9; Communiqué 2004/22
- Saudi Arabia EMC.CVG, 28 October 2002

Chassis and adapters

The I/O modules are installed in I/O bays in the rear of the Flex System Chassis, as shown in the following figure. I/O modules are typically installed in pairs because ports on the I/O adapters that are installed in the compute nodes are routed to two I/O bays for redundancy and performance.
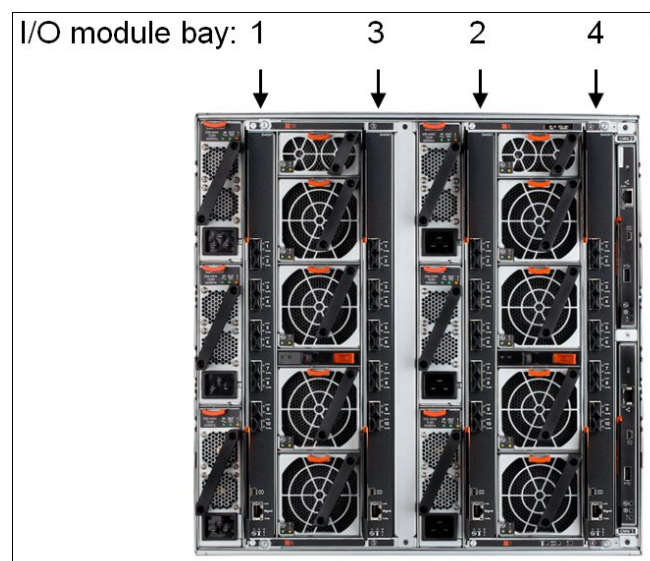

Figure 3. Location of the I/O bays in the Flex System Chassis

The SI4091 interconnect modules can be installed in bays 1, 2, 3, and 4 of the Flex System chassis. A supported adapter must be installed in the corresponding slot of the compute node. Although an adapter can use up to four ports to connect to the respective I/O module bay, the SI4091 can use only one of the four ports.

In compute nodes that have an integrated dual-port 10 GbE network interface controller (NIC), NIC ports are routed to bays 1 and 2 with a specialized periscope connector (the adapter card is not required). However, the periscope connector can be replaced with the adapter when needed. In such a case, integrated NIC is disabled.

The following table shows compatibility information for the SI4091 and Flex System chassis.

Table 5. Flex System chassis compatibility

Description	Part number	Enterprise Chassis with CMM	Enterprise Chassis with CMM2	Carrier-grade Chassis with CMM2
Flex System SI4091 10Gb System Interconnect Module	00FE327	No	Yes	No

The midplane connections between the adapters that are installed in the compute nodes to the I/O module bays in the chassis are listed in the following table. Half-wide compute nodes support up to two adapters, and full-wide compute nodes support up to four adapters.

Table 6. Adapter to I/O bay correspondence

I/O adapter slot in the compute node	Port on the adapter	Corresponding I/O 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 adapters that are supported by the I/O module.

Table 7. Network adapters

Description	Part number	Feature code
50 Gb Ethernet		
ThinkSystem QLogic QL45212 Flex 50Gb 2-Port Ethernet Adapter	7XC7A05843	B2VT
ThinkSystem QLogic QL45262 Flex 50Gb 2-Port Ethernet Adapter with iSCSI/FCoE	7XC7A05845	B2VV
25 Gb Ethernet		
ThinkSystem QLogic QL45214 Flex 25Gb 4-Port Ethernet Adapter	7XC7A05844	B2VU
10 Gb Ethernet		
Embedded 10Gb Virtual Fabric Adapter (2-port)†	None	None
Flex System CN4022 2-port 10Gb Converged Adapter	88Y5920	A4K3
Flex System CN4052 2-port 10Gb Virtual Fabric Adapter	00JY800*	A5RP
Flex System CN4052S 2-port 10Gb Virtual Fabric Adapter	00AG540	ATBT
Flex System CN4052S 2-port 10Gb Virtual Fabric Adapter Advanced	01CV780	AU7X
Flex System CN4054 10Gb Virtual Fabric Adapter (4-port)	90Y3554*	A1R1
Flex System CN4054R 10Gb Virtual Fabric Adapter (4-port)	00Y3306*	A4K2
Flex System CN4054S 4-port 10Gb Virtual Fabric Adapter	00AG590	ATBS
Flex System CN4054S 4-port 10Gb Virtual Fabric Adapter Advanced	01CV790	AU7Y
Flex System EN4132 2-port 10Gb Ethernet Adapter	90Y3466	A1QY
Flex System EN4172 2-port 10Gb Ethernet Adapter	00AG530	A5RN
1 Gb Ethernet		
Embedded 1 Gb Ethernet controller (2-port)**	None	None
Flex System EN2024 4-port 1Gb Ethernet Adapter	49Y7900	A10Y

