Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch

Product Guide (withdrawn product)

The Lenovo® Flex System Fabric CN4093 10Gb Converged Scalable Switch provides unmatched scalability, port flexibility, performance, convergence, and network virtualization. It also delivers innovations to help address networking concerns today and provide capabilities that help you prepare for the future.

The switch offers full Layer 2/3 switching and FCoE Full Fabric and Fibre Channel NPV Gateway operations to deliver a truly converged integrated solution. It is designed to install within the I/O module bays of the Flex System™ Enterprise Chassis. The switch can help customers migrate to a converged 10 Gb or 40 Gb Ethernet infrastructure and offers virtualization features, such as Virtual Fabric and VMready®.

The Flex System Fabric CN4093 10Gb Converged Scalable Switch is shown in the following figure.

Figure 1. Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch

Did you know?

The CN4093 offers up to 12 external Omni Ports, which provide extreme flexibility with the choice of SFP+ based 10 Gb Ethernet connectivity or 4/8 Gb Fibre Channel connectivity, depending on the SFP+ module used.

The base switch configuration comes standard with 22x 10 GbE port licenses that can be assigned to internal connections or external SFP+, Omni, or QSFP+ ports with flexible port mapping. For example, this feature allows customers to trade off four 10 GbE ports for one 40 GbE port (or vice versa) or trade off one external 10 GbE SFP+ or Omni port for one internal 10 GbE port (or vice versa). Customers then have the flexibility of turning on more ports when needed by using Lenovo Features on Demand upgrade licensing capabilities that provide “pay as you grow” scalability without the need to buy more hardware.

Key features

The Flex System Fabric CN4093 10Gb Converged Scalable Switch is considered particularly suited for the following customers:

- Customers who want to implement a converged infrastructure with FCoE where the CN4093 acts as a Full Fabric FC/FCoE switch for the end-to-end FCoE configurations or as an integrated Fibre Channel Forwarder (FCF) NPV Gateway that breaks out FC traffic within the chassis for the native Fibre Channel SAN connectivity.
- Customers who are implementing a virtualized environment.
- Customers who require investment protection for 40 GbE external ports.
- 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 avoid or minimize oversubscription, which can result in congestion and loss of performance.

The switch offers the following key features and benefits:

- Convergence and lower acquisition and operational costs
  One of the key trends that is driving the transformation of the data center is converging to a simplified networking infrastructure, which collapses Ethernet and Fibre Channel at the server and the edge of the network while maintaining connectivity upstream to existing LANs and SANs. The CN4093 Converged Switch supports multiple protocols, including Ethernet, Fibre Channel, iSCSI, and FCoE; Omni Ports give customers the flexibility to choose between 10 Gb Ethernet external connections to the top-of-rack switch and 4/8 Gb Fibre Channel for flexible and scalable access to FC storage.

- Increased performance
  With the growth of virtualization and the evolution of cloud, many of today's applications require low latency and high bandwidth performance. The CN4093 is the embedded 10 GbE switch for a Flex System chassis to support sub-microsecond latency and up to 1.28 Tbps, while also delivering full line rate performance on Ethernet ports, which makes it ideal for managing dynamic workloads across the network. In addition, this switch provides a rich Layer 2 and Layer 3 feature set that is ideal for many of today's data centers. It also offers industry-leading external bandwidth by being the integrated switch to support 40 GbE external ports.

- Pay-as-you-grow investment protection and lower total cost of ownership
  The CN4093's flexible port mapping allows customers to buy only the ports that are needed and when needed. The base switch configuration includes 22x 10 GbE port licenses that can be assigned to internal connections and external SFP+, Omni Ports, or 40 GbE QSFP+ ports (by using four 10 GbE licenses per one 40 GbE port). Customers then have the flexibility of turning on more internal 10 GbE connections and more external ports when needed by using Features on Demand licensing capabilities that provide pay-as-you-grow scalability without the need for more hardware.

- Cloud ready, optimized network virtualization with virtual NICs
  With most IT organizations implementing virtualization, there is an increased need to reduce the cost and complexity of their environments. Lenovo is helping to address these requirements by removing multiple physical I/O ports. Virtual Fabric provides a way for companies to carve up 10 GbE ports into virtual NICs (vNICs) to meet those requirements with Intel processor-based compute nodes.

  To help deliver maximum performance per vNIC and to provide higher availability and security with isolation between vNICs, the switch uses the capabilities of its Networking Operating System. For large-scale virtualization, the Flex System solution can support up to 48 vNICs by using a pair of CN4058S 10Gb Virtual Fabric Adapters in each compute node and four CN4093 10Gb Converged Scalable Switches in the chassis.

  The CN4093 offers the benefits of next-generation vNIC, which is Unified Fabric Port (UFP). UFP is an advanced, cost-effective solution that provides a flexible way for clients to allocate, reallocate, and adjust bandwidth to meet their ever-changing data center requirements.

- Cloud ready, VM-aware networking
  VMready software on the module simplifies configuration and improves security in virtualized environments. VMready automatically detects virtual machine movement between physical servers and instantly reconfigures each VM's network policies across VLANs to keep the network up and running without interrupting traffic or affecting performance. VMready works with all leading VM providers, such as VMware, Citrix Xen, and Microsoft Hyper-V.

  Support for Edge Virtual Bridging (EVB) that is based on the IEEE 802.1Qbg standard enables scalable, flexible management of networking configuration and policy requirements per VM and eliminates many of the networking challenges that are introduced with server virtualization.

- Simplify network infrastructure
  The CN4093 10Gb Converged Scalable Switch simplifies deployment and growth by using its innovative scalable architecture. This architecture helps increase return on investment by reducing the qualification cycle while providing investment protection for more I/O bandwidth requirements in the future. The extreme flexibility of the switch comes from the ability to turn on more ports as required down to the compute node and for upstream connections (including 40 GbE). Also, as you consider migrating to a converged LAN and SAN, the CN4093 supports Omni Ports for Ethernet or FC connectivity. It can operate as an integrated FCF, which can be used in an FCoE converged environment.

  CN4093 hybrid stacking capabilities simplify management for clients by stacking up to eight switches (two CN4093 and from 2 - 6 EN4093R switches) that share one IP address and one management interface. Support for Switch Partition (SPAR) allows clients to virtualize the switch with partitions that isolate communications for multi-tenancy environments.

- Transparent networking capability
  With a simple configuration change to "easy connect" mode, the CN4093 becomes a transparent network device that is invisible to the core 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 VMs by eliminating the need to configure the typical access switch parameters.

- Advanced network management
  System Center application is used for advanced levels of management and control, which can significantly reduce deployment and day-to-day maintenance times while providing in-depth visibility into the network performance and operations of Lenovo switches. When tools, such as VMware vCenter Server or vSphere are used, Switch Center provides added integration for better optimization.

Components and connectors

The front panel of the Flex System Fabric CN4093 10Gb Converged Scalable Switch is shown in the following figure.

