Brocade X7-8 and X7-4 FC SAN Directors
Product Guide

The Brocade X7 FC SAN Directors are high-performance, modular, chassis-based Fibre Channel networking devices that provides connectivity between servers, switches and storage systems to form the backbone of an enterprise FC storage area network. The X7 Directors provide a modular building block, purpose-built for scalability to accommodate growth and power large-scale storage environments.

With a 50% latency reduction compared to the previous generation, X7 Directors maximize the performance of NVMe storage and high transaction workloads, eliminating I/O bottlenecks and unleashing the full performance of next generation storage.

The modular design provides flexibility with two customizable chassis that can scale on-demand for more devices, applications, and workloads, the X7-8 and X7-4. Both chassis utilize Brocade UltraScale ICL technology to scale out modular SANs while preserving blade ports for device connectivity and allowing flexible SAN design that supports core-edge or mesh topologies.

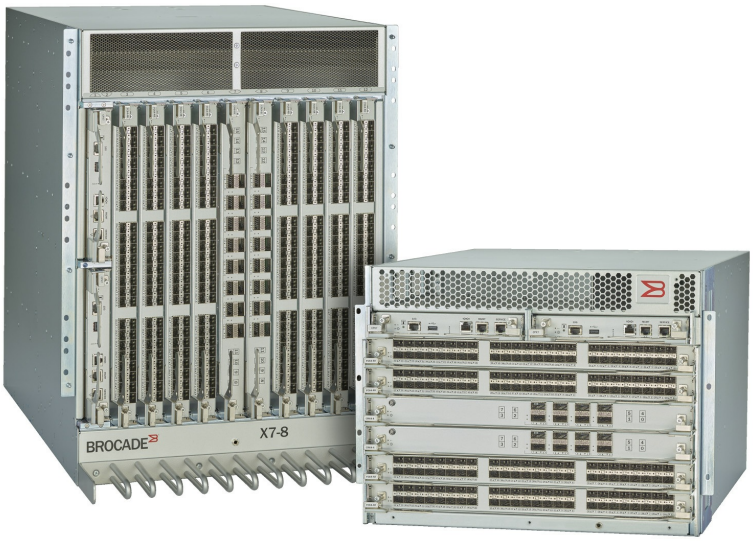

Figure 1. Brocade Gen 7 Director X7-8 (left) and X7-4 (right)

Did you know?

X7 Directors provide cyber resiliency with integrated security technology that protects mission critical operations by validating the integrity of Gen 7 hardware and software. With enhanced security and autonomous SAN technology, organizations can take the guesswork out of protecting and managing a network.

With Lenovo FC SAN Switch offerings, Lenovo can be your trusted partner that offers "one stop shop" and single point of contact for delivery of leading-edge technologies and innovations from Lenovo and other leading IT vendors. These offerings can satisfy the wide range of your end-to-end IT infrastructure needs, including end-user devices, servers, storage, networking, services, management software, and financing.

Key features

The Brocade X7 FC SAN Directors provide up to 512 ports, enabling organizations to scale more devices, applications, and workloads. With diverse deployment options, multiprotocol flexibility, and mixed blade capability, organizations can adapt and optimize their businesses to meet next-generation storage and server requirements. The X7 Directors support the concurrent use of both traditional Fibre Channel and NVMe storage traffic, allowing organizations to seamlessly integrate Gen 7 Fibre Channel networks with next generation NVMe-based storage, without a disruptive rip-and-replace.

The X7 Directors lay the foundation for the autonomous SAN. With autonomous SAN technology, the director harnesses the power of analytics and the simplicity of automation to optimize performance, ensure reliability, and simplify management. Leveraging these capabilities enables organizations to realize a self-learning, self-optimizing, and self-healing SAN.

The X7 Directors offer the following features and benefits:

- Scale more devices, applications, and workloads with up to 512 64 Gb links per chassis
- Maximize NVMe and high transaction workloads with 50% lower network latency
- Transform telemetry data into actionable insights to optimize performance and ensure reliability
- Automate actions to simplify management and resolve issues without intervention
- Increase visibility and simplify operations with a modern SAN management tool
- Safeguard mission-critical workloads from vulnerabilities with Gen 7 integrated security
- Seamlessly integrate next generation NVMe into the storage fabric without a disruptive rip-and replace
- Design flexible architectures to increase agility with concurrent Fibre Channel, NVMe, FICON, or FCIP connectivity
- Extend replication over distance with a highly scalable extension solution for Fibre Channel, IP, and FICON
- Enterprise bundle software (Fabric Vision, Extended Fabrics, Trunking, CUP and Integrated Routing) are included as standard features.

Components and connectors

The Brocade X7-4 Director with the airflow diversion kit is a 9U rack mount chassis that is built for midsize networks. It has four horizontal blade slots to provide up to 256 ports for device connectivity. An additional 16 UltraScale ICL connections provide 64 ports for chassis-to-chassis interconnect.

The Brocade X7-8 Director is a 14U rack mount chassis that is built for large enterprise networks. It has eight vertical blade slots to provide up to 512 ports for device connectivity. An additional 32 UltraScale Inter-Chassis Link (ICL) connections provide 128 ports for chassis-to-chassis interconnect.

In this section:

X7-4 Chassis

The following figure shows the port-side view of the X7-4 FC SAN Director.

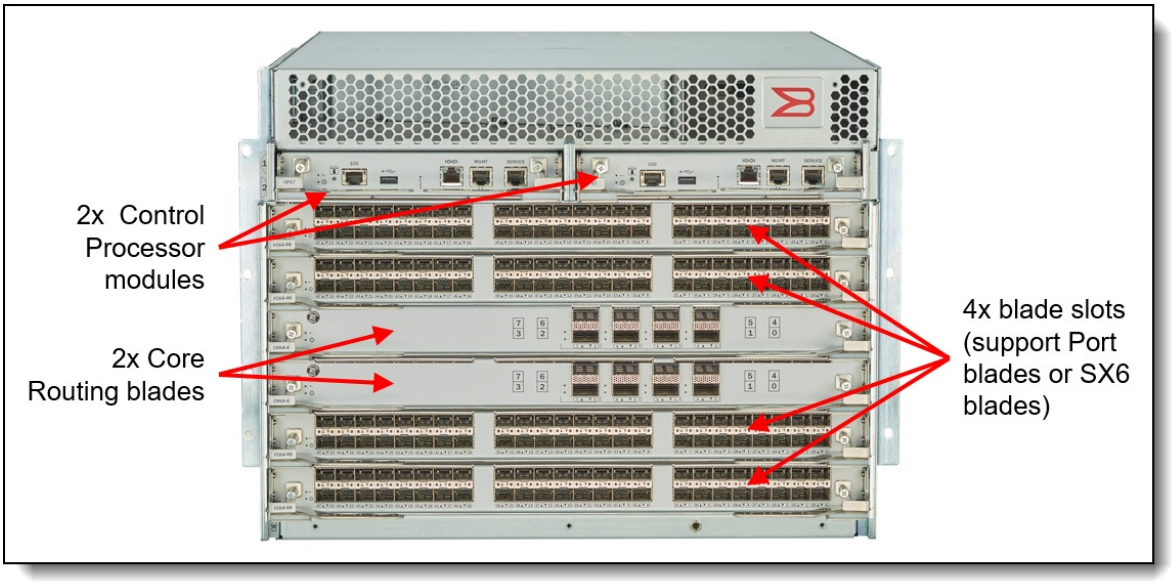

Figure 2. X7-4 FC SAN Director port-side view

The port side of the X7-4 chassis has the following components:

- Four blade slots within the X7-4 chassis can be populated with optional port or extension blades. The chassis comes without port blades or extension blades, see Blades for ordering information.
- Two redundant hot-swap active/standby Control Processor blades (CP blades come with the chassis). A Control Processor (CP) blade contains the control plane for the device and hosts the Fabric OS that manages all hardware within the device, and it provides the following external connections for device configuration, firmware downloads, service, management, and monitoring functions:
  - USB port for firmware download and technical support data
  - Serial console RJ-45 port
  - 10/100/1000 Mb Ethernet RJ-45 port for device management and configuration
  - 10/100/1000 Mb Ethernet RJ-45 port for service
  - 10 Gb Ethernet RJ-45 port (reserved for future use)
  - **Note:** The two 10/100/1000 Mb Ethernet ports are configured in an active/standby pair.
- Two redundant hot-swap active/active Core Routing blades (CR blades come with the chassis). Core routing blades contain ASICs that allow switching between up to four port blades, and each core routing blade provides 96 Fibre Channel backplane ports for port or extension blade connections and 32 front-end FC links that are mapped to 8 QSFP+ ports for inter-chassis links (ICLs). POD License Kits are sold separately.

The following figure shows the non-port side view of the X7-4 FC SAN Director.

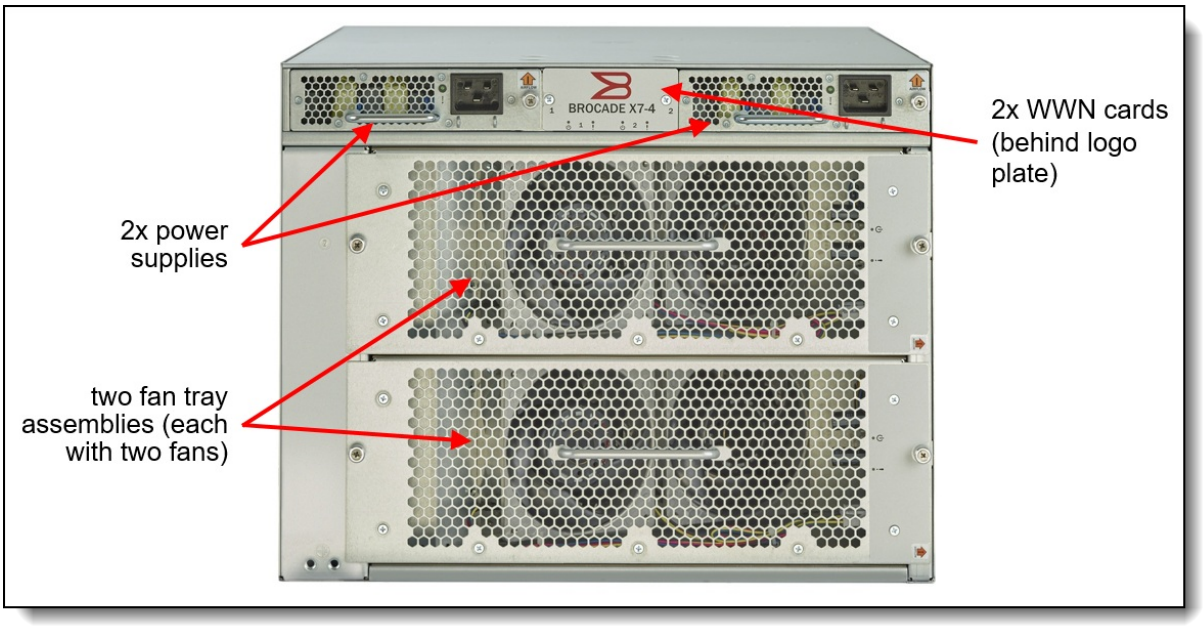

Figure 3. X7-4 FC SAN Director non-port side view

The non-port side of the X7-4 chassis has the following components:

- Choice of hot-swap power supplies AC or High Voltage (two must be ordered together with the chassis). Dual-function high-voltage AC, high-voltage DC (HVAC/HVDC) power supply assembly: Converts AC or DC input to the required DC output power required for device operation. Each power supply assembly provides the following power outputs in Watts at the indicated AC and DC input rated voltages: 1450W (100–120 VAC); 2870W (200–277 VAC); 2870W (240–380 VDC). Most common is AC NPI power supply.
    - AC power supply supporting non-port side air intake (NPI) provides 1450W (100–120 VAC) and 2870W (200–240 VAC). This assembly has two fans that move the air from the non-port side to the port side of the device.
    - AC power supply model supporting non-port side air exhaust (NPE) provides 1450W (100–120 VAC) and 2870W (200–240 VAC). This assembly has two fans that move the air from the port side to the non-port side of the device.
    - High voltage power supply model supporting non-port side air intake (NPI). This assembly has two fans that move the air from the non-port side to the port side of the device.
    - High voltage power supply model supporting non-port side air exhaust (NPE). This assembly has two fans that move the air from the port side to the non-port side of the device.
- Choice of hot-swap cooling modules (two must be ordered together with the chassis and must match airflow of the power supplies)
    - Non-port side air intake (NPI) moves the air from the non-port side to the port side of the device.
    - Non-port side air exhaust (NPE) moves the air from the port side to the non-port side of the device.