* Withdrawn from marketing
† The Embedded 10Gb Virtual Fabric Adapter is built into selected compute nodes.
** The Embedded 1 Gb Ethernet controller is built into selected compute nodes.

Network connectivity

The most common SI4091 connectivity topology, which can be used with both Lenovo and non-Lenovo upstream network devices, is shown in the following figure.
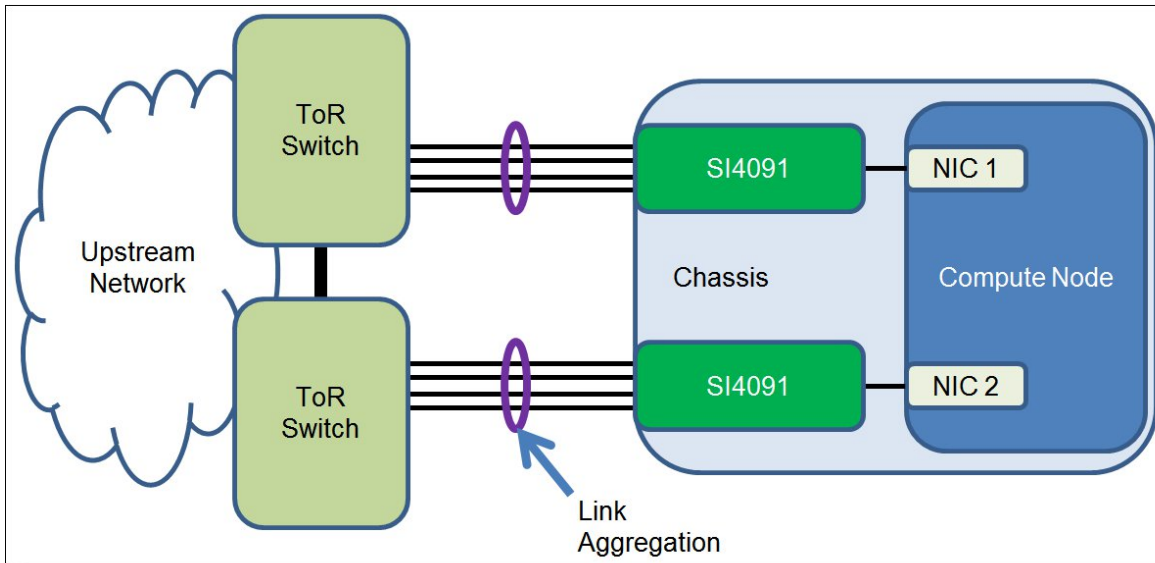

Figure 4. SI4091 connectivity topology: Link Aggregation

In this loop-free redundant topology, each SI4091 is physically connected to a separate Top-of-Rack (ToR) switch with static or LACP aggregated links.