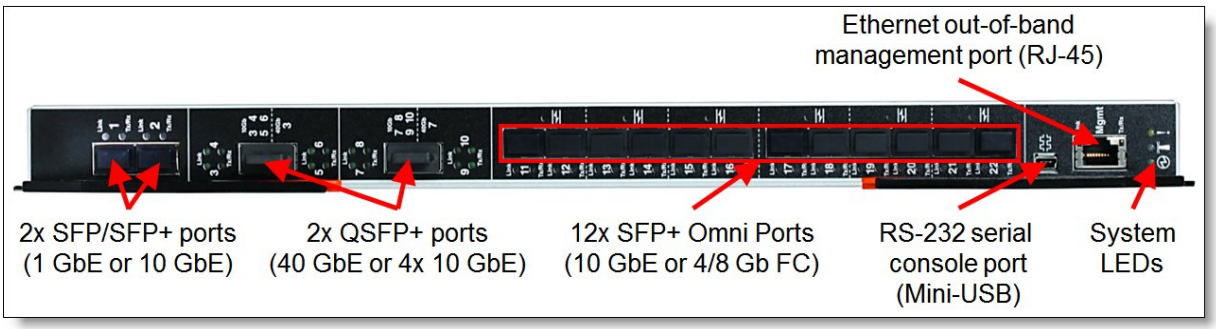

Figure 2. Front panel of the Flex System Fabric CN4093 10Gb Converged Scalable Switch

The following components are on the front panel:

- 2x SFP/SFP+ ports to attach SFP/SFP+ transceivers for 1 GbE or 10 GbE connections or SFP+ DAC cables for 10 GbE connections.
- 2x QSFP+ ports to attach QSFP+ transceivers or DAC cables for 40 GbE or 4x 10 GbE connections.
- 12x Omni Ports to attach SFP+ transceivers for 4/8 Gb Fibre Channel or 10 Gb Ethernet connections or DAC cables for 10 Gb Ethernet connections.
- One mini-USB RS-232 console port that provides another means to configure the switch module.
- System LEDs that display the status of the switch module and the network.
- 1x RJ-45 10/100/1000 Mb Ethernet port for out-of-band management.

System specifications

The following table lists the CN4093 system specifications.

Table 1. System specifications

Component	Specification
Form factor	Flex System embedded I/O module
Ports	Internal ports: 42x 10 Gb Ethernet ports External ports: • 2x SFP/SFP+ ports (for 1 GbE SFP or 10 GbE SFP+ media) • 12x SFP+ Omni Ports (for 10 GbE SFP+ or 8 Gb SFP+ FC media; no 1 GbE SFPs) • 2x QSFP+ ports (for 40 GbE QSFP+ media)
Media types (external ports)	40 Gb Ethernet QSFP+: • 40 GbE short-range (SR) QSFP+ bi-directional (BiDi) transceivers • 40 GbE short-range (SR4/iSR4/eSR4) QSFP+ transceivers • 40 GbE long-range (LR4) QSFP+ transceivers • 40 GbE QSFP+ to QSFP+ active optical cables (AOCs) • 40 GbE QSFP+ to 4x 10 GbE SFP+ active optical breakout cables • 40 GbE QSFP+ to QSFP+ direct attach copper (DAC) cables • 40 GbE QSFP+ to 4x 10 GbE SFP+ DAC breakout cables 10 Gb Ethernet SFP+: • 10 GbE short-range (SR) SFP+ transceivers • 10 GbE long-range (LR) SFP+ transceivers • 10 GbE SFP+ active optical cables • 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 8 Gb Fibre Channel SFP+: • 8 Gb FC short-wave (SW) SFP+ transceivers
Port speeds	• 40 GbE QSFP+ SR BiDi/SR4/LR4 transceivers: 40 GbE • 40 GbE QSFP+ iSR4/eSR4 transceivers, DAC cables and AOCs: 40 GbE or 4x 10 GbE • 10 GbE SFP+ transceivers, DAC cables and AOCs: 10 Gbps • 1/10 GbE SFP+ transceivers: 1 Gbps or 10 Gbps (Omni Ports: 10 Gbps only) • 1 GbE SFP transceivers: 1 Gbps • 8 Gb FC SFP+ transceivers: 4/8 Gbps
Switching method	Cut-through.
Data traffic types	Unicast, multicast, broadcast.
Software features	Lenovo Networking OS: Layer 2 switching, Layer 3 switching, virtual local area networks (VLANs), VLAN tagging, spanning tree protocol (STP), link aggregation (trunk) groups (LAGs), virtual LAGs (vLAGs), Hot Links, Layer 2 failover, quality of service (QoS), Edge Virtual Bridging (EVB), VMready, Switch Partitioning (SPAR), stacking, Flexible Port Mapping, IPv4/IPv6 management, IPv4/IPv6 routing, IPv4 virtual router redundancy protocol (VRRP), virtual NICs, Unified Fabric Port (UFP), Converged Enhanced Ethernet, Fibre Channel over Ethernet (FCoE) full fabric switch operations, FCoE N_Port Virtualization (NPV) gateway operations.

Component	Specification
Performance	Non-blocking architecture with wire-speed forwarding of traffic: • Up to 1.28 Tbps aggregated throughput • 100% line-rate performance with sub-microsecond switching latency • Up to 9,216-byte jumbo frames • Receive buffer size: 9 MB
Scalability	• MAC address forwarding database entries: 128,000 • VLANs: 4,095 • Per VLAN Rapid Spanning Tree (PVRST) instances: 256 • Multiple STP (MSTP) instances: 32 • Link aggregation groups: 64 • Ports in a link aggregation group: 16
Hot-swap parts	SFP/SFP+/QSFP+ transceivers, SFP+/QSFP+ DAC cables.
Management ports	2x GbE internal ports connected to the chassis management module; 1x 10/100/1000 Mb Ethernet EXTM external port (RJ-45); 1x RS-232 external port (Mini-USB).
Management interfaces	Industry standard command line interface (isCLI); SNMP v1 and v3; Netconf (XML). 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 switch assumes the chassis' base warranty and any warranty service upgrade; warranty includes Networking OS software upgrades.
Mean Time Between Failures	262,135 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 CN4093 switch is initially licensed for 22x 10 GbE ports. More ports can be enabled with Upgrade 1 and Upgrade 2 license options. Upgrade 1 and Upgrade 2 can be applied on the switch independently from each other or in combination for full feature capability. The part numbers and feature codes for ordering the switches and the upgrades are listed in the following table.

Withdrawn from marketing: The Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch is now withdrawn from marketing. The Features on Demand upgrades continue to be available.

Table 2. Part numbers and feature codes for ordering

Description	Part number	Feature code
Switch module		
Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch	00FM510	ASUT
Features on Demand upgrades		
Flex System Fabric CN4093 Converged Scalable Switch (Upgrade 1)	00D5845	A3HL
Flex System Fabric CN4093 Converged Scalable Switch (Upgrade 2)	00D5847	A3HM

The part number for the switch includes the following items:

- One Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch
- Documentation package

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

The switch does not include a serial management cable; the optional Flex System Management Serial Access Cable (part number 90Y9338) is supported and contains two cables: a mini-USB-to-RJ45 serial cable and a mini-USB-to-DB9 serial cable. These cables can be used to connect to the switch locally for configuration tasks and firmware updates.