X7-8 Chassis

The following figure shows the port-side view of the X7-8 FC SAN Director.

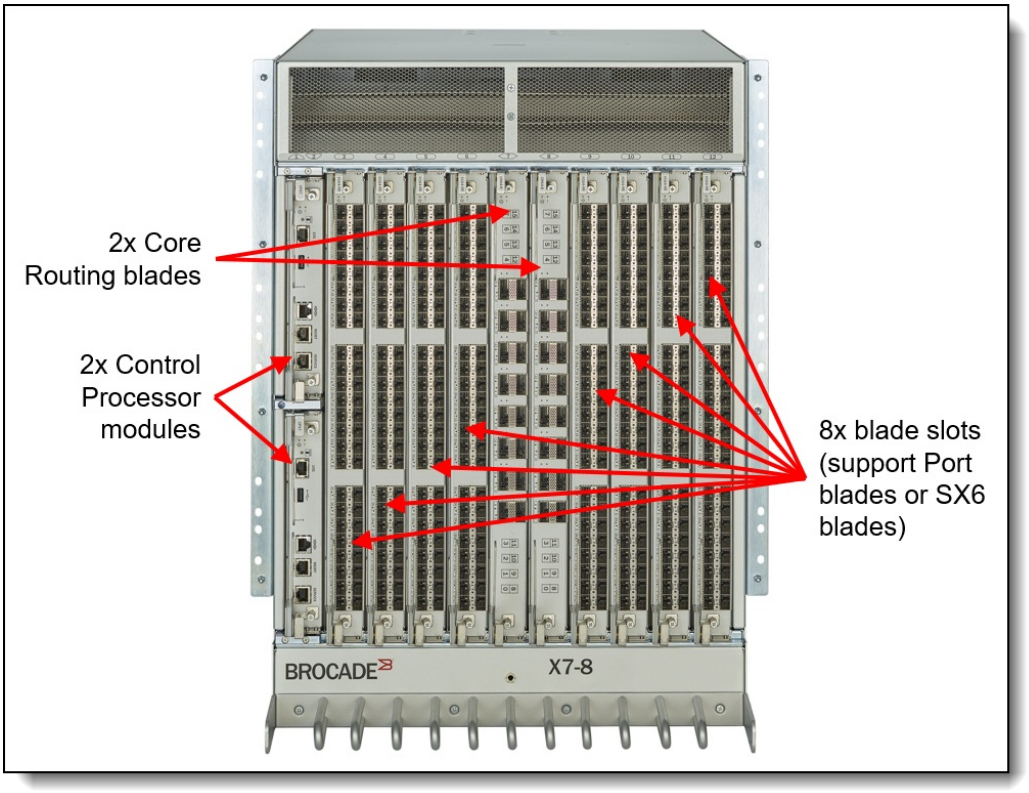

Figure 4. X7-8 FC SAN Director port-side view

The port side of the X7-8 chassis has the following components:

- Eight blade slots within the X7-8 chassis can be populated with optional port or extension blades. The chassis comes without port blades or extension blades, see Blades for ordering information.
- Two redundant hot-swap active/standby Control Processor blades (CP blades come with the chassis) A Control Processor (CP) blade contains the control plane for the device and hosts the Fabric OS that manages all hardware within the device, and it provides the following external connections for device configuration, firmware downloads, service, management, and monitoring functions:
    - USB port for firmware download and technical support data
    - Serial console RJ-45 port
    - 10/100/1000 Mb Ethernet RJ-45 port for device management and configuration
    - 10/100/1000 Mb Ethernet RJ-45 port for service
    - 10 Gb Ethernet RJ-45 port (reserved for future use)
    - Note: The two 10/100/1000 Mb Ethernet ports are configured in an active/standby pair.
- Two redundant hot-swap active/active Core Routing blades (CR blades come with the chassis). Core routing blades contain ASICs that allow switching between up to eight port blades, and each core routing blade provides 192 Fibre Channel backplane ports for port or extension blade connections and 64 front-end FC links that are mapped to 16 QSFP+ ports for inter-chassis links (ICLs). POD License Kits are sold separately.

The following figure shows the non-port side view of the X7-8 FC SAN Director.

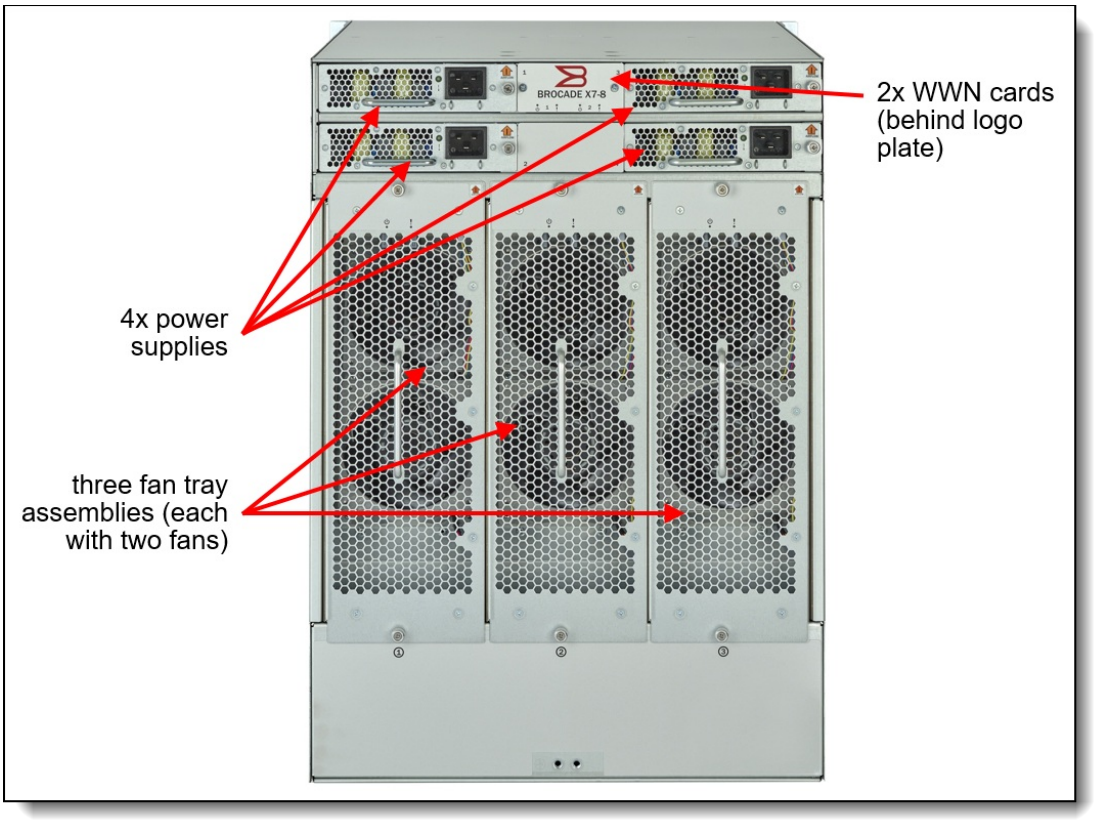

Figure 5. X7-8 FC SAN Director non-port side view

- Choice of hot-swap power supplies AC or High Voltage (four must be ordered together with the chassis). Dual-function high-voltage AC, high-voltage DC (HVAC/HVDC) power supply assembly: Converts AC or DC input to the required DC output power required for device operation. Each power supply assembly provides the following power outputs in Watts at the indicated AC and DC input rated voltages: 1450W (100–120 VAC); 2870W (200–277 VAC); 2870W (240–380 VDC). Most common is AC NPI power supply.
    - AC power supply supporting non-port side air intake (NPI) provides 1450W (100–120 VAC) and 2870W (200–240 VAC). This assembly has two fans that move the air from the non-port side to the port side of the device.
    - AC power supply model supporting non-port side air exhaust (NPE) provides 1450W (100–120 VAC) and 2870W (200–240 VAC). This assembly has two fans that move the air from the port side to the non-port side of the device.
    - High voltage power supply model supporting non-port side air intake (NPI). This assembly has two fans that move the air from the non-port side to the port side of the device.
    - High voltage power supply model supporting non-port side air exhaust (NPE). This assembly has two fans that move the air from the port side to the non-port side of the device.
- Choice of hot-swap cooling modules (three must be ordered together with the chassis and must match airflow of the power supplies)
    - Non-port side air intake (NPI) moves the air from the non-port side to the port side of the device.
    - Non-port side air exhaust (NPE) moves the air from the port side to the non-port side of the device

Port Blades and SX6 Extension Blades

The following figure shows the FC64-64 port blade.

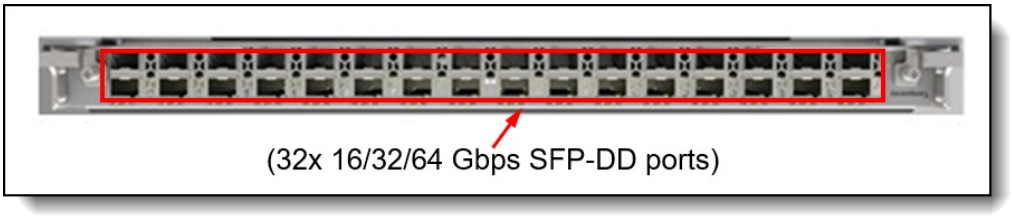

Figure 6. FC64-64 port blade

The Brocade FC64-64 Fibre Channel port blade with 32 SFP-DD ports provides 64 x 64G Fibre Channel ports with backward-compatibility support for 8, 16, and 32G Fibre Channel connectivity. The FC64-64 port blade enables industry-leading platform density for Gen 7 SAN configurations supporting up to 256 64-Gbps external ports in a single X7-4 chassis, and up to 512 64-Gbps external ports in a single X7-8 chassis. Leveraging this efficient, high-density designed blade, organizations can consolidate more device connectivity into a single fabric and reduce capital expenses by consuming less rack space. By utilizing fewer chassis, it lowers operational cost by reducing power consumption, cooling, and management. With industry-leading port density and increased bandwidth, organizations can effectively scale to meet data growth demands and drive efficiency by maximizing space utilization with room for future scaling of demanding IT applications. (Requires chassis use FOS 9.2 or later).

The following figure shows the 48-port blade.

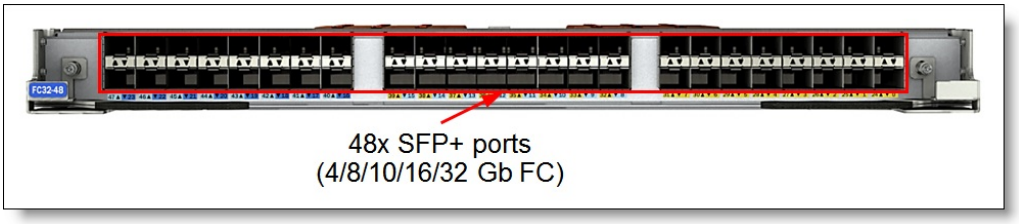

Figure 7. 48-port blade (Image example is FC32-48)

There are multiple 48-port blades offerings. These blades contain 48 ports capable of Fibre Channel speeds up to 32 or 64 Gbps depending on model, and support up to 192 32-Gbps external ports in a single X7-4 chassis, and up to 384 32-Gbps external ports in a single X7-8 chassis. While most client will leverage SWL transceiver models, LWL models are available for those mainframe-connected environments or those needing connectivity over longer distances.

- The Gen 7 Brocade FC64-48 Fibre Channel port blade provides 48 x 64G Fibre Channel ports with backward-compatibility support for 8, 10, 16, and 32G Fibre Channel connectivity.
- The Brocade FC32-X7-48 Fibre Channel port blade provides 48 x 32G Fibre Channel ports with backward-compatibility support for 8, 10, and 16G Fibre Channel connectivity.
- The Gen 6 FC32-48 Fibre Channel port blade provides 48 x 32G Fibre Channel ports with backward-compatibility support for 4, 8, 10, and 16G Fibre Channel connectivity

The following figure shows the SX6 extension blade.