When the SI4091 is used with the Lenovo RackSwitch switches, Virtual Link Aggregation Groups (vLAGs) can be used for load balancing and redundancy purposes. The virtual link aggregation topology with the Lenovo RackSwitch G8272 is shown in the following figure.
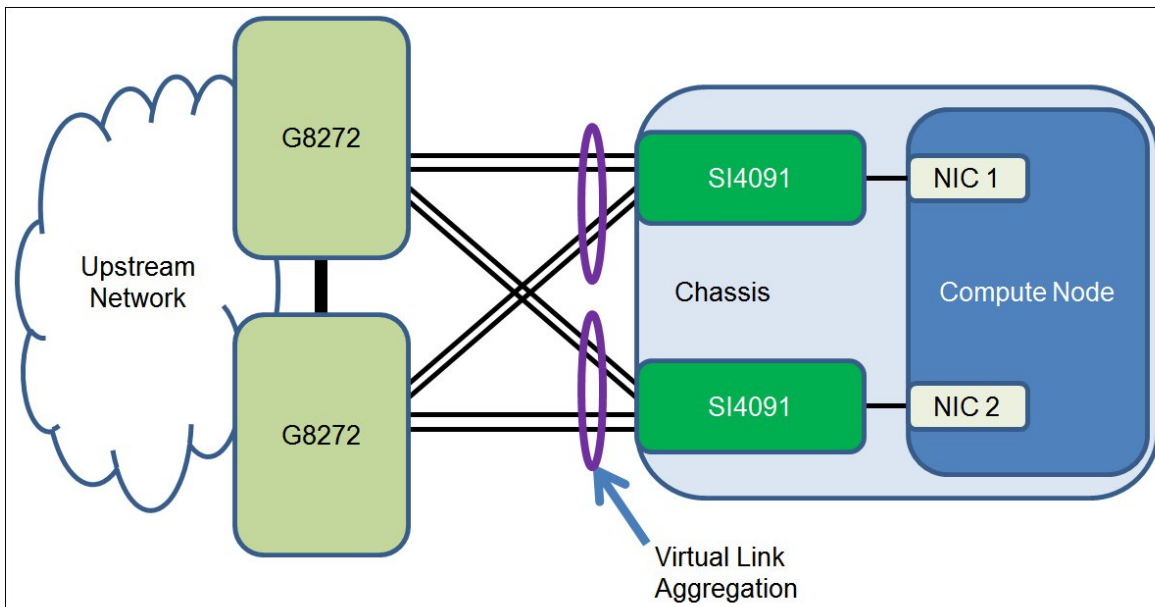

Figure 5. SI4091 connectivity topology: Virtual Link Aggregation

In this loop-free topology, aggregation is split between two physical switches, which appear as a single logical switch. Each SI4091 is connected to ToR switches through static or LACP aggregated links.

Dual isolated SAN fabrics: If you plan to use FCoE in a dual isolated SAN fabric design approach (also known as SAN air gaps), consider the SI4091 connectivity topology shown in Figure 4 (Link Aggregation).

The following table lists the 10 Gb Ethernet network switches that are offered by Lenovo that can be used with the SI4091 interconnect module in Flex System network connectivity solutions.

Table 8. Network switches

Description	Part number
10 Gb Ethernet switches	
Lenovo RackSwitch G8124E (Rear to Front)	7159BR6
Lenovo RackSwitch G8264 (Rear to Front)	7159G64
Lenovo RackSwitch G8272 (Rear to Front)	7159CRW
Lenovo RackSwitch G8296 (Rear to Front)	7159GR6
10 Gb Converged switches	
Lenovo RackSwitch G8264CS (Rear to Front)*	7159DRX

* The SI4091 supports FCoE transit switch operations when connected to the RackSwitch G8264CS.

For more information, see the list of Product Guides in the Top-of-rack Switches category:
http://lenovopress.com/servers/options/switches

Related publications and links

For more information, see the following Lenovo Flex System Fabric SI4091 System Interconnect Module product publications, which are available from the Flex System Information Center:
http://flexsystem.lenovofiles.com/help/topic/com.lenovo.acc.si4091pt.doc/IO_Module_SI4091.html

- *Flex System SI4091 10Gb System Interconnect Module Installation Guide*
- *Flex System SI4091 10Gb System Interconnect Module Application Guide*
- *Flex System SI4091 10Gb System Interconnect Module Industry Standard CLI Command Reference*

For more information, see the following resources:

- *Flex System Enterprise Chassis* Product Guide:
  http://lenovopress.com/tips0865

- *Flex System Products and Technology*, SG24-8255:
  http://lenovopress.com/sg248255

- Flex System Interoperability Guide:
  http://lenovopress.com/fsig

- Product Guides for Flex System compute nodes and options:
  http://lenovopress.com/flexsystem

Related product families

Product families related to this document are the following:

- 10 Gb Embedded Connectivity
- Blade Networking Modules

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