The part numbers for the upgrades (00D5845 and 00D5847) include the following items:

- Features on Demand Activation Flyer
- Upgrade authorization letter

The base switch and upgrades feature the following configuration:

- Part number 00FM510 is for the base switch, which includes 14 internal 10 GbE ports enabled (one to each node bay), 2 external 10 GbE SFP+ ports enabled, and 6 Omni Ports enabled to connect to Ethernet or Fibre Channel networking infrastructure, depending on the SFP+ transceiver or DAC cable that is used.
- Part number 00D5845 (Upgrade 1) can be applied on the base switch when you need more external bandwidth with two 40 GbE QSFP+ ports that can be converted into 4x 10 GbE SFP+ links each with the optional break-out cables. This upgrade also enables 14 more internal ports (for a total of 28 internal ports) to provide more bandwidth to the compute nodes by using 4-port expansion cards. This configuration makes full use of the 4-port adapters that are installed in each compute node and requires the base switch.
- Part number 00D5847 (Upgrade 2) can be applied on the base switch when you need more external Omni Ports on the switch or if you want more internal bandwidth to the node bays. The upgrade enables the remaining six external Omni Ports and 14 more internal 10 GbE ports (for a total of 28 internal ports) to provide more bandwidth to the compute nodes by using 4-port expansion cards. This configuration makes full use of the 4-port adapters that are installed in each compute node and requires the base switch.
- Part numbers 00D5845 (Upgrade 1) and 00D5847 (Upgrade 2) can be applied on the switch at the same time so that you can use 42 internal 10 GbE ports that use six ports on an eight-port expansion card, and to use all external ports on the switch.

With flexible port mapping, customers have more flexibility in assigning ports that they licensed on the CN4093, which can help eliminate or postpone the need to purchase upgrades. Although the base model and upgrades still activate specific ports, flexible port mapping provides clients with the capability of reassigning ports as needed by moving internal and external 10 GbE ports and Omni Ports, or trading off four 10 GbE ports for the use of an external 40 GbE port. This feature is valuable when you consider the flexibility with the base license and with Upgrade 1 or Upgrade 2.

Note: Flexible port mapping is supported in Stacking mode with Networking OS version 8.3 or later.

With flexible port mapping, customers have the following licenses available for a specific number of ports:

- Part number 00FM510 is for the base switch. It provides 22x 10 GbE port licenses that can enable any combination of internal and external 10 GbE ports and Omni Ports and external 40 GbE ports (with the use of four 10 GbE port licenses per one 40 GbE port).
- Part number 00D5845 (Upgrade 1) upgrades the base switch by activating 14 internal 10 GbE ports and two external 40 GbE ports, which is equivalent to adding 22 10 GbE port licenses for a total of 44x 10 GbE port licenses. Any combination of internal and external 10 GbE ports and Omni Ports and external 40 GbE ports (with the use of four 10 GbE port licenses per one 40 GbE port) can be enabled with this upgrade. This upgrade requires the base switch.
- Part number 00D5847 (Upgrade 2) upgrades the base switch by activating 14 internal 10 GbE ports and six external Omni Ports, which is equivalent to adding 20 10 GbE port licenses for a total of 42x 10 GbE port licenses. Any combination of internal and external 10 GbE ports and Omni Ports and external 40 GbE ports (with the use of four 10 GbE port licenses per one 40 GbE port) can be enabled with this upgrade. This upgrade requires the base switch.
- Part numbers 00D5845 (Upgrade 1) and 00D5847 (Upgrade 2) activate all of the ports on the CN4093, which is 42 internal 10 GbE ports, 2 external SFP+ ports, 12 external Omni Ports, and 2 external QSFP+ ports.

Note: When Upgrade 1 and Upgrade 2 are activated, flexible port mapping is no longer used because all of the ports on the CN4093 are enabled.

The supported port combinations on the switch and required upgrades are listed in the following tables.

Table 3. Supported port combinations: Default port mapping

Supported port combinations	**Quantity required**		
	Base switch, 00FM510	**Upgrade 1, 00D5845**	**Upgrade 2, 00D5847**
• 14x internal 10 GbE ports • 2x external 10 GbE SFP+ ports • 6x external SFP+ Omni Ports	1	0	0
• 28x internal 10 GbE ports • 2x external 10 GbE SFP+ ports • 6x external SFP+ Omni Ports • 2x external 40 GbE QSFP+ ports	1	1	0
• 28x internal 10 GbE ports • 2x external 10 GbE SFP+ ports • 12x external SFP+ Omni Ports	1	0	1
• 42x internal 10 GbE ports† • 2x external 10 GbE SFP+ ports • 12x external SFP+ Omni Ports • 2x external 40 GbE QSFP+ ports	1	1	1

† This configuration uses six of the eight ports on the CN4058S adapter.

Table 4. Supported port combinations: Flexible port mapping

Supported port combinations	Quantity required		
	Base switch, 00FM510	Upgrade 1, 00D5845	Upgrade 2, 00D5847
• 22x 10 GbE ports (internal and external SFP+ and Omni Ports) or • 18x 10 GbE ports (internal and external SFP+ and Omni Ports) • 1x external 40 GbE QSFP+ ports or • 14x 10 GbE ports (internal and external SFP+ and Omni Ports) • 2x external 40 GbE QSFP+ ports	1	0	0
• 44x 10 GbE ports (internal and external SFP+ and Omni Ports) or • 40x 10 GbE ports (internal and external SFP+ and Omni Ports) • 1x external 40 GbE QSFP+ ports or • 36x 10 GbE ports (internal and external SFP+ and Omni Ports) • 2x external 40 GbE QSFP+ ports	1	1	0
• 42x 10 GbE ports (internal and external SFP+ and Omni Ports) or • 38x 10 GbE ports (internal and external SFP+ and Omni Ports) • 1x external 40 GbE QSFP+ ports or • 34x 10 GbE ports (internal and external SFP+ and Omni Ports) • 2x external 40 GbE QSFP+ ports	1	0	1

Transceivers and cables

With the flexibility of the CN4093 switch, 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 (OM1) and up to 550 meters with 50 µ (OM2) multimode fiber, 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 longer distances, the 10GBASE-SR transceiver can support 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.

  To increase the number of available 10 GbE ports, customers can split out four 10 GbE ports for each 40 GbE port by using QSFP+ DAC or active optical breakout cables for distances up to 5 meters. For distances up to 100 meters, the 40GBASE-iSR4 QSFP+ transceivers can be used with OM3 optical MPO-to-LC breakout cables or up to 150 meters with OM4 optical MPO-to-LC breakout cables. For longer distances, the 40GBASE-eSR4 transceivers can be used with OM3 optical MPO-to-LC breakout cables for distances up to 300 meters or OM4 optical MPO-to-LC breakout cables for distances up to 400 meters.

- For 40 GbE to 40 GbE connectivity, customers can use the affordable QSFP+ to QSFP+ DAC cables for distances up to 7 meters or QSFP+ to QSFP+ active optical cables for distances up to 20 meters.