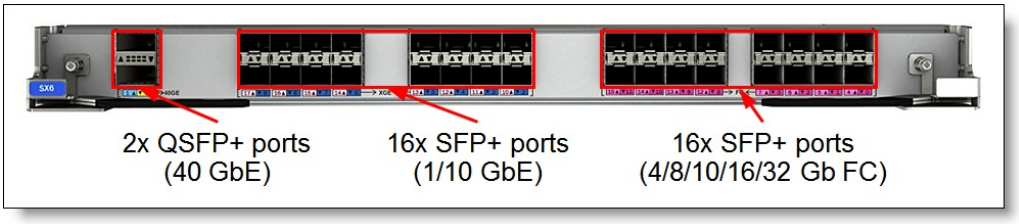

Figure 8. SX6 extension blade

The SX6 Extension blade is intended as an extension platform to support Fibre Channel, FICON, and IP based storage data flows. Extension features enable you to use the existing IP wide area network (WAN) infrastructure to connect Fibre Channel and IP fabrics. Extension features support applications such as remote data replication (RDR), centralized backup, and data migration over very long distances. Extension tunnels, built on a physical connection between two extension switches or blades, allow Fibre Channel and IP I/O to pass through the IP WAN. The SX6 Extension blade can connect with an SX6 blade in another Brocade FC SAN Director or with a Brocade 7840 Extension Switch.

System specifications

The following table lists the Brocade X7-4 and X7-8 FC SAN Director system specifications.

Note: The supported hardware options and firmware features listed in this product guide are based on the Fabric OS version 9.X.

Table 1. Specifications

Component	Specification
System Architecture	
Chassis	**Brocade X7-8:** Non-blocking architecture • X7-8 Director with 48x 64Gb/s port blades: 30.9Tb/s of aggregate chassis bandwidth (384 device ports with a 64Gb/s data rate plus 32 4xGen7 ICLs) • X7-8 Director with 64 64G port blades: 39.6Tb/s of aggregate chassis bandwidth (512 device ports with a 64G data rate plus 32 4xGen7 ICLs) **Brocade X7-4:** Non-blocking architecture • X7-4 Director with 48x 64Gb/s port blades: 15.7Tb/s of aggregate chassis bandwidth (192 device ports with a 64Gb/s data rate plus 16 4xGen7 ICLs) • X7-4 Director with 48 64Gport blades: 19.8Tb/s of aggregate chassis bandwidth (192 device ports with a 64G data rate plus 16 4xGen7 ICLs) Each provides support for (E, F, D, M, SIM, and EX) Fibre Channel ports using 48-port 64Gb/s Fibre Channel blades.
Control processor	Redundant (active/standby) control processor modules.
Scalability	Full-fabric architecture of 239 switches.
Certified maximum	6000 active devices per switch; 56 switches, 19 hops in Brocade Fabric OS® (FOS) fabrics; larger fabrics certified as required.
Fibre Channel blades	• Brocade FC64-48 port blade provides 48 ports of 64Gb/s Fibre Channel. • Brocade FC64-64 port blade provides 64 ports of 64Gb/s Fibre Channel. • Brocade FC32-X7-48 port blade provides 48 ports of 32Gb/s Fibre Channel. • Brocade FC32-48 port blade provides 48 ports of 32Gb/s Fibre Channel.

Component	Specification
Extension blades	Brocade SX6 Extension Blade provides Fibre Channel extension (16x 32Gb/s Fibre Channel ports) and IP extension over IP networks (16×1GbE/10GbE and 2×40GbE ports).
Performance	**Brocade FC64-48 Port Blade:** • Fibre Channel: 8.5Gb/s line speed, full duplex; 10.53Gb/s line speed, full duplex; 14.025Gb/s line speed, full duplex; 28.05Gb/s line speed, full duplex; 57.8Gb/s line speed, full duplex. • Autosensing of 8, 16, 32, and 64Gb/s port speeds depending on SFPs used. • 10Gb/s port speeds with dedicated SFPs. **Brocade FC64-64 Port Blade:** • Fibre Channel: 8.5Gb/s line speed, full duplex; 14.025Gb/s line speed, full duplex; 28.05Gb/s line speed, full duplex; 57.8Gb/s line speed, full duplex. • Autosensing of 8, 16, 32, and 64G port speeds depending on SFP-DD/SFP+ used. Support for 8G requires a 32G SFP+ LWL or ELWL transceiver. **Brocade FC32-X7-48 Port Blade:** • Fibre Channel: 4.25Gb/s line speed, full duplex; 8.5Gb/s line speed, full duplex; 10.53Gb/s line speed, full duplex; 14.025Gb/s line speed, full duplex; 28.05Gb/s line speed, full duplex. • Autosensing of 4, 8, 16, and 32Gb/s port speeds depending on SFPs used. • 10Gb/s port speeds with dedicated SFPs. **Brocade FC32-48 Port Blade**: • Fibre Channel: 4.25Gb/s line speed, full duplex; 8.5Gb/s line speed, full duplex; 10.53Gb/s line speed, full duplex; 14.025Gb/s line speed, full duplex; 28.05Gb/s line speed, full duplex. • Autosensing of 4, 8, 16, and 32G port speeds depending on SFPs used. • 10G port speeds with dedicated SFPs.
ISL Trunking	Frame-based trunking with up to eight 64Gb/s ports per ISL trunk; up to 512Gb/s per ISL trunk between switches using 8G, 16G, 32G, or 64G ports; exchange-based load balancing across ISLs with DPS included in Brocade FOS.
UltraScale ICL Trunking	Chassis-to-chassis linkage through connectors on the Core Routing (CR) blade. Can configure the following maximum number of QSFPs per trunk depending on blade type, connecting: • Up to four QSFP ports in a trunk group between two Brocade CR64-4 blades. For trunks that contain four or fewer QSFP ports, ports in a trunk must be in the same port group on each blade. • Up to four QSFP ports in a trunk group between a Brocade CR64-4 blade and a CR64-8 blade. For trunks that contain four or fewer QSFP ports, ports in a trunk must be in the same port group on each blade. A minimum of two QSFP connections are required for a trunk, and up to four QSFP trunks between pairs of Brocade CR64-8 or CR64-4.
Multi-chassis with UltraScale ICL ports	Up to 4608 Fibre Channel ports; UltraScale ICL ports (32 for 8-slot or 16 per 4-slot chassis, optical QSFP) connect up to 9 chassis in a full-mesh topology or up to 12 chassis in a core-edge topology.

Component	Specification
Chassis bandwidth	• **X7-8**: 39.6Tb/s per chassis with 512 device ports + 32 UltraScale ICL connections supporting 128 ports. • **X7-4**: 19.8Tb/s per chassis with 256 device ports + 16 UltraScale ICL connections supporting 64 ports.
Slot bandwidth	3072Gb/s (line rate) providing line-rate performance for the Brocade FC64-48 blade or 4096Gb/s providing line-rate performance for the Brocade FC64-64 blade.
Maximum frame size	2112-byte payload.
Frame buffers	24,000 per switching ASIC.
Classes of service	Class 2, Class 3, Class F (inter-switch frames).
Fibre Channel port types	• **CR64-8 and CR64-4 CR blades**: E_Port, EX_Port, and D_Port. • **FC64-64, FC64-48, FC32-X7-48, FC32-48 port blades**: F_Port, E_Port, EX_Port, M_Port, SIM, and D_Port. • **SX6 extension blade**: F_Port, FL_Port, E_Port, SIM, and EX_Port on FC and VE_Port on GbE. Self-discovery is based on switch type (U_Port) with an optional port type control.
Data traffic types	Fabric switches supporting unicast.

Component	Specification

Media types	• **Brocade FC64-48 port blade:**
	  ◦ 64G FC SFP+ LC connector: SWL, LWL, ELWL
	  ◦ 32G FC SFP+ LC connector: SWL, LWL, ELWL
	  ◦ 10G FC SFP+ LC connector: SWL, LWL
	• **Brocade FC64-64 port blade:**
	  ◦ 64G FC SFP-DD LC connector: SWL
	  ◦ 64G FC SFP+ LC connector: SWL, LWL
	  ◦ 32G FC SFP+ LC connector: LWL, ELWL
	• **Brocade FC32-X7-48 and FC 32-48 port blade:**
	  ◦ 32G FC SFP+ LC connector: SWL, LWL, ELWL
	  ◦ 16G FC SFP+ LC connector: SWL, LWL, ELWL
	  ◦ 10G FC SFP+ LC connector: SWL, LWL
	• **Brocade SX6 Extension Blade:**
	  ◦ 32G FC SFP+ LC connector: SWL, LWL, ELWL
	  ◦ 16G FC SFP+ LC connector: SWL, LWL, ELWL
	  ◦ 10G FC SFP+ LC connector: SWL, LWL
	  ◦ Ethernet QSFP+ MPO connector: 40GBASE-SR4, 40GBASE-LR4, 40GBASE-ER4
	  ◦ Ethernet QSFP+ LC connector: 40GbE BiDi
	  ◦ 10GbE SFP+ LC connector: SR, LR
	  ◦ 1GbE SFP+ LC connector: SX, LX
	  ◦ 1GbE SFP+ copper connector
	• **Core Routing (CR) blades, Brocade CR64-4 and CR64-8:**
	  ◦ Gen 7 FC QSFP+ MPO connector: SWL, 2 km*
	  ◦ 4x32G FC QSFP+ SMF LC connector: SWL, 2 km
	* Use of the Gen 7 2-km ICL QSFP is subject to the following environmental ratings for maximum intake air temperature: 0–40°C at sea level; 0–35°C up to 1500m (4921 ft) elevation; and 0–30°C from 1500m to 3000m (9843 ft) elevation.

USB	One USB port per control processor for firmware download, SupportSave, and configuration upload or download.
Fabric services	BB Credit Recovery; Brocade Advanced Zoning (Default Zoning, Port/WWN Zoning, Peer Zoning); Congestion Signaling; Dynamic Path Selection (DPS); Extended Fabrics; Fabric Performance Impact Notification (FPIN); Fabric Vision; FDMI; FICON CUP; Flow Vision; F_Port Trunking; FSPF; Integrated Routing; ISL Trunking; Management Server; NPIV; NTP v3; Port Decommission/Fencing; QoS; Registered State Change Notification (RSCN); Name Server; Target-Driven Zoning; Traffic Optimizer; Virtual Fabrics (Logical Switch, Logical Fabric); VMID+ and AppServer.
Extension	Supports DWDM, CWDM, and FC-SONET Devices; Fibre Channel; In-flight Compression (Brocade LZO) and Encryption (AES-GCM-256); BB Credit Recovery; FCIP; IP Extension; Adaptive Rate Limiting (ARL); Data Compression; Fast Write; Read/Write Tape Pipelining; QoS.
FICON	FICON cascading; support for lossless DLS; FICON CUP; Advanced Accelerator for FICON (IBM z/OS Global Mirror and read/write Tape Pipelining). (FICON connectivity is not supported on the FC64-64 blades.)
System Components	
Fibre Channel ports	• **Brocade X7-8:** Up to 512 ports, universal (E_Port, F_Port, EX_Port, M_Port, D_Port, SIM Port, *FICON). • **Brocade X7-4:** Up to 256 ports, universal (F_Port, E_Port, EX_Port, M_Port, D_Port, SIM Port, *FICON). *Brocade 48 port blade required

Component	Specification
Classes of service	Class 2, Class 3, Class F (inter-switch frames).
ANSI Fibre Channel protocol	FC-PH (Fibre Channel Physical and Signaling Interface standard).
Port-to-port latency	• Local switching: 460 ns at 64Gb/s (including FEC as part of the FC standard). • Blade-to-blade: 1.4 µs.
High Availability	
Architecture	Non-blocking shared memory; passive backplane; redundant active/passive control processor; redundant active/active core switching blades; redundant WWN cards.
Chassis power	• **Brocade X7-8:** 2+2 redundancy. • **Brocade X7-4:** 1+1 redundancy.
Cooling	**Brocade X7-8:** • Requires three fan tray assemblies. A failure condition is one failed fan from any fan tray. • Each assembly contains two fans for a total of six fans. The system requires five of six functioning fans for operation in the Brocade X7-8. One fan tray assembly can be hot-swapped and should be replaced immediately in the event of a failure. **Brocade X7-4:** • Requires two fan tray assemblies. A failure condition is one failed fan from any fan tray. • Each assembly contains two fans for a total of four fans. The system requires three of four functioning fans for operation in the Brocade X7-4. One fan assembly can be hot-swapped and should be replaced immediately in the event of a failure.
Solution availability	Designed to provide 99.999% uptime capabilities; hot-pluggable redundant power supplies, fans, WWN cards, processors, core switching, port blades, and optics; online diagnostics; non-disruptive firmware download and activation.
Management	
Management	Brocade SANnav Management Portal and SANnav Global View; Command Line Interface (CLI); HTTP/HTTPS; RESTful API; SSH; SNMP v1/v3 (FE MIB, FC Management MIB); trial licenses for add-on capabilities.
Security	AES-GCM-256 encryption on FC ISLs (E_Port); Device Connection Control (DCC); DH-CHAP (between switches and end devices); Fabric Configuration Server (FCS); FCAP switch authentication; FIPS 140-2 compliant; HTTPS; IP filtering; LDAP with IPv6; OpenLDAP; RADIUS; user-defined Role-Based Access Control (RBAC); Secure Boot; Secure Copy (SCP); SFTP; SSH v2; Switch Binding; TACACS+; TLS v1.2/v1.3; USGv6 compliant.
Management access	10/100/1000Mb/s Ethernet (RJ-45) per control processor; serial console port (RJ-45) and one USB per control processor module; DHCP/DHCPv6; call-home integration enabled through Brocade SANnav Management Portal.
Diagnostics	Active Support Connectivity (ASC) and Brocade Support Link (BSL); built-in flow generator; ClearLink® optics and cable diagnostics, including electrical/optical loopback, link traffic/latency/distance; Fabric Performance Impact Monitoring (FPI); flow mirroring; Forward Error Correction; frame viewer; IO Insight for SCSI and NVMe monitoring; Monitoring and Alerting Policy Suite (MAPS); nondisruptive daemon restart; optics health monitoring; POST and embedded online/offline diagnostics, including environmental monitoring, FCping, and Pathinfo (FC traceroute); power monitoring; RAStrace logging; Rolling Reboot Detection (RRD); Syslog/Audit Log; VM Insight.

Component	Specification

Warranty & Support	
Hardware warranty & SW entitlement	Three-year customer-replaceable unit limited warranty with 9x5 next business day parts delivered. Also, entitlement to access latest FOS software
Service and support	Optional service upgrades are available through Lenovo Services: 9x5 next business day onsite response, 24x7 2-hour or 4-hour onsite response, 24x7 6-hour or 24-hour committed service repair, up to 5 years of warranty coverage, and 1-year or 2-year post-warranty extensions.

Models

The following table lists the X7-4 and X7-8 FC SAN Director Models.

Table 2. Models

Part number	Description
7DB4CTO1WW	Brocade X7-4 FC Director (4 Blade slots, 9U, 3-year warranty/entitlement)
7DB4CTO2WW	Brocade X7-8 FC Director (8 Blade slots, 14U, 3-year warranty/entitlement)

The X7-4 and X7-8 FC SAN Director part numbers include the following items:

- One Director chassis that contains the following components:
  - Two control processing blades
  - Two core routing blades
- Enterprise Bundle SW license installed
- Integrated Routing SW license installed
- Ground lug kit
- Wrist strap
- X7-4 Specific
  - Vertical Cable Management Comb
  - Airflow diversion Kit (27"-31") and documentation
  - 4-post rack mount Kit
- X7-8 Specific
  - Cable Management Comb
  - 14U rack mount kit (27"-31")

Configuration notes:

- Models come standard with **CR blades**, however in order to leverage the ICLs, ICL POD kits are required. See the Inter-Chassis Links section for details.
- Models do not include **port blades** or **extension blades** and will need to be ordered for the Director model. See the Blades section for details.

- Models do not include **fan modules** or **power supplies** and must be ordered together with the director model. See Cooling and Power supplies and cables for details.
- Models do not include **power cords** and must be ordered together with the director model. See Power supplies and cables for details.

Blades

The X7-4 and X7-8 FC SAN Directors support the port and extension blade options that are listed in the following table.

Blades can be mixed, but the maximum is four for the X7-4 and eight for the X7-8.

Table 3. Port and extension blades

Part number	Feature code	Description
Port Blades		
01KN848	AVGU	Lenovo Gen 6 Port Blade FC32-48 (48 transceivers, 32Gbps)
4C57A87792	BVHH	Gen 7 Port Blade FC64-64, with 32 x 64Gb (64x64Gb) SWL SFP-DD optics
4XF7A84049	BR95	Brocade FC32-X7-48 Port Blade w/ 32G SWL Transceivers
4XF7A84050	BR94	Brocade FC32-X7-48 Port Blade w/ 32G LWL Transceivers
4XF7A84046	BR98	Brocade FC64-48 Port Blade w/ 32G SWL transceivers
4XF7A84047	BR97	Brocade FC64-48 Port Blade w/ 64G SWL transceivers
4XF7A84048	BR96	Brocade FC64-48 Port Blade w/ 32G LWL transceivers
4XF7A84079	BRE7	Brocade FC64-48 Port Blade w/ 64G LWL transceivers
SX6 Extension Blades		
4M27A14145	B5Z7	Lenovo SX6 FC-IP SAN Extension Blade + 16 32Gb SWL SFPs, 1YR
4M27A14146	B5Z8	Lenovo SX6 FC-IP SAN Extension Blade + 16 32Gb LWL SFPs, 1YR

Port and extension blades come standard with all ports activated. They also include a specific number and type of transceivers, as indicated in the description of each part number. Additional transceivers and cables can be ordered. See Transceivers and cables for details.

Transceivers and cables

In this section:

Connectivity choices

With the flexibility of the X7-4 and X7-8 Directors, customers can choose the following connectivity technologies:

- SFP+ ports on the 48-port blades and SX6 extension blade
  - For 64 Gb FC links, customers can use 64 Gb FC SFP+ SWL optical transceivers for distances up to 100 meters on OM4/OM5 or up to 70 meters on OM3 50 µ multimode fiber (MMF) optic cables. For longer distances, the 64 Gb FC LW SFP+ optical transceivers can support up to 10 kilometers on 9 µ single-mode fiber (SMF) optic cables. For extended

distances, the 64 Gb FC ELW SFP+ optical transceivers can support up to 25 kilometers on 9 µ SMF cables. (These transceivers are only available on Brocade FC64-48 Port Blade)

- For 32 Gb FC links, customers can use 32 Gb FC SFP+ SW optical transceivers for distances up to 100 meters on OM4 or up to 70 meters on OM3 50 µ multimode fiber (MMF) optic cables. For longer distances, the 32 Gb FC LW SFP+ optical transceivers can support up to 10 kilometers on 9 µ single-mode fiber (SMF) optic cables. For extended distances, the 32 Gb FC ELW SFP+ optical transceivers can support up to 25 kilometers on 9 µ SMF cables.
- For 16 Gb FC links, customers can use 16 Gb FC SFP+ SW optical transceivers for distances up to 125 meters on OM4 or up to 100 meters on OM3 50 µ MMF cables. For longer distances, the 16 Gb FC LW SFP+ optical transceivers can support up to 10 kilometers on 9 µ SMF cables. For extended distances, the 16 Gb FC ELW SFP+ optical transceivers can support up to 25 kilometers on 9 µ SMF cables. (These transceivers are NOT supported on Brocade FC64-48 Port Blade)
- For 10 Gb FC links, customers can use 10 Gb FC SFP+ SW transceivers for distances up to 550 meters on OM4 or up to 300 meters on OM3 50 µ MMF cables, or 10 Gb FC SFP+ LW transceivers for distances up to 10 km on 9 µ SMF cables. 10 Gb FC operations allow metro connectivity by directly utilizing a fiber optic cable between sites or by creating multiple channels on an optical cable between sites, utilizing Wave Division Multiplexing (WDM) technology.

- SFP-DD ports
  - For 64G FC links, customers can use 64G FC SFP-DD SWL optical transceivers for distances up to 100 meters on OM4 or up to 70 meters on OM3 50 µ MMF cables. These transceivers can operate at 64G, 32G, or 16G speeds.
- QSFP+ ports on the core routing blades:
  - For 128 Gb FC inter-chassis links for connectivity between the X7-4 or X7-8 FC Directors, customers can use 128 Gb (4x 32 Gb) FC QSFP+ SW optical transceivers for distances up to 100 meters on OM4 or up to 70 meters on OM3 50 µ MMF cables.
    Note: ICL trunks are formed automatically with corresponding 32 Gbps ports on different QSFP+ transceivers (ICL trunks cannot be formed with the 4x 32 Gbps ports on the same QSFP+ transceiver), and the trunking license is not required.
  - For 64 Gb FC inter-chassis links for connectivity between the X7-4 or X7-8 FC Directors and Brocade DCX 8510 Backbones, customers can use the following transceivers:
    Note: ICL trunks are formed automatically with corresponding 16 Gbps ports on different QSFP+ transceivers (ICL trunks cannot be formed with the 4x 16 Gbps ports on the same QSFP+ transceiver), and the trunking license is not required.
    - 128 Gb (4x 32 Gb) QSFP+ SWL v2 optical transceivers running at 4x 16 Gb speeds for distances up to 125 meters on OM4 or up to 100 meters on OM3 50 µ MMF cables.
    - 4x 16 Gb FC QSFP+ SWL optical transceivers for distances up to 100 meters on OM4 or up to 66 meters on OM3 50 µ MMF cables.
    - 4x 16 Gb FC QSFP+ LWL optical transceivers for distances up to 2 kilometers on parallel 9 µ SMF cables.
  - 1/10 GbE SFP+ and 40 GbE QSFP+ ports on extension blades allow connection to IP WANs and allow Fibre Channel and IP I/O traffic to pass through the IP WAN through extension tunnels.
    - 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 on 50 µ OM2 MMF cables, or the 1000BASE-LX transceivers that support distances up to 10 kilometers on 9 µ SMF cables.
    - For 10 GbE links, customers can use a 10GBASE-SR transceiver that supports distances up to 300 meters on OM3 or up to 400 meters on OM4 50 µ MMF cables. For longer distances, the 10GBASE-LR transceivers can support distances up to 10

kilometers on 9 µ SMF cables.

- For 40 GbE links, customers can use the 40GBASE-SR4 QSFP+ transceivers for distances up to 100 meters on OM3 or up to 150 meters on OM4 50 µ MMF cables. For longer distances, the 40GBASE-LR4 transceivers can support distances up to 10 kilometers on 9 µ SMF cables. For extended distances, the 40GBASE-ER4 transceivers can support distances up to 40 kilometers on 9 µ SMF cables.
- 1 GbE RJ-45 management ports on control processor blades: Customers can use UTP cables for distances up to 100 meters.

All port-blades come standard with transceivers that you see reflected in the descriptions. The SX6 extension blades come standard with 16x 32 Gb FC SWL or LWL SFP+ transceivers. The optional ICL bundles include eight Gen 7 FC QSFP+ or eight 4x32G SWL FC QSFP+ transceivers. Additional or different Fibre Channel or Ethernet SFP+, SFP-DD and QSFP+/QSFP28 transceivers can be ordered, if required.

Transceivers

The following table lists the supported transceiver options and optical cables.

Brocade secure transceivers: These new transceivers have features to ensure that you are using genuine Brocade components to maximize performance and reliability and to help avoid issues related to counterfeit products.

Table 4. Supported transceivers

Part number	Feature code	Description	Blade support (Y=supported)						
			FC32-X7-48	FC64-64	FC64-48	FC32-48	SX6	CR32-4	CR32-8
64 Gb FC SFP-DD transceivers									
4M27A65827	PBJ5	Brocade Secure 64G SWL SFP-DD	N	Y	N	N	N	N	N
4M27A65828	PBJ6	Brocade Secure 64G SWL SFP-DD (8-pack)	N	Y	N	N	N	N	N
64 Gb FC SFP+ transceivers									
4M27A65425	BF6J	Brocade Secure 64GB SWL SFP+	N	Y	Y	N	N	N	N
4M27A65426	BF6K	Brocade Secure 64Gb SWL SFP+ (8-pack)	N	Y	Y	N	N	N	N
4M27A65433	BQQG	Brocade Secure 64Gb LWL SFP+ Transceiver	N	Y	Y	N	N	N	N
4M27A65434	BQQH	Brocade Secure 64Gb LWL SFP+ Transceiver 8-pack	N	Y	Y	N	N	N	N
4M27A65432	BQQF	Brocade Secure 64Gb ELWL SFP+ Transceiver (25 km)	N	N	Y	N	N	N	N
32 Gb FC SFP+ transceivers									
4M27A65416	BF69	Brocade Secure 32Gb SWL SFP+	Y	N	Y	Y	Y	N	N
4M27A65417	BF6A	Brocade Secure 32Gb SWL SFP+ (8-pack)	Y	N	Y	Y	Y	N	N
4M27A65418	BF6B	Brocade Secure 32Gb LWL SFP+	Y	Y	Y	Y	Y	N	N
4M27A65419	BF6C	Brocade Secure 32Gb LWL SFP+ (8-pack)	Y	Y	Y	Y	Y	N	N
4M27A65424	BF6D	Brocade Secure 32Gb ELWL SFP+ (25 km)**	Y	N	Y	Y	N	N	N
4M27A65431	BQQE	Brocade Secure 32Gb ELWL SFP+ Transceiver V2 (25 km)*/**	Y	Y	Y	N	N	N	N