  With multimode fiber LC cables, customers can use the 40GBASE QSFP+ bi-directional transceivers for distances up to 100 meters with OM3 MMF LC cables or up to 150 meters with OM4 MMF LC cables.

  With multimode fiber MPO cables, customers can use the 40GBASE-SR4/iSR4 QSFP+ transceivers for distances up to 100 meters with OM3 MMF MPO cables or up to 150 meters with OM4 MMF MPO cables. For distances up to 300 meters, the 40GBASE-eSR4 QSFP+ transceiver can be used with OM3 MMF MPO cables or up to 400 meters with OM4 MMF MPO cables.

  For distances up to 10 kilometers, the 40GBASE-LR4 QSFP+ transceiver can be used with single mode fiber LC cables.

- For 8 Gb or 4 Gb FC links (supported on Omni Ports only), customers can use 8 Gb FC SFP+ SW optical transceivers for distances up to 150 meters (at 8 Gbps speed) or up to 380 m (at 4 Gbps speed) with 50 µ OM3 multimode fiber. These transceivers can operate at 8 Gbps or 4 Gbps speeds.

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

Table 5. Transceivers and DAC cables

Description	Part number	Feature code	Maximum quantity supported
SFP transceivers - 1 GbE			
Lenovo 1000BASE-T (RJ-45) SFP Transceiver (no 10/100 Mbps support)	00FE333	A5DL	2
Lenovo 1000BASE-SX SFP Transceiver	81Y1622	3269	2
Lenovo 1000BASE-LX SFP Transceiver	90Y9424	A1PN	2
SFP+ transceivers - 10 GbE			
Lenovo Dual Rate 1/10Gb SX/SR SFP+ Transceiver	00MY034	ATTJ	14
Lenovo 10GBASE-SR SFP+ Transceiver	46C3447	5053	14
Lenovo 10GBASE-SR SFP+ Transceiver (85°C)	00VX183	AT45	14*
Lenovo 10GBASE-LR SFP+ Transceiver	90Y9412	A1PM	14
Optical cables for 1 GbE SX SFP, 10 GbE SR SFP+, 40 GbE SR QSFP+ BiDi, and 8 Gb FC SW SFP+ transceivers			
Lenovo 1m LC-LC OM3 MMF Cable	00MN502	ASR6	14
Lenovo 3m LC-LC OM3 MMF Cable	00MN505	ASR7	14
Lenovo 5m LC-LC OM3 MMF Cable	00MN508	ASR8	14
Lenovo 10m LC-LC OM3 MMF Cable	00MN511	ASR9	14
Lenovo 15m LC-LC OM3 MMF Cable	00MN514	ASRA	14
Lenovo 25m LC-LC OM3 MMF Cable	00MN517	ASRB	14
Lenovo 30m LC-LC OM3 MMF Cable	00MN520	ASRC	14
SFP+ active optical cables - 10 GbE			
Lenovo 1m SFP+ to SFP+ Active Optical Cable	00YL634	ATYX	14
Lenovo 3m SFP+ to SFP+ Active Optical Cable	00YL637	ATYY	14
Lenovo 5m SFP+ to SFP+ Active Optical Cable	00YL640	ATYZ	14
Lenovo 7m SFP+ to SFP+ Active Optical Cable	00YL643	ATZ0	14
Lenovo 15m SFP+ to SFP+ Active Optical Cable	00YL646	ATZ1	14
Lenovo 20m SFP+ to SFP+ Active Optical Cable	00YL649	ATZ2	14

Description	Part number	Feature code	Maximum quantity supported
SFP+ direct-attach cables - 10 GbE			
Lenovo 1m Passive SFP+ DAC Cable	90Y9427	A1PH	14
Lenovo 1.5m Passive SFP+ DAC Cable	00AY764	A51N	14
Lenovo 2m Passive SFP+ DAC Cable	00AY765	A51P	14
Lenovo 3m Passive SFP+ DAC Cable	90Y9430	A1PJ	14
Lenovo 5m Passive SFP+ DAC Cable	90Y9433	A1PK	14
Lenovo 7m Passive SFP+ DAC Cable	00D6151	A3RH	2**
QSFP+ transceivers - 40 GbE			
Lenovo 40GBase QSFP+ Bi-Directional Transceiver	00YL631	ATYW	2
Lenovo 40GBASE-SR4 QSFP+ Transceiver	49Y7884	A1DR	2
Lenovo 40GBASE-iSR4 QSFP+ Transceiver	00D9865	ASTM	2
Lenovo 40GBASE-eSR4 QSFP+ Transceiver	00FE325	A5U9	2
Lenovo 40GBASE-LR4 QSFP+ Transceiver	00D6222	A3NY	2
Optical cables for 40 GbE QSFP+ SR4/iSR4/eSR4 transceivers			
Lenovo 10m QSFP+ MPO-MPO OM3 MMF Cable	00VX003	AT2U	2
Lenovo 30m QSFP+ MPO-MPO OM3 MMF Cable	00VX005	AT2V	2
Optical breakout cables for 40 GbE QSFP+ iSR4/eSR4 transceivers			
Lenovo 1m MPO-4xLC OM3 MMF Breakout Cable	00FM412	A5UA	2
Lenovo 3m MPO-4xLC OM3 MMF Breakout Cable	00FM413	A5UB	2
Lenovo 5m MPO-4xLC OM3 MMF Breakout Cable	00FM414	A5UC	2
QSFP+ active optical cables - 40 GbE			
Lenovo 1m QSFP+ to QSFP+ Active Optical Cable	7Z57A04256	AX42	2
Lenovo 3m QSFP+ to QSFP+ Active Optical Cable	00YL652	ATZ3	2
Lenovo 5m QSFP+ to QSFP+ Active Optical Cable	00YL655	ATZ4	2
Lenovo 7m QSFP+ to QSFP+ Active Optical Cable	00YL658	ATZ5	2
Lenovo 15m QSFP+ to QSFP+ Active Optical Cable	00YL661	ATZ6	2
Lenovo 20m QSFP+ to QSFP+ Active Optical Cable	00YL664	ATZ7	2
QSFP+ active optical breakout cables - 40 GbE to 4x10 GbE			
Lenovo 1M QSFP+ to 4xSFP+ Active Optical Cable	00YL667	ATZ8	2
Lenovo 3M QSFP+ to 4xSFP+ Active Optical Cable	00YL670	ATZ9	2
Lenovo 5M QSFP+ to 4xSFP+ Active Optical Cable	00YL673	ATZA	2
QSFP+ direct-attach cables - 40 GbE			
Lenovo 1m Passive QSFP+ DAC Cable	49Y7890	A1DP	2
Lenovo 3m Passive QSFP+ DAC Cable	49Y7891	A1DQ	2
Lenovo 5m Passive QSFP+ DAC Cable	00D5810	A2X8	2
Lenovo 7m Passive QSFP+ DAC Cable	00D5813	A2X9	2
QSFP+ breakout cables - 40 GbE to 4x10 GbE			
Lenovo 1m Passive QSFP+ to SFP+ Breakout DAC Cable	49Y7886	A1DL	2
Lenovo 3m Passive QSFP+ to SFP+ Breakout DAC Cable	49Y7887	A1DM	2
Lenovo 5m Passive QSFP+ to SFP+ Breakout DAC Cable	49Y7888	A1DN	2

Description	Part number	Feature code	Maximum quantity supported
SFP+ transceivers - 8 Gb FC (supported in Omni Ports)			
8Gb SFP+ SW Optical Transceiver (supports 4/8 Gbps)	44X1964	5075	12
Serial console cables			
Flex System Management Serial Access Cable Kit	90Y9338	A2RR	1

* The 10GBASE-SR SFP+ Transceiver (85°C), part number 00NU537, is required and supported only when the CN4093 switch is used for 10 GbE fiber optics connectivity in the Carrier-Grade Chassis.
** Supported in SFP+ ports only, not supported in Omni Ports.