Part number	Feature code	Description	Blade support (Y=supported)						
			FC32-X7-48	FC64-64	FC64-48	FC32-48	SX6	CR32-4	CR32-8
16 Gb FC SFP+ transceivers									
4M27A65411	BF64	Brocade Secure 16Gb SWL SFP+	Y	N	N	Y	Y	N	N
4M27A65412	BF65	Brocade Secure 16Gb SWL SFP+ 8-pack	Y	N	N	Y	Y	N	N
4M27A65413	BF66	Brocade Secure 16Gb LWL SFP+ (10 km)	Y	N	N	Y	Y	N	N
4M27A65414	BF67	Brocade Secure 16Gb LWL SFP+ (10 km) 8pk	Y	N	N	Y	Y	N	N
4M27A65415	BF68	Brocade Secure 16Gb ELWL SFP+ (25 km)	Y	N	N	Y	Y	N	N
10 Gb FC SFP+ transceivers									
4M27A65420	BF6E	Brocade Secure 10Gb FC LWL SFP+	Y	N	Y	Y	Y	N	N
4M27A65421	BF6F	Brocade Secure 10Gb FC SWL SFP+	Y	N	Y	Y	Y	N	N
QSFP+ FC transceivers									
4M27A65422	BF6G	Brocade Secure 128Gb (4x 32Gb) SWL QSFP+	N	N	N	N	N	Y	Y
4XF7A84078	BRA5	Brocade Gen 7 FC SWL QSFP+	N	N	N	N	N	Y	Y
4XF7A84077	BRA6	Brocade Gen 7 FC 2KM QSFP+	N	N	N	N	N	Y	Y
40 Gb Ethernet QSFP+ transceivers									
01KN813	AVGL	Brocade 40Gb QSFP+ SR4 Optical	N	N	N	N	Y	N	N
01KN817	AVGM	Brocade 40Gb QSFP+ LR4 Optical	N	N	N	N	Y	N	N
01KN821	AVGN	Brocade 40Gb QSFP+ ER4 Optical	N	N	N	N	Y	N	N
10 Gb Ethernet SFP+ transceivers									
49Y4216	0069	Brocade 10Gb SFP+ SR	N	N	N	N	Y	N	N
95Y0540	A3AB	Brocade 10Gb SFP+ LR	N	N	N	N	Y	N	N
1 Gb Ethernet SFP transceivers									
01KN825	AVGP	Brocade 1000BASE-SX SFP	N	N	N	N	Y	N	N
01KN829	AVGQ	Brocade 1000BASE-LX SFP	N	N	N	N	Y	N	N
01KN833	AVGR	Brocade 1000BASE-T SFP	N	N	N	N	Y	N	N

* The specific ELWL only operates at 32 Gbps and 16Gbps.
** ELWL Requires same optic type/part number on both ends (no-mixing) to assure interoperability.

Cables

The following table lists the supported optical cables and Cat6 UTP cables.

Table 5. Supported cables

Part number	Feature code	Description	Blade support (Y=supported)					
			FC32-X7-48	FC64-48	FC32-48	SX6	CR32-4	CR32-8
Optical cables for 128 Gb v2 / 4x16 Gb FC SWL,and 40 GbE SR4 QSFP+ transceivers								
00VX003	AT2U	Lenovo 10m QSFP+ MPO-MPO OM3 MMF Cable	N	N	N	Y	Y	Y
00VX005	AT2V	Lenovo 30m QSFP+ MPO-MPO OM3 MMF Cable	N	N	N	Y	Y	Y
Optical breakout cables for 128 Gb v2 / 4x16 Gb FC SWL,and 40 GbE SR4 transceivers								
00FM412	A5UA	Lenovo 1m MPO-4xLC OM3 MMF Breakout Cable	N	N	N	Y	Y	Y
00FM413	A5UB	Lenovo 3m MPO-4xLC OM3 MMF Breakout Cable	N	N	N	Y	Y	Y
00FM414	A5UC	Lenovo 5m MPO-4xLC OM3 MMF Breakout Cable	N	N	N	Y	Y	Y
OM3 optical cables for 16 Gb FC SWL, 32 Gb FC SWL,and 1/10 GbE SFP+ transceivers								
00MN499	ASR5	Lenovo 0.5m LC-LC OM3 MMF Cable	Y	Y	Y	Y	N	N
00MN502	ASR6	Lenovo 1m LC-LC OM3 MMF Cable	Y	Y	Y	Y	N	N
00MN505	ASR7	Lenovo 3m LC-LC OM3 MMF Cable	Y	Y	Y	Y	N	N
00MN508	ASR8	Lenovo 5m LC-LC OM3 MMF Cable	Y	Y	Y	Y	N	N
00MN511	ASR9	Lenovo 10m LC-LC OM3 MMF Cable	Y	Y	Y	Y	N	N
00MN514	ASRA	Lenovo 15m LC-LC OM3 MMF Cable	Y	Y	Y	Y	N	N
00MN517	ASRB	Lenovo 25m LC-LC OM3 MMF Cable	Y	Y	Y	Y	N	N
00MN520	ASRC	Lenovo 30m LC-LC OM3 MMF Cable	Y	Y	Y	Y	N	N
OM4 optical cables for 16 Gb FC SWL, 32 Gb FC SWL,and 1/10 GbE SFP+ transceivers								
4Z57A10845	B2P9	Lenovo 0.5m LC-LC OM4 MMF Cable	Y	Y	Y	Y	N	N
4Z57A10846	B2PA	Lenovo 1m LC-LC OM4 MMF Cable	Y	Y	Y	Y	N	N
4Z57A10847	B2PB	Lenovo 3m LC-LC OM4 MMF Cable	Y	Y	Y	Y	N	N
4Z57A10848	B2PC	Lenovo 5m LC-LC OM4 MMF Cable	Y	Y	Y	Y	N	N
4Z57A10849	B2PD	Lenovo 10m LC-LC OM4 MMF Cable	Y	Y	Y	Y	N	N
4Z57A10850	B2PE	Lenovo 15m LC-LC OM4 MMF Cable	Y	Y	Y	Y	N	N
4Z57A10851	B2PF	Lenovo 25m LC-LC OM4 MMF Cable	Y	Y	Y	Y	N	N
4Z57A10852	B2PG	Lenovo 30m LC-LC OM4 MMF Cable	Y	Y	Y	Y	N	N
UTP Category 6 cables (Green) for 1 GbE RJ-45 SFP transceivers and management ports								
00WE123	AVFW	0.75m CAT6 Green Cable	N	N	N	Y	Y	Y
00WE127	AVFX	1.0m CAT6 Green Cable	N	N	N	Y	Y	Y
00WE131	AVFY	1.25m CAT6 Green Cable	N	N	N	Y	Y	Y
00WE135	AVFZ	1.5m CAT6 Green Cable	N	N	N	Y	Y	Y
00WE139	AVG0	3m CAT6 Green Cable	N	N	N	Y	Y	Y
90Y3718	A1MT	10m CAT6 Green Cable	N	N	N	Y	Y	Y
90Y3727	A1MW	25m CAT6 Green Cable	N	N	N	Y	Y	Y
UTP Category 6 cables (Blue) for 1 GbE RJ-45 SFP transceivers and management ports								
40K5679	3801	0.6m Blue Cat5e Cable	N	N	N	Y	Y	Y

Part number	Feature code	Description	Blade support (Y=supported)					
			FC32-X7-48	FC64-48	FC32-48	SX6	CR32-4	CR32-8
40K8785	3802	1.5m Blue Cat5e Cable	N	N	N	Y	Y	Y
40K5581	3803	3m Blue Cat5e Cable	N	N	N	Y	Y	Y
40K8927	3804	10m Blue Cat5e Cable	N	N	N	Y	Y	Y
40K8930	3805	25m Blue Cat5e Cable	N	N	N	Y	Y	Y

The SFP-DD Cables specific for the FC64-64 port blade are listed in the following table.

Table 6. SFP-DD Cables specific for the FC64-64 port blade

Part number	Feature code	Description
OM4 SN to LC (SFP-DD to SFP) optical cables for 64G FC SW SFP-DD transceivers		
4X97A81905	BPAF	12U-8020m-MG1M Fiber Cable, SN to LC, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 1M
4X97A81907	BPAG	12U-8020m-MG3M Fiber Cable, SN to LC, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 3M
4X97A81908	BPAH	12U-8020m-MG5M Fiber Cable, SN to LC, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 5M
4X97A81910	BPAJ	12U-8020m-MG10M Fiber Cable, SN to LC, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 10M
4X97A81911	BPAK	12U-8020m-MG15M Fiber Cable, SN to LC, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 15M
4X97A81913	BPAL	12U-8020m-MG25M Fiber Cable, SN to LC, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 25M
4X97A81914	BPAM	12U-8020m-MG30M Fiber Cable, SN to LC, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 30M
OM4 SN to SN (SFP-DD to SFP-DD) optical cables for 64G FC SW SFP-DD transceivers		
4X97A81893	BPA8	11U-8020m-MG1M Fiber Cable, SN to SN, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 1M
4X97A81895	BPA9	11U-8020m-MG3M Fiber Cable, SN to SN, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 3M
4X97A81896	BPAA	11U-8020m-MG5M Fiber Cable, SN to SN, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 5M
4X97A81898	BPAB	11U-8020m-MG10M Fiber Cable, SN to SN, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 10M
4X97A81899	BPAC	11U-8020m-MG15M Fiber Cable, SN to SN, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 15M
4X97A81901	BPAD	11U-8020m-MG25M Fiber Cable, SN to SN, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 25M
4X97A81902	BPAE	11U-8020m-MG30M Fiber Cable, SN to SN, OM4 1.6mm Round Duplex Jacket, Magenta, OFNR, 30M

Cabling requirements

The following table lists the cabling requirements for the directors.

Table 7. Cabling requirements

Transceiver	Standard	Cable	Connector
128 Gb (4x 32 Gb) Fibre Channel			
128 Gb (4x 32 Gb) FC SWL QSFP+ (4M27A65422)	FC-PI-6	Up to 30 m with MPO-MPO MMF cables or up to 5 m with MPO-4xLC MMF breakout cables supplied by Lenovo (see Cables). 850 nm 50 µ MPO-MPO MMF cable: • 32GFC: Up to 100 m (OM4) or up to 70 m (OM3). • 16GFC: Up to 125 m (OM4) or up to 100 m (OM3).	MPO
64 Gb (4x 16 Gb) Fibre Channel			
4x 16 Gb FC SWL QSFP+ (01KN805)	FC-PI-5	Up to 30 m with MPO-MPO MMF cables or up to 5 m with MPO-4xLC MMF breakout cables supplied by Lenovo (see Cables). 16GFC: 850 nm 50 µ MPO-MPO MMF cable up to 100 m (OM4) or up to 66 m (OM3).	MPO
64 Gb Fibre Channel			
64 Gb FC SWL SFP+ (4M27A65425, 4M27A65426)	FC-PI-6	Up to 30 m with LC-LC MMF cables supplied by Lenovo (see Cables). 850 nm 50 µ LC-LC MMF cable: • 64GFC: Up to 100 m (OM4) or up to 70 m (OM3) • 32GFC: Up to 100 m (OM4) or up to 70 m (OM3) • 16GFC: Up to 125 m (OM4) or up to 100 m (OM3)	LC
64 Gb FC LWL SFP+ (4M27A65433, 4M27A65434)	FC-PI-6	1310 nm 9 µ SMF cable: 64GFC, 32GFC, 16GFC: Up to 10 km.	LC
64 Gb FC ELWL SFP+ (4M27A65432)	FC-PI-5	1310 nm 9 µ SMF cable: 64GFC, 32GFC, 16GFC: Up to 25 km.	LC
32 Gb Fibre Channel			
32 Gb FC SWL SFP+ (4M27A65416, 4M27A65417)	FC-PI-6	Up to 30 m with LC-LC MMF cables supplied by Lenovo (see Cables), or the following 850 nm 50 µ MMF cables: • 32GFC: Up to 100 m (OM4) or up to 70 m (OM3). • 16GFC: Up to 125 m (OM4) or up to 100 m (OM3). • 8GFC: Up to 125 m (OM4) or up to 100 m (OM3).	LC
32 Gb FC LWL SFP+ (4M27A65418, 4M27A65419)	FC-PI-6	1310 nm 9 µ SMF cable: • 32GFC, 16GFC, 8GFC: Up to 10 km	LC
32 Gb FC ELWL SFP+ (4M27A65424, 4M27A65431*)	FC-PI-6	1310 nm 9 µ SMF cable: • 32GFC, 16GFC, 8GFC: Up to 25 km • * 32GFC, 16GFC: Up to 25 km	LC
16 Gb Fibre Channel			

Transceiver	Standard	Cable	Connector
16 Gb FC SWL SFP+ (4M27A65411 / 4M27A65412)	FC-PI-5	Up to 30 m with LC-LC MMF cables supplied by Lenovo (see Cables).	LC
16 Gb FC LWL SFP+ (4M27A65413 / 4M27A65414)	FC-PI-5	1310 nm 9 µ SMF cable: • 16GFC, 8GFC: Up to 10 km.	LC
16 Gb FC ELWL SFP+ (4M27A65415)	FC-PI-5	1310 nm 9 µ SMF cable: • 16GFC: Up to 25 km	LC
10 Gb Fibre Channel			
10Gb FC SWL SFP+ (4M27A65420)	FC-10GFC	850 nm 50 µ MMF cable: • 10GFC: Up to 550 m (OM4) or up to 300 m (OM3)	LC
10Gb FC LWL SFP+ (4M27A65421)	FC-10GFC	1310 nm 9 µ SMF cable: • 10GFC: Up to 10 km	LC
100 Gb (4x 25 Gb) Fibre Channel over Ethernet			
100Gb (4x25Gb) SR4 QSFP28 (4M27A09989)	100GBASE-SR4	Up to 5 m with MPO-4xLC MMF breakout cables supplied by Lenovo (see Cables). 850 nm 50 µ MPO-4xLC MMF breakout cable up to 70 m (OM3) or up to 100m (OM4).	MPO
40 Gb Fibre Channel over Ethernet			
40Gb (4x10Gb) SR4 QSFP+ (4M27A09987)	40GBASE-SR4	Up to 30 m with MPO-MPO MMF cables or up to 5 m with MPO-4xLC MMF breakout cables supplied by Lenovo (see Cables). 850 nm 50 µ MPO-MPO MMF cable or MPO-4xLC MMF breakout cable up to 100 m (OM3) or up to 150 m (OM4).	MPO
40Gb SR QSFP+ BiDi (4M27A09988)	40GBASE-SR BiDi	Up to 30 m with LC-LC MMF cables supplied by Lenovo (see Cables). 850 nm 50 µ LC-LC MMF cable up to 100 m (OM3) or up to 150 m (OM4).	LC
40 Gb Ethernet			
40 GbE SR4 QSFP+ (01KN813)	40GBASE-SR4	Up to 30 m with MPO-MPO MMF cables or up to 5 m with MPO-4xLC MMF breakout cables supplied by Lenovo (see Cables). 850 nm 50 µ MPO-MPO MMF cable or MPO-4xLC MMF breakout cable up to 100 m (OM3) or up to 150 m (OM4).	MPO
40 GbE LR4 QSFP+ (01KN817)	40GBASE-LR4	1310 nm 9 µ SMF cable up to 10 km.	LC
40 GbE ER4 QSFP+ (01KN821)	40GBASE-ER4	1310 nm 9 µ SMF cable up to 40 km.	LC
10 Gb Ethernet			

Transceiver	Standard	Cable	Connector
10 GbE SR SFP+ (49Y4216)	10GBASE-SR	Up to 30 m with LC-LC MMF cables supplied by Lenovo (see Cables). 850 nm 50 µ LC-LC MMF cable up to 400 m (OM4) or up to 300 m (OM3).	LC
10 GbE LR SFP+ (95Y0540)	10GBASE-LR	1310 nm 9 µ SMF cable up to 10 km.	LC
10 GbE DWDM SFP+ (01KN837)	10GBASE-ZRD	1550 nm 9 µ SMF cable up to 80 km.	LC
1 Gb Ethernet			
1 GbE SX SFP (01KN825)	1000BASE-SX	Up to 30 m with LC-LC MMF cables supplied by Lenovo (see Cables). 850 nm 50 µ LC-LC MMF cable up to 550 m.	LC
1 GbE LX SFP (01KN829)	1000BASE-LX	1310 nm 9 µ SMF cable up to 10 km.	LC
1 GbE RJ-45 SFP (01KN833)	1000BASE-T	UTP Category 5, 5E, or 6 up to 100 meters.	RJ-45
Management ports			
10/100/1000 Mb Ethernet port	1000BASE-T	Up to 25 m with UTP cables supplied by Lenovo (see Table 4). UTP Category 5, 5E, or 6 up to 100 meters.	RJ-45
Serial port	RS-232	DB-9/RJ-45-to-RJ-45 console cable (comes with the director).	RJ-45

Firmware

For details on the latest features supported with the X7-4 & X7-8 FC SAN Directors, see the Administration Guide for the latest available Fabric OS version 9.0 and above:
https://www.broadcom.com/products/fibre-channel-networking/software/fabric-operating-system

Inter-Chassis Links

UltraScale Inter-Chassis Link (ICL) are optional features for the X7 Directors. ICLs allow the interconnect of up to 9 (full-mesh) or 12 (core-edge) X7-4 or X7-8, or a combination of both, or to connect to X6-4 (Lenovo DB400D) or X6-8 (Lenovo DB800D) Backbones by using the QSFP+ ports on the core routing blades.

The following table lists ordering information for the optional features and bundles for the X7-4 and X7-8 FC SAN Directors Models HC1.

Table 8. Optional ICL POD Kits for X7-4 and X7-8 Models

Part number	Feature code	Description	Gen ICL Support	X7-4 Min/Max	X7-8 Min/Max
License and transceiver bundles					
4XF7A84081	BR8Y	X7 ICL POD Kit (License + 4x32G SWL QSFP+ transceivers)	Gen 5,6,7	1 / 2	2 / 4
4XF7A84080	BR8Z	X7 ICL POD Kit (License + Gen 7 SWL QSFP+ transceivers)	Gen 6,7	1 / 2	2 / 4
4XF7A84082	BR8X	X7 ICL POD Kit (License + Gen 7 2KM QSFP+ transceivers)	Gen 6,7	1 / 2	2 / 4

Each Inter-Chassis Link (ICL) bundle includes Port on Demand (POD) licenses to activate four available QSFP+ ports on both CR blades in the chassis. On the X7-8 clients can are required to have a minimum of 2 licenses and can upgrade to 3 or the max of 4 licenses per chassis.

Each ICL bundle also includes eight QSFP+ transceivers to populate the activated ports.

Management software

Lenovo offers optional Brocade SANnav™ Management Portal and SANnav Global View software license subscriptions that provide comprehensive visibility into the SAN environment, allow administrators to quickly identify, isolate, and correct problems, and accelerate administrative tasks by simplifying and automating workflows.

SANnav Management Portal is a next-generation SAN management application with a simple browser-based user interface (UI) and with a focus on streamlining common workflows, such as configuration, zoning, deployment, monitoring, troubleshooting, reporting, and analytics.

Lenovo offers the following SANnav Management Portal subscriptions:

- SANnav Management Portal Base: Designed for mid-sized SANs to manage up to 600 SAN switch ports only (SAN director ports can only be managed with the Enterprise edition).
- SANnav Management Portal Enterprise: Designed for enterprise-class SANs to manage up to 15 000 SAN switch and director ports.

SANnav Management Portal supports all Brocade SAN switches and platforms that run the Fabric OS® version 7.4 or above, including Lenovo B300, B6505, B6510, DB610S, DB620S, DB400D, DB720S, DB800D, Brocade Directors, and FC5022.

With SANnav Global View, administrators can quickly visualize the health, performance, and inventory of multiple SANnav Management Portal instances using a simple, intelligent dashboard and can easily navigate from a global view down to local environments to investigate points of interest. SANnav Global View is designed to manage up to 20 SANnav Management Portal instances.

For more information, refer to the SANnav Management Portal documentation:
http://www.broadcom.com/products/fibre-channel-networking/software/sannav-management-portal#documentation

The following table lists ordering information for the optional SANnav Management Portal and SANnav Global View management tools. After a client has an active SANnav license, Lenovo offers a “license extension/renewal”. This offering provides our clients the flexible to extend their subscription down to a specific end date. This allows clients the ability to align to your company’s budget or align with warranty of your FC SAN switches/directors. Please engage directly with your Lenovo sales representative for more details.

Table 9. SANnav Management Portal and SANnav Global View subscription licenses

Part number	Feature code	Description
SANnav Management Portal electronic authorization licenses		
7S0C0010WW	S1K6	Brocade SANnav Mgmt Portal Base Edition - 1YR License 600 ports
7S0C0013WW	S1K8	Brocade SANnav Mgmt Portal Base Edition - 3YR License 600 ports
7S0C001KWW	S4MB	Brocade SANnav Mgmt Portal Base Edition - 5YR License 600 ports
7S0C0011WW	S1K7	Brocade SANnav Mgmt Portal Enterprise Edition - 1YR License 15K ports
7S0C0014WW	S1K9	Brocade SANnav Mgmt Portal Enterprise Edition - 3YR License 15K ports
7S0C001LWW	S4MC	Brocade SANnav Mgmt Portal Enterprise Edition - 5YR License 15K ports
SANnav Global View electronic authorization licenses		
7S0C0012WW	S1D8	Brocade SANnav Global View - 1YR License
7S0C0015WW	S1D9	Brocade SANnav Global View - 3YR License
7S0C001JWW	S4MA	Brocade SANnav Global View - 5YR License

The SANnav licenses are subscription-based with 1-year, 3-year, or 5-year software entitlement and support.

Fibre Channel standards

The SAN Directors supports the standards listed at the following web page:

https://www.broadcom.com/support/fibre-channel-networking/san-standards/standards-compliance

Ethernet standards

The X7 Directors support 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 VLAN Tagging
- IEEE 802.1Qbb Priority-Based Flow Control (PFC)
- IEEE 802.1Qaz Enhanced Transmission Selection (ETS)
- IEEE 802.3 10BASE-T Ethernet (CP management interfaces)
- IEEE 802.3u 100BASE-TX Fast Ethernet (CP management interfaces)
- IEEE 802.3z 1000BASE-SX short range fiber optics Gigabit Ethernet
- IEEE 802.3z 1000BASE-LX long range fiber optics Gigabit Ethernet
- IEEE 802.3ab 1000BASE-T copper twisted pair Gigabit 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-LR4 long range fiber optics 40 Gb Ethernet
- IEEE 802.3bm 40GBASE-ER4 extended range fiber optics 40 Gb Ethernet
- IEEE 802.3bm 100GBASE-SR4 short range fiber optics 100 Gb Ethernet
- 10GBASE-ZRD DWDM fiber optics 10 Gb Ethernet

Cooling

Models of the X7 Directors do not include cooling modules (fan assemblies) - the cooling modules must be ordered as well. Each cooling module has two integrated fans.

Two matching cooling modules are required for the X7-4, and three cooling modules are required for the X7-8. Cooling modules provide N+1 fan redundancy (3+1 for the X7-4; 5+1 for the X7-8), and the device can continue operation while one fan assembly is replaced if the fan assembly is replaced immediately.

Air flow: It is also important to remember your fan tray airflow must match your power supplies!

The following table lists the supported cooling modules.

Table 10. Cooling modules

Part number	Feature code	Description
01KN895	AVGY	FC SAN Director Fan Tray (Non-port side Intake / port-side exhaust)
4XF7A84076	BR90	FC SAN Director Fan Tray (Non-port-side exhaust / port-side intake)

Power supplies and cables

Models of the X7 Directors do not include power supplies - the power supplies must be ordered separately.

Power supply requirements:

- X7-8: Four matching PSUs must be installed to provide power efficiency and 2+2 redundancy.
- X7-4: Two matching PSUs must be installed to provide power efficiency and 1+1 redundancy

The AC power supplies are hot-swap 1450 W (100-120 V AC) / 2870 W (200-240 V AC), and each power supply has an IEC 320-C20 connector. Each power supply has two integrated fans that provide non-port side air intake that matches the airflow of the cooling modules.

The High Voltage (HV) Power Supplies has a HVAC/HVDC power cable receptacle connector. The unique power cords is available from Lenovo and is 6m (19.7 ft.) long and contain three colored 14 AWG unterminated wires.

The following table lists the supported power supplies.

Table 11. Power supplies

Part number	Feature code	Description
Standard AC Power Supplies		
4M27A36850	BBCU	FC SAN Director PSU (Non-Port Side Intake / port side exhaust)
4XF7A84054	BR93	FC SAN Director PSU (Non-port-side exhaust / port-side intake)
High Voltage (HV) Power Supplies		
4XF7A84055	BR92	FC SAN Director High Voltage PSU (Non-port-side intake / port-side exhaust)
4XF7A84057	BR91	FC SAN Director High Voltage PSU (Non-port-side exhaust / port-side intake)

The X7 Directors do not include power cords by default. Up to four rack power cables or line cords should be ordered for the FC SAN Directors depending on the quantity of power supplies.