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

Table 6. CN4093 network cabling requirements

Transceiver	Standard	Cable	Connector
40 Gb Ethernet			
40Gb SR QSFP+ BiDi (00YL631)	40GBASE-SR BiDi	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 5); up to 100 m with OM3 or up to 150 m with OM4 multimode fiber optic cable.	LC
40Gb SR4 QSFP+ (49Y7884)	40GBASE-SR4	Up to 30 m MPO fiber cables supplied by Lenovo (see Table 5); up to 100 m with OM3 or up to 150 m with OM4 multimode fiber optic cable.	MPO
40Gb iSR4 QSFP+ (00D9865)	40GBASE-SR4	Up to 30 m MPO fiber cables or MPO-4xLC breakout cables up to 5 m supplied by Lenovo (see Table 5); up to 100 m with OM3 or up to 150 m with OM4 multimode fiber optic cable.	MPO
40Gb eSR4 QSFP+ (00FE325)	40GBASE-SR4	Up to 30 m MPO fiber cables or MPO-4xLC breakout cables up to 5 m supplied by Lenovo (see Table 5); up to 300 m with OM3 or up to 400 m with OM4 multimode fiber optic cable.	MPO
40Gb LR4 QSFP+ (00D6222)	40GBASE-LR4	1310 nm single-mode fiber optic cable up to 10 km.	LC
Active optical cable	40GBASE-SR4	QSFP+ to QSFP+ active optical cables up to 1 m; QSFP+ to 4x SFP+ active optical breakout cables up to 5 m for 4x 10 GbE SFP+ connections out of a 40 GbE port (see Table 5)	QSFP+
Direct attach copper cable	40GBASE-CR4	QSFP+ to QSFP+ DAC cables up to 7 m; QSFP+ to 4xSFP+ DAC breakout cables up to 5 m for 4x10GbE SFP+ connections out of a 40GbE port (see Table 5).	QSFP+
10 Gb Ethernet			
10Gb SR SFP+ (46C3447, 00VX183) 1/10Gb SFP+ (00MY034)	10GBASE-SR	Up to 30 m with fiber cables supplied by Lenovo (see Table 5); up to 300 m with OM3 or up to 400 m with OM4 multimode fiber optic cable.	LC
10Gb LR SFP+ (00D6180)	10GBASE-LR	1310 nm single-mode fiber optic cable up to 10 km.	LC
Active optical cable	10GBASE-SR	SFP+ active optical cables up to 20 m (see Table 5)	SFP+
Direct attach copper cable	10GSFP+Cu	SFP+ DAC cables up to 7 m (see Table 5).	SFP+
1 Gb Ethernet			

1Gb RJ-45 SFP (00FE333, 00AY240)	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 5); 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 optic cable up to 10 km.	LC
8 Gb Fibre Channel (operating at 8 Gbps or 4 Gbps)			
8Gb FC SW SFP+ (44X1964)	FC-PI-4 (8GFC, 4GFC)	Up to 30 m with fiber optic cables supplied by Lenovo (see Table 5); 850 nm multimode fiber, 50 µ OM3 up to 150 m at 8Gbps or up to 380 m at 4Gbps.	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 the optional Cable Kit, 90Y9338).	Mini-USB

Software features

Note: The features that are listed in this section are based on Networking OS version 8.3.

The Flex System Fabric CN4093 10Gb Converged Scalable Switch has the following software features:

- Scalability and performance:
  - Media access control (MAC) address learning with automatic updates
  - Up to 128 IP interfaces per switch
  - Static and LACP (IEEE 802.3ad) link aggregation
  - Broadcast and multicast storm control
  - IGMP snooping to limit flooding of IP multicast traffic
  - IGMP filtering to control multicast traffic for hosts that are participating in multicast groups
  - Configurable traffic distribution schemes over trunk links that are based on source and destination IP or MAC addresses, or both
  - Fast port forwarding and fast uplink convergence for rapid STP convergence
- Availability and redundancy:
  - IEEE 802.1D STP for providing L2 redundancy
  - IEEE 802.1s Multiple STP (MSTP) for topology optimization
  - IEEE 802.1w Rapid STP (RSTP) provides rapid STP convergence for delay-sensitive traffic
  - Per-VLAN Rapid STP (PVRST) enhancements
  - Layer 2 Failover to support active/standby configurations of NIC teaming on compute nodes
  - Hot Links provides basic link redundancy with fast recovery for network topologies that require Spanning Tree to be turned off
- VLAN support:
  - Up to 4095 VLANs supported per switch, with VLAN numbers 1 - 4095 (4095 is used for management module's connection only)
  - 802.1Q VLAN tagging support on all ports
  - Full private VLANs
- Security:
  - VLAN-based, MAC-based, and IP-based access control lists (ACLs)
  - 802.1x port-based authentication
  - Multiple user IDs and passwords
  - User access control
  - Radius, TACACS+, and LDAP authentication and authorization
  - NIST 800-131A Encryption
  - Selectable encryption protocol; SHA 256 enabled as default
- Quality of Service (QoS):

- Support for IEEE 802.1p, IP ToS/DSCP, and ACL-based (MAC and IP source and destination addresses, VLANs) traffic classification and processing
- Traffic shaping and re-marking that is based on defined policies
- Eight Weighted Round Robin (WRR) priority queues per port for processing qualified traffic
- IPv4/IPv6 ACL metering