The following table lists the available power cords.

Table 12. Power cord options

Part number	Feature code	Description
Rack power cables		
39Y7916	6252	2.5m, 16A/125-250V, C19 to IEC 320-C20 Rack Power Cable
Line cords		
40K9777	6276	Argentina 4.3m, 16A/250V, C19 to IRAM 2073 Line Cord
40K9775	6277	Brazil 4.3m, 16A/250V, C19 to NBR 14136 Line Cord
40K9774	6288	China 4.3m, 16A/250V, C19 to GB2099.1 Line Cord
40K9776	6285	India 4.3m, 16A/250V, C19 to IS6538 Line Cord
40K9771	6282	Israel 4.3m, 16A/250V, C19 to SI 32 Line Cord
40K9768	6281	Italy 4.3m, 16A/250V, C19 to CEI 23-16 Line Cord
41Y9232	6290	Japan 4.3m, 15A/100V, C19 to JIS C-8303 Line Cord
41Y9233	6291	Japan 4.3m, 15A/200V, C19 to JIS C-8303 Line Cord
41Y9231	6289	Korea 4.3m, 15A/250V, C19 to KSC 8305 Line Cord
40K9770	6280	South Africa 4.3m, 16A/250V, C19 to SABS 164 Line Cord
81Y2391	6549	Switzerland 4.3m, 16A/250V, C19 to SEV 1011 Line Cord
41Y9229	6286	Taiwan 4.3m, 16A/125V, C19 to CNS 10917-3 Line Cord
41Y9230	6287	Taiwan 4.3m, 16A/250V, C19 to CNS 10917-3 Line Cord
40K9767	6278	United Kingdom 4.3m, 13A/250V, C19 to BS 1363/A Line Cord
4L67A08372	B0RV	United States 4.3m, 15A/125V, C19 to NEMA 5-15P Line Cord
00D7197	A1NV	United States 4.3m, 15A/250V, C19 to NEMA 6-15P Line Cord
Power Cord for High Voltage Power Supply		
4L67A84075	BRA7	Universal Power Cord for High Voltage PSU

Rack installation

The X7 Directors come standard with the adjustable 27" to 31" rack mount kits that can be used for 4-post rack installations. The X7-4 also comes standard with the 27” to 31” Airflow Diversion Kit that allow to divert the airflow from the side air vent to the port side. In addition, the X7-8 supports 22" rack mount kit for specific racks and the X7-4 offers an optional 18”to 24” Airflow Diversion Kit.

If required, the Brocade FC SAN Directors can be mounted in a 2-post rack cabinet by using the optional mid-mount rack kits.

The following table lists rack-mount options.

Table 13. Rack-mount options

Part number	Feature code	Description	Maximum supported
X7-4 rack-mount options			
01KN874	AVKB	4-slot Director mid-mount rack kit	1
01KN880	AVKD	18-24" Airflow Diversion Kit for 4-slot Director	1
X7-8 rack-mount options			
01KN883	AVH1	8-slot Director 22" rack mount kit	1
01KN886	AVH2	8-slot Director mid-mount rack kit	1

The optional airflow diversion kit for the X7-4 Director is shown in the following figure.

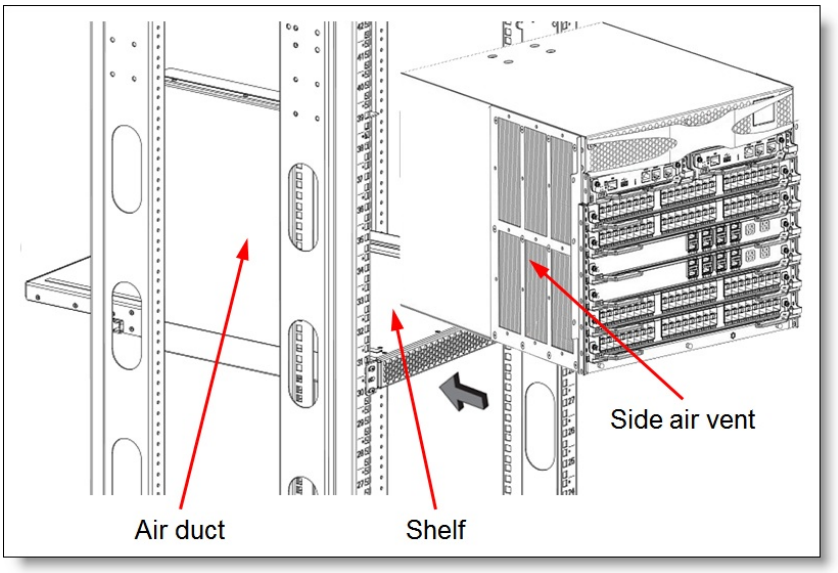

Figure 9. X7-4 Airflow Diversion Kit

The optional mid-mount rack kits for the X7-4 and X7-8 Directors are shown in the following figure.

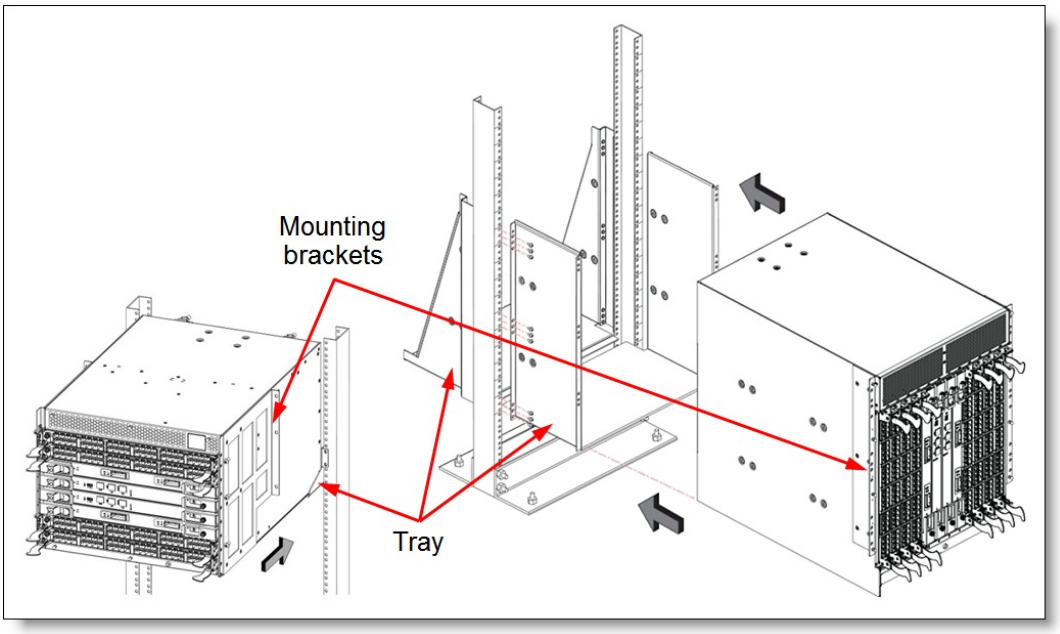

Figure 10. X7-4 (left) and X7-8 (right) Mid-mount Rack Kits

In addition, in order for the X7-4 and X7-8 FC SAN Directors to meet FIPS 140-2 Level 2 Physical Security requirements the tamper-evident seals must be installed (see the following table for ordering information).

Table 14. Tamper-evident security seals

Part number	Feature code	Description	Maximum supported
01KN785	AVGB	Brocade FIPS 140-2 High Security Labels and Seals	1

Physical specifications

The X7 Directors have the following dimensions and weight:

Dimensions:

- X7-8 Director
  - Height: 61.23 cm (24.11 in., 14U)
  - Width: 43.74 cm (17.23 in.)
  - Depth: 61.04 cm (24.04 in.)
- X7-4 Director
  - Height: 34.45 cm (13.56 in., 8U)
  - Width: 43.74 cm (17.23 in.)
  - Depth: 61.04 cm (24.04 in.)
- X7-4 with airflow diversion rack-mount kit
  - Height: 40.00 cm (15.75 in., 9U)
  - Width: 43.74 cm (17.23 in.)
  - Depth: 61.29 cm (24.09 in.)

Weight:

- X7-8 Director
  - 61 kg (78.5 lb) for chassis
  - 8 kg (321.5 lb) maximum fully populated configuration
- X7-4 Director
  - 5 kg (54 lb) for chassis
  - 68.95 kg (152.0 lb) maximum fully populated configuration

Operating environment

Temperature and humidity, Electrical requirements, and Heat output Information can be found in the Brocade X7-4 and X7-8 Director Hardware Installation Guide. https://www.broadcom.com/roducts/fibre-channel-networking/directors/x7-directors

Warranty and support

The X7 Directors have a three-year warranty.

The standard warranty terms are customer-replaceable unit (CRU) and onsite (for field-replaceable units FRUs only) with standard call center support during normal business hours and 9x5 Next Business Day Parts Delivered.

Lenovo's additional support services provide a sophisticated, unified support structure for your data center, with an experience consistently ranked number one in customer satisfaction worldwide. Available offerings include:

- **Premier Support**

  Premier Support provides a Lenovo-owned customer experience and delivers direct access to technicians skilled in hardware, software, and advanced troubleshooting, in addition to the following:

  - Direct technician-to-technician access through a dedicated phone line
  - 24x7x365 remote support
  - Single point of contact service
  - End to end case management
  - Third-party collaborative software support
  - Online case tools and live chat support
  - On-demand remote system analysis

- **Warranty Upgrade (Preconfigured Support)**

  Services are available to meet the on-site response time targets that match the criticality of your systems.

  - 3, 4, or 5 years of service coverage
  - 1-year or 2-year post-warranty extensions
  - **Foundation Service**: 9x5 service coverage with next business day onsite response
  - **Essential Service:** 24x7 service coverage with 4-hour onsite response or 24-hour committed repair (available only in select markets)
  - **Advanced Service:** 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select markets)

- **Managed Services**

  Lenovo Managed Services provides continuous 24x7 remote monitoring (plus 24x7 call center availability) and proactive management of your data center using state-of-the-art tools, systems, and practices by a team of highly skilled and experienced Lenovo services professionals.

  Quarterly reviews check error logs, verify firmware & OS device driver levels, and software as needed. We'll also maintain records of latest patches, critical updates, and firmware levels, to ensure you systems are providing business value through optimized performance.

- **Technical Account Management (TAM)**

  A Lenovo Technical Account Manager helps you optimize the operation of your data center based on a deep understanding of your business. You gain direct access to your Lenovo TAM, who serves as your single point of contact to expedite service requests, provide status updates, and furnish reports to track incidents over time. In addition, your TAM will help proactively make service recommendations and manage your service relationship with Lenovo to make certain your needs are met.

- **Enterprise Server Software Support**

  Enterprise Software Support is an additional support service providing customers with software support on Microsoft, Red Hat, SUSE, and VMware applications and systems. Around the clock availability for critical problems plus unlimited calls and incidents helps customers address challenges fast, without incremental costs. Support staff can answer troubleshooting and diagnostic questions, address product comparability and interoperability issues, isolate causes of problems, report defects to software vendors, and more.

- **Health Check**

  Having a trusted partner who can perform regular and detailed health checks is central to maintaining efficiency and ensuring that your systems and business are always running at their best. Health Check supports Lenovo-branded server, storage, and networking devices, as well as select Lenovo-supported products from other vendors that are sold by Lenovo or a Lenovo-Authorized Reseller.

Examples of region-specific warranty terms are second or longer business day parts delivery or parts-only base warranty.

If warranty terms and conditions include onsite labor for repair or replacement of parts, Lenovo will dispatch a service technician to the customer site to perform the replacement. Onsite labor under base warranty is limited to labor for replacement of parts that have been determined to be field-replaceable units (FRUs). Parts that are determined to be customer-replaceable units (CRUs) do not include onsite labor under base warranty.

If warranty terms include parts-only base warranty, Lenovo is responsible for delivering only replacement parts that are under base warranty (including FRUs) that will be sent to a requested location for self-service. Parts-only service does not include a service technician being dispatched onsite. Parts must be changed at customer's own cost and labor and defective parts must be returned following the instructions supplied with the spare parts.