- IP v4 Layer 3 functions:
  - Host management
  - IP forwarding
  - IP filtering with ACLs; up to 256 ACLs supported
  - Virtual Router Redundancy Protocol (VRRP) for Layer 3 router redundancy
  - Support for up to 128 static routes
  - Routing protocol support (RIP v1, RIP v2, OSPF v2, and BGP-4); up to 2,048 dynamic routes
  - Support for DHCP Relay
  - Support for IGMP snooping and IGMP relay
  - Support for Protocol Independent Multicast (PIM) in Sparse Mode (PIM-SM) and Dense Mode (PIM-DM)
- IP v6 Layer 3 functions:
  - IPv6 host management (except default switch management IP address)
  - IPv6 forwarding
  - Up to 128 static routes
  - Support for OSPF v3 routing protocol
  - IPv6 filtering with ACLs; up 128 ACLs supported
- Virtualization:
  - Virtual NIC (vNIC): Ethernet, iSCSI, or FCoE traffic on vNICs (adapter-specific)
  - Unified fabric port (UFP):
    - Up to eight UFP virtual ports (vPorts) per 10 GbE physical port (adapter-specific)
    - Ethernet, iSCSI, or FCoE traffic on vPorts
    - Up to 1,024 VLAN for the virtual ports
    - Integration with L2 failover
  - Virtual link aggregation groups (vLAGs)
    - Two switches (vLAG peers) act as a single virtual entity for a multi-port aggregation
    - vLAG Peer Gateway for improved usage of the link between the vLAG peers
    - Two-tier vLAGs with VRRP enables active/active VRRP to reduce routing latency
  - 802.1Qbg Edge Virtual Bridging (EVB) is an emerging IEEE standard for allowing networks to become virtual machine (VM)-aware:
    - Virtual Ethernet Bridging (VEB) and Virtual Ethernet Port Aggregator (VEPA) are mechanisms for switching between VMs on the same hypervisor.
    - Edge Control Protocol (ECP) is a transport protocol that operates between two peers over an IEEE 802 LAN, which provides reliable, in-order delivery of upper layer protocol data units.
    - Virtual Station Interface (VSI) Discovery and Configuration Protocol (VDP) allows centralized configuration of network policies that persist with the VM, independent of its location.
    - EVB Type-Length-Value (TLV) is used to discover and configure VEPA, ECP, and VDP.
  - VMready:
    - Up to 4,096 virtual entities (VEs)
    - Automatic VE discovery
    - Up to 4,096 local or distributed VM groups for VEs
    - NMotion® feature for automatic network configuration migration

    - Switch partitioning (SPAR):
        - SPAR forms separate virtual switching contexts by segmenting the data plane of the switch. Data plane traffic is not shared between SPARs on the same switch.
        - SPAR operates as a Layer 2 broadcast network. Hosts on the same VLAN attached to a SPAR can communicate with each other and with the upstream switch. Hosts on the same VLAN but attached to different SPARs communicate through the upstream switch.
        - SPAR is implemented as a dedicated VLAN with a set of internal compute node ports and a single external port or link aggregation (LAG). Multiple external ports or LAGs are not allowed in SPAR. A port can be a member of only one SPAR.
- Converged Enhanced Ethernet:
    - Priority-Based Flow Control (PFC) (IEEE 802.1Qbb) extends 802.3x standard flow control to allow the switch 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.
    - Multi-hop RDMA over Converged Ethernet (RoCE) with LAG support.
- Fibre Channel and Fibre Channel over Ethernet (FCoE):
    - FC-BB-5 FCoE specification compliant
    - Native FC Forwarder (FCF) switch operations
    - End-to-end FCoE support (initiator to target)
    - FCoE Initialization Protocol (FIP) support
    - FCoE Link Aggregation Group (LAG) support
    - Optimized FCoE to FCoE forwarding
    - Omni Ports support 4/8 Gb FC when FC SFPs+ are installed in these ports
    - Support for F_port, E_Port ISL, NP_port and VF_port FC port types
    - Full Fabric mode for end-to-end FCoE or FCoE gateway; NPV Gateway mode for external FC SAN attachments (support for Brocade and Cisco MDS external SANs)
    - Supports 16 buffer credits
    - Fabric Device Management Interface (FDMI)
    - NPIV support
    - Fabric Shortest Path First (FSPF)
    - Port security
    - Fibre Channel ping, debugging
    - Supports 2,000 secure FCoE sessions with FIP Snooping by using Class ID ACLs
    - Fabric services in Full Fabric mode:
        - Name Server
        - Registered State Change Notification (RSCN)
        - Login services
        - Zoning
- Stacking:
    - Hybrid stacking support (from two to six EN4093R switches with two CN4093 switches); single IP management
    - FCoE support
    - FCoE LAG on external ports
    - 802.1Qbg support
    - vNIC and UFP support:
        - UFP with 802.1Qbg
        - Support for UFP with private VLANs

- Manageability:
  - Simple Network Management Protocol (SNMP V1 and V3)
  - Telnet interface for CLI
  - Secure Shell (SSH)
  - Secure FTP (sFTP)
  - Service Location Protocol (SLP)
  - Serial interface for CLI
  - Scriptable CLI
  - Firmware image update (TFTP and FTP)
  - Network Time Protocol (NTP) for switch clock synchronization
  - Lenovo Switch Center support
  - Lenovo XClarity support
- Monitoring:
  - Switch LEDs for external port status and switch module status indication
  - Remote Monitoring (RMON) agent to collect statistics and proactively monitor switch performance
  - Port mirroring for analyzing network traffic that is passing through the switch
  - Change tracking and remote logging with syslog feature
  - Support for sFLOW agent for monitoring traffic in data networks (separate sFLOW analyzer required elsewhere)
  - POST diagnostics

The following features are not supported with IPv6:

- Default switch management IP address
- SNMP trap host destination IP address
- Bootstrap Protocol (BOOTP) and DHCP
- RADIUS, TACACS+, and LDAP
- QoS metering and re-marking ACLs for out-profile traffic
- VMware Virtual Center (vCenter) for VMready
- Routing Information Protocol (RIP)
- Internet Group Management Protocol (IGMP)
- Border Gateway Protocol (BGP)
- Virtual Router Redundancy Protocol (VRRP)
- sFLOW

The following features are not supported with Stacking (for more information about limitations, see the Networking OS Application Guide):

- Converged Enhanced Ethernet (CEE)
- IGMP Relay, IGMP Querier, and IGMPv3
- IPv6
- Policy-based routing
- Routing protocols (RIP, OSPF, BGP)
- sFLOW
- Switch partitioning (SPAR)
- Virtual Router Redundancy Protocol (VRRP)

Ethernet standards

The CN4093 switch supports the following Ethernet standards:

- IEEE 802.1AB Data Center Bridging Capability Exchange Protocol (DCBX)
- IEEE 802.1D Spanning Tree Protocol (STP)
- IEEE 802.1p Class of Service (CoS) prioritization
- IEEE 802.1s Multiple STP (MSTP)
- IEEE 802.1Q Tagged VLAN (frame tagging on all ports when VLANs are enabled)
- IEEE 802.1Qbg Edge Virtual Bridging
- IEEE 802.1Qbb Priority-Based Flow Control (PFC)
- IEEE 802.1Qaz Enhanced Transmission Selection (ETS)
- IEEE 802.1x port-based authentication
- IEEE 802.1w Rapid STP (RSTP)
- 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-KR backplane 10 Gb Ethernet
- 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 802.3ba 40GBASE-SR4 short range fiber optics 40 Gb Ethernet
- IEEE 802.3ba 40GBASE-CR4 copper 40 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

Fibre Channel standards

The CN4093 switch supports the following Fibre Channel standards:

- FC-PH, Revision 4.3 (ANSI/INCITS 230-1994)
- FC-PH, Amendment 1 (ANSI/INCITS 230-1994/AM1 1996)
- FC-PH, Amendment 2 (ANSI/INCITS 230-1994/AM2-1999)
- FC-PH-2, Revision 7.4 (ANSI/INCITS 297-1997)
- FC-PH-3, Revision 9.4 (ANSI/INCITS 303-1998)
- FC-PI, Revision 13 (ANSI/INCITS 352-2002)
- FC-PI-2, Revision 10 (ANSI/INCITS 404-2006)
- FC-PI-4, Revision 7.0
- FC-FS, Revision 1.9 (ANSI/INCITS 373-2003)
- FC-FS-2, Revision 0.91
- FC-FS-3, Revision 1.11
- FC-LS, Revision 1.2
- FC-SW-2, Revision 5.3 (ANSI/INCITS 355-2001)
- FC-SW-3, Revision 6.6 (ANSI/INCITS 384-2004)
- FC-SW-5, Revision 8.5 (ANSI/INCITS 461-2010)
- FC-GS-3, Revision 7.01 (ANSI/INCITS 348-2001)
- FC-GS-4, Revision 7.91 (ANSI/INCITS 387-2004)
- FC-GS-6, Revision 9.4,(ANSI/INCITS 463-2010)
- FC-BB-5, Revision 2.0 for FCoE
- FCP, Revision 12 (ANSI/INCITS 269-1996)
- FCP-2, Revision 8 (ANSI/INCITS 350-2003)
- FCP-3, Revision 4 (ANSI/INCITS 416-2006)
- FC-MI, Revision 1.92 (INCITS TR-30-2002, except for FL-ports and Class 2)
- FC-MI-2, Revision 2.6 (INCITS TR-39-2005)
- FC-SP, Revision 1.6
- FC-DA, Revision 3.1 (INCITS TR-36-2004)

Warranty

The CN4093 switch carries a 1-year, customer-replaceable unit (CRU) limited warranty. When installed in a supported chassis, the switch assumes your system's base warranty and any Lenovo warranty service upgrade for the system.

Physical specifications

The switch 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 switch 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 switches conform to the following standards:

- 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 Communique 2004/9; Communique 2004/22
- Saudi Arabia EMC.CVG, 28 October 2002

Chassis and adapters

The switches are installed in I/O module bays in the rear of the Flex System Chassis, as shown in Figure 2. Switches are normally 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.

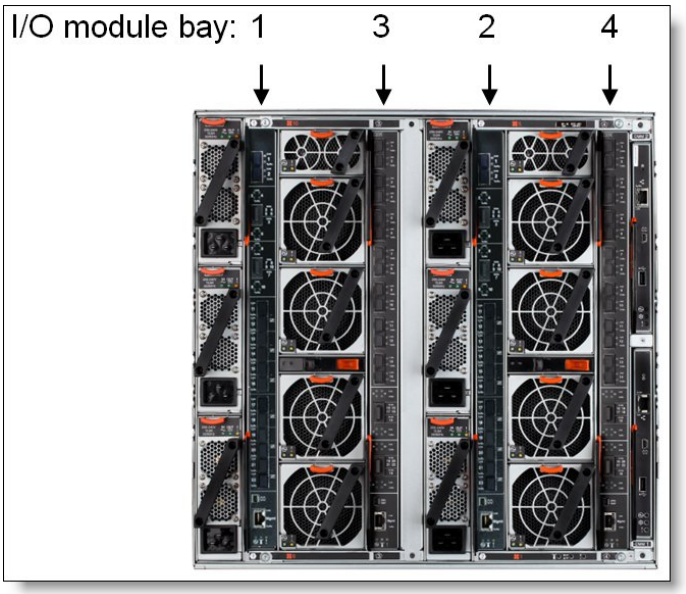

Figure 3. Location of the I/O bays in the Flex System chassis

The CN4093 switch 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. Each adapter can use up to four lanes to connect to the respective I/O module bay. The CN4093 can use up to three of the four lanes.

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. However, when needed, the periscope connector can be replaced with the adapter. In this case, integrated NIC will be disabled.

With flexible port mapping. there is no need to buy more switch upgrades for 4-port and 8-port adapters if the total number of port licenses on the switch does not exceed the number of external (upstream network ports) and internal (compute node network ports) connections that are used.

The following table shows compatibility information for the CN4093 and Flex System chassis.

Table 7. Flex System chassis compatibility

Description	Part number	Enterprise Chassis with CMM	Enterprise Chassis with CMM2	Carrier-grade Chassis with CMM2
Flex System Fabric CN4093 10Gb Converged Scalable Switch	00FM510	No	Yes	Yes

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 8. 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		
	Port 3	Yes			
	Port 4		Yes		
	Port 5	Yes			
	Port 6		Yes		
	Port 7*				
	Port 8*				
Slot 2	Port 1			Yes	
	Port 2				Yes
	Port 3			Yes	
	Port 4				Yes
	Port 5			Yes	
	Port 6				Yes
	Port 7*				
	Port 8*				
Slot 3 (full-wide compute nodes only)	Port 1	Yes			
	Port 2		Yes		
	Port 3	Yes			
	Port 4		Yes		
	Port 5	Yes			
	Port 6		Yes		
	Port 7*				
	Port 8*				
Slot 4 (full-wide compute nodes only)	Port 1			Yes	
	Port 2				Yes
	Port 3			Yes	
	Port 4				Yes
	Port 5			Yes	
	Port 6				Yes
	Port 7*				
	Port 8*				

* Ports 7 and 8 are routed to I/O bays 1 and 2 (Slot 1 and Slot 3) or 3 and 4 (Slot 2 and Slot 4), but these ports cannot be used with the CN4093 switch.

The following table lists the adapters that are supported by the I/O module.

Table 9. 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 CN4058S 8-port 10Gb Virtual Fabric Adapter	94Y5160	A4R6
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 following table lists the 10 Gb and 40 Gb Ethernet network switches that are offered by Lenovo that can be used with the CN4093 switch in Flex System network connectivity solutions.

Table 10. 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
40 Gb Ethernet switches	
Lenovo RackSwitch G8332 (Rear to Front)	7159BRX

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

Storage connectivity

The following table lists the external storage systems that are currently offered by Lenovo that can be used with the CN4093 switch for external NAS or iSCSI, FC, or FCoE SAN storage connectivity.

Table 11. External storage systems

Description	Part number
Lenovo Storage DX8200 Series (NAS, iSCSI connectivity)	
Lenovo Storage DX8200D ServerSAN Entry, 8TB, 3yr SW S&S	5135D2x#
Lenovo Storage DX8200D ServerSAN Entry, 8TB, 4yr SW S&S	5135N2x#
Lenovo Storage DX8200D ServerSAN Entry, 8TB, 5yr SW S&S	51354Vx#
Lenovo Storage DX8200D ServerSAN Mid, 16TB, 3yr SW S&S	5135F2x#
Lenovo Storage DX8200D ServerSAN Mid, 16TB, 4yr SW S&S	5135P2x#
Lenovo Storage DX8200D ServerSAN Mid, 16TB, 5yr SW S&S	51355Vx#
Lenovo Storage DX8200D ServerSAN High, 32TB, 3yr SW S&S	5135G2x#
Lenovo Storage DX8200D ServerSAN High, 32TB, 4yr SW S&S	5135Q2x#
Lenovo Storage DX8200D ServerSAN High, 32TB, 5yr SW S&S	51356Vx#
Lenovo Storage DX8200D Storage Virtualization Entry, 4TB, 3yr SW S&S	5135A2x#
Lenovo Storage DX8200D Storage Virtualization Entry, 4TB, 4yr SW S&S	5135J2x#
Lenovo Storage DX8200D Storage Virtualization Entry, 4TB, 5yr SW S&S	51351Vx#
Lenovo Storage DX8200D Storage Virtualization Mid, 16TB, 3yr SW S&S	5135B2x#
Lenovo Storage DX8200D Storage Virtualization Mid, 16TB, 5yr SW S&S	51352Vx#
Lenovo Storage DX8200D Storage Virtualization Mid, 16TB, 4yr SW S&S	5135L2x#
Lenovo Storage DX8200D Storage Virtualization High, 64TB, 3yr SW S&S	5135C2x#
Lenovo Storage DX8200D Storage Virtualization High, 64TB, 4yr SW S&S	5135M2x#
Lenovo Storage DX8200D Storage Virtualization High, 64TB, 5yr SW S&S	51353Vx#
Lenovo Storage DX8200N with 1x N2226 HBA (Requires a supported external drive enclosure)	5128A1x#
Lenovo Storage DX8200N with 2x N2226 HBAs (Requires a supported external drive enclosure)	5128A2x#
Lenovo Storage S Series (iSCSI connectivity)	
Lenovo Storage S2200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64114B1
Lenovo Storage S2200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64114B2
Lenovo Storage S2200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64114B3
Lenovo Storage S2200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64114B4
Lenovo Storage S3200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64116B1
Lenovo Storage S3200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64116B2
Lenovo Storage S3200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD	64116B3
Lenovo Storage S3200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD	64116B4
Lenovo Storage V Series (iSCSI connectivity, end-to-end FCoE connectivity, FCoE/FC gateway connectivity)	
Lenovo Storage V3700 V2 LFF Control Enclosure	6535C1D
Lenovo Storage V3700 V2 LFF Control Enclosure (Top Seller)	6535EC1
Lenovo Storage V3700 V2 SFF Control Enclosure	6535C2D
Lenovo Storage V3700 V2 SFF Control Enclosure (Top Seller)	6535EC2
Lenovo Storage V3700 V2 XP LFF Control Enclosure	6535C3D

Description	Part number
Lenovo Storage V3700 V2 XP LFF Control Enclosure (Top Seller)	6535EC3
Lenovo Storage V3700 V2 XP SFF Control Enclosure	6535C4D
Lenovo Storage V3700 V2 XP SFF Control Enclosure (Top Seller)	6535EC4
Lenovo Storage V5030 LFF Control Enclosure 3Yr S&S	6536C12
Lenovo Storage V5030 LFF Control Enclosure 5Yr S&S	6536C32
Lenovo Storage V5030 SFF Control Enclosure 3Yr S&S	6536C22
Lenovo Storage V5030 SFF Control Enclosure 5Yr S&S	6536C42
Lenovo Storage V5030F SFF Control Enclosure 3Yr S&S	6536B1F
Lenovo Storage V5030F SFF Control Enclosure 5Yr S&S	6536B2F
IBM Storwize for Lenovo (iSCSI connectivity, end-to-end FCoE connectivity, FCoE/FC gateway connectivity)	
IBM Storwize V3500 3.5-inch Dual Control Storage Controller Unit	6096CU2^
IBM Storwize V3500 2.5-inch Dual Control Storage Controller Unit	6096CU3^
IBM Storwize V3700 3.5-inch Storage Controller Unit	6099L2C
IBM Storwize V3700 2.5-inch Storage Controller Unit	6099S2C
IBM Storwize V3700 2.5-inch DC Storage Controller Unit	6099T2C
IBM Storwize V7000 2.5-inch Storage Controller Unit, w/3 Yr S&S (Model 524)	6195SC5†
IBM Storwize V7000 2.5-inch Storage Controller Unit, w/3 Yr S&S (LA) (Model 524)	6195SCL‡
IBM Storwize V7000 2.5-inch Storage Controller Unit, w/5 Yr S&S (Model 524)	61951F1†
IBM Storwize V7000 2.5-inch Storage Controller Unit, w/5 Yr S&S (LA) (Model 524)	61951FL‡
IBM Storwize V7000 SFF Control Enclosure, 3YR SWMA (Model HC1 [Gen2+])	6195C32†
IBM Storwize V7000 SFF Control Enclosure, 3YR SWMA, LA (Model HC1 [Gen2+])	6195C3L‡
IBM Storwize V7000 SFF Control Enclosure, 5YR SWMA (Model HC1 [Gen2+])	6195C52†
IBM Storwize V7000 SFF Control Enclosure, 5YR SWMA, LA (Model HC1 [Gen2+])	6195C5L‡

* Available worldwide (except China and Japan).
^ Available only in China.
** Available only in Japan.
# x represents a geo-specific letter (for example: U = North America, G = EMEA). Ask a Lenovo representative for specifics.
† Available worldwide except Latin America.
‡ Available only in Latin America.

For more information, see the list of Product Guides in the following categories:

- Lenovo NAS storage:
  http://lenovopress.com/storage/nas?rt=product-guide
- Lenovo S Series and V Series storage:
  http://lenovopress.com/storage/san/lenovo?rt=product-guide
- IBM Storwize for Lenovo storage:
  http://lenovopress.com/storage/san/ibm?rt=product-guide

The following table lists the FC SAN switches that are offered by Lenovo that can be used with the CN4093 in FC SAN storage connectivity solutions. The CN4093 also supports connectivity to FC SAN switches from Brocade and Cisco.

Note: The CN4093 is supported only in NPV mode when connected to FC SAN switches.

Table 12. FC SAN switches

Description	Part number
8 Gb FC	
Lenovo B300, 8 ports activated w/ 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR3
Lenovo B6505, 12 ports activated w/ 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR4
Lenovo B6510, 24 ports activated w/ 8Gb SWL SFPs, 2 PS, Rail Kit	3873BR2
16 Gb FC	
Lenovo B6505, 12 ports activated w/ 16Gb SWL SFPs, 1 PS, Rail Kit	3873AR5
Lenovo B6510, 24 ports activated w/ 16Gb SWL SFPs, 2 PS, Rail Kit	3873BR3

For more information, see the list of Product Guides in the Rack SAN Switches category:
http://lenovopress.com/storage/switches/rack?rt=product-guide

Related publications and links

For more information, see the following Flex System Fabric CN4093 10Gb Converged Scalable Switch product publications, which are available from the Flex System Information Center:
http://flexsystem.lenovofiles.com/help/topic/com.lenovo.acc.cn4093.doc/IO_Module_CN4093.html

- *Flex System Fabric CN4093 10Gb Converged Scalable Switch Installation Guide*
- *Flex System Fabric CN4093 10Gb Converged Scalable Switch Application Guide*
- *Flex System Fabric CN4093 10Gb Converged Scalable Switch Industry Standard CLI Command Reference*

For additional Flex System information, see these 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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