Lenovo Service offerings are region-specific. Not all preconfigured support and upgrade options are available in every region. For information about Lenovo service upgrade offerings that are available in your region, refer to the following resources:

- Service part numbers in Lenovo Data Center Solution Configurator (DCSC):
  http://dcsc.lenovo.com/#/services
- Lenovo Services Availability Locator
  http://lenovolocator.com/

For service definitions, region-specific details, and service limitations, please refer to the following documents:

- Lenovo Statement of Limited Warranty for Infrastructure Solutions Group (ISG) Servers and System Storage
  http://pcsupport.lenovo.com/us/en/solutions/ht503310
- Lenovo Data Center Services Agreement
  http://support.lenovo.com/us/en/solutions/ht116628

Services

Lenovo Services is a dedicated partner to your success. Our goal is to reduce your capital outlays, mitigate your IT risks, and accelerate your time to productivity.

Note: Some service options may not be available in all markets or regions. For more information, go to https://www.lenovo.com/services. For information about Lenovo service upgrade offerings that are available in your region, contact your local Lenovo sales representative or business partner.

Here's a more in-depth look at what we can do for you:

- **Asset Recovery Services**

  Asset Recovery Services (ARS) helps customers recover the maximum value from their end-of-life equipment in a cost-effective and secure way. On top of simplifying the transition from old to new equipment, ARS mitigates environmental and data security risks associated with data center equipment disposal. Lenovo ARS is a cash-back solution for equipment based on its remaining market value, yielding maximum value from aging assets and lowering total cost of ownership for your customers. For more information, see the ARS page, https://lenovopress.com/lp1266-reduce-e-waste-and-grow-your-bottom-line-with-lenovo-ars.

- **Assessment Services**

  An Assessment helps solve your IT challenges through an onsite, multi-day session with a Lenovo technology expert. We perform a tools-based assessment which provides a comprehensive and thorough review of a company's environment and technology systems. In addition to the technology based functional requirements, the consultant also discusses and records the non-functional business requirements, challenges, and constraints. Assessments help organizations like yours, no matter how large or small, get a better return on your IT investment and overcome challenges in the ever-changing technology landscape.

- **Design Services**

  Professional Services consultants perform infrastructure design and implementation planning to support your strategy. The high-level architectures provided by the assessment service are turned into low level designs and wiring diagrams, which are reviewed and approved prior to implementation. The implementation plan will demonstrate an outcome-based proposal to provide business capabilities through infrastructure with a risk-mitigated project plan.

- **Basic Hardware Installation**

  Lenovo experts can seamlessly manage the physical installation of your server, storage, or networking hardware. Working at a time convenient for you (business hours or off shift), the technician will unpack and inspect the systems on your site, install options, mount in a rack cabinet, connect to power and network, check and update firmware to the latest levels, verify operation, and dispose of the packaging, allowing your team to focus on other priorities.

- **Deployment Services**

  When investing in new IT infrastructures, you need to ensure your business will see quick time to value with little to no disruption. Lenovo deployments are designed by development and engineering teams who know our Products & Solutions better than anyone else, and our technicians own the process from delivery to completion. Lenovo will conduct remote preparation and planning, configure & integrate systems, validate systems, verify and update appliance firmware, train on administrative tasks, and provide post-deployment documentation. Customer's IT teams leverage our skills to enable IT staff to transform with higher level roles and tasks.

- **Integration, Migration, and Expansion Services**

  Move existing physical & virtual workloads easily, or determine technical requirements to support increased workloads while maximizing performance. Includes tuning, validation, and documenting ongoing run processes. Leverage migration assessment planning documents to perform necessary migrations.

Regulatory compliance

The X7 Directors conform to the following regulations which can be found in the Hardware Installation Guide, available from the following web page:
https://www.broadcom.com/products/fibre-channel-networking/directors/x7-directors

Interoperability

For end-to-end storage configuration support, refer to the Lenovo Storage Interoperation Center (LSIC):
https://datacentersupport.lenovo.com/us/en/lsic

Use the LSIC to select the known components of your configuration and then get a list all other supported combinations, with details about supported hardware, firmware, operating systems, and drivers, plus any additional configuration notes. View results on screen or export them to Excel.

External storage systems

Lenovo offers the ThinkSystem DE Series and ThinkSystem DM Series external storage systems for high-performance storage. See the DE Series and DM Series product guides for specific controller models, expansion enclosures and configuration options:

- ThinkSystem DE Series Storage
  https://lenovopress.com/storage/thinksystem/de-series#rt=product-guide
- ThinkSystem DM Series Storage
  https://lenovopress.com/storage/thinksystem/dm-series#rt=product-guide
- ThinkSystem DG Series Storage
  https://lenovopress.com/storage/thinksystem/dg-series#rt=product-guide

External backup units

The following table lists the external backup options that are offered by Lenovo that can be used in Lenovo FC SAN solutions.

Note: Information provided in this section is for ordering reference purposes only. End-to-end LTO Ultrium configuration support for a particular tape backup unit *must* be verified through the System Storage Interoperation Center (SSIC):
http://www.ibm.com/systems/support/storage/ssic

Table 15. External Fibre Channel backup options

Part number	Description
External tape backup libraries	
6741A1F	IBM TS4300 3U Tape Library-Base Unit
Fibre Channel backup drives for TS4300 Tape Library - Full Height	
01KP938	LTO 7 FH Fibre Channel Drive
01KP954	LTO 8 FH Fibre Channel Drive
02JH837	LTO 9 FH Fibre Channel Drive
Fibre Channel backup drives for TS4300 Tape Library - Full Height	
01KP936	LTO 7 HH Fibre Channel Drive
01KP952	LTO 8 HH Fibre Channel Drive
02JH835	LTO 9 HH Fibre Channel Drive

For more information, see the list of Product Guides in the Tape Autoloaders and Libraries category:
https://lenovopress.com/storage/tape/library

Rack cabinets

The following table lists the supported rack cabinets.

Table 16. Rack cabinets

Part number	Description
93072RX	25U Standard Rack (1000mm)
93072PX	25U Static S2 Standard Rack (1000mm)
7D6DA007WW	ThinkSystem 42U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6DA008WW	ThinkSystem 42U Pearl Primary Heavy Duty Rack Cabinet (1200mm)
1410-O42	Lenovo EveryScale 42U Onyx Heavy Duty Rack Cabinet
1410-P42	Lenovo EveryScale 42U Pearl Heavy Duty Rack Cabinet
93604PX	42U 1200mm Deep Dynamic Rack
93614PX	42U 1200mm Deep Static Rack
93634PX	42U 1100mm Dynamic Rack
93634EX	42U 1100mm Dynamic Expansion Rack
93074RX	42U Standard Rack (1000mm)
7D6EA009WW	ThinkSystem 48U Onyx Primary Heavy Duty Rack Cabinet (1200mm)
7D6EA00AWW	ThinkSystem 48U Pearl Primary Heavy Duty Rack Cabinet (1200mm)
1410-O48	Lenovo EveryScale 48U Onyx Heavy Duty Rack Cabinet
1410-P48	Lenovo EveryScale 48U Pearl Heavy Duty Rack Cabinet

For specifications about these racks, see the Lenovo Rack Cabinet Reference, available from: https://lenovopress.com/lp1287-lenovo-rack-cabinet-reference

For more information, see the list of Product Guides in the Rack cabinets category: https://lenovopress.com/servers/options/racks

Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo.

Table 17. Power distribution units

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
0U Basic PDUs															
00YJ776	ATZY	0U 36 C13/6 C19 24A 1 Phase PDU	N	Y	Y	N	N	N	N	N	N	Y	Y	Y	N
0U Switched and Monitored PDUs															
00YJ783	AU04	0U 12 C13/12 C19 Switched and Monitored 48A 3 Phase PDU	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N
00YJ781	AU03	0U 20 C13/4 C19 Switched and Monitored 24A 1 Phase PDU	N	N	Y	N	Y	N	Y	N	N	Y	Y	Y	N
1U Switched and Monitored PDUs															
4PU7A90808	C0D4	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 ETL	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
4PU7A81117	BNDV	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - ETL	N	N	N	N	N	N	N	N	N	N	N	Y	N
4PU7A90809	C0DE	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 CE	N	N	N	N	N	Y	Y	N	N	N	N	N	N
4PU7A81118	BNDW	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - CE	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y
4PU7A90810	C0DD	1U 18 C19/C13 Switched and monitored 80A 3P Delta PDU V2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A77467	BLC4	1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	N	N	N	N	N	N	N	N	N	Y	N	Y	N
4PU7A90811	C0DC	1U 12 C19/C13 Switched and monitored 32A 3P WYE PDU V2	N	N	N	N	N	Y	Y	N	N	N	N	N	N
4PU7A77468	BLC5	1U 12 C19/C13 switched and monitored 32A 3P WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A90812	C0DB	1U 12 C19/C13 Switched and monitored 60A 3P Delta PDU V2	N	N	N	N	N	N	N	N	N	Y	N	N	N
4PU7A77469	BLC6	1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	N	N	N	N	N	N	N	N	N	N	N	Y	N
1U Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)															
71763NU	6051	Ultra Density Enterprise C19/C13 PDU 60A/208V/3PH	N	N	Y	N	N	N	N	N	N	Y	Y	Y	N
71762NX	6091	Ultra Density Enterprise C19/C13 PDU Module	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U C13 Enterprise PDUs (12x IEC 320 C13 outlets)															
39Y8941	6010	DPI C13 Enterprise PDU Module (WW)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U Front-end PDUs (3x IEC 320 C19 outlets)															
39Y8938	6002	DPI Single-phase 30A/120V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8939	6003	DPI Single-phase 30A/208V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8934	6005	DPI Single-phase 32A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8940	6004	DPI Single-phase 60A/208V Front-end PDU (US)	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N
39Y8935	6006	DPI Single-phase 63A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U NEMA PDUs (6x NEMA 5-15R outlets)															
39Y8905	5900	DPI 100-127V NEMA PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Line cords for 1U PDUs that ship without a line cord															
40K9611	6504	4.3m, 32A/380-415V, EPDU/IEC 309 3P+N+G 3ph wye (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9612	6502	4.3m, 32A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
40K9613	6503	4.3m, 63A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9614	6500	4.3m, 30A/208V, EPDU to NEMA L6-30P (US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9615	6501	4.3m, 60A/208V, EPDU to IEC 309 2P+G (US) Line Cord	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N
40K9617	6505	4.3m, 32A/230V, Souriau UTG Female to AS/NZ 3112 (Aus/NZ) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9618	6506	4.3m, 32A/250V, Souriau UTG Female to KSC 8305 (S. Korea) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

For more information, see the Lenovo Press documents in the PDU category:
https://lenovopress.com/servers/options/pdu

Uninterruptible power supply units

The following table lists the uninterruptible power supply (UPS) units that are offered by Lenovo.

Table 18. Uninterruptible power supply units

Part number	Description
55941AX	RT1.5kVA 2U Rack or Tower UPS (100-125VAC)
55941KX	RT1.5kVA 2U Rack or Tower UPS (200-240VAC)
55942AX	RT2.2kVA 2U Rack or Tower UPS (100-125VAC)
55942KX	RT2.2kVA 2U Rack or Tower UPS (200-240VAC)
55943AX	RT3kVA 2U Rack or Tower UPS (100-125VAC)
55943KX	RT3kVA 2U Rack or Tower UPS (200-240VAC)
55945KX	RT5kVA 3U Rack or Tower UPS (200-240VAC)
55946KX	RT6kVA 3U Rack or Tower UPS (200-240VAC)
55948KX	RT8kVA 6U Rack or Tower UPS (200-240VAC)
55949KX	RT11kVA 6U Rack or Tower UPS (200-240VAC)
55948PX	RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)
55949PX	RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)
55943KT†	ThinkSystem RT3kVA 2U Standard UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)
55943LT†	ThinkSystem RT3kVA 2U Long Backup UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)
55946KT†	ThinkSystem RT6kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)
5594XKT†	ThinkSystem RT10kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)

† Only available in China and the Asia Pacific market.

For more information, see the list of Product Guides in the UPS category:
https://lenovopress.com/servers/options/ups

Related publications and links

For more information, see the following resources:

- Lenovo FC SAN Switches product page: https://www3.lenovo.com/us/en/data-center/storage/storage-area-network/fibre-channel-switches/c/san-fibre-channel-switches
- Brocade X7-4 and X7-8 FC Director product publications: https://www.broadcom.com/products/fibre-channel-networking/directors/x7-directors
    - Hardware Installation Guide
    - Fabric OS Administration Guide
    - Fabric OS Extension Configuration Guide
    - Fabric OS Command Reference
    - Fabric OS Message Reference
    - Fabric OS MIB Reference
    - Flow Vision Configuration Guide
    - FOS and SANnav Downloads - https://support.lenovo.com/us/en/solutions/TT1116
    - TruFOS Certificates - https://support.lenovo.com/us/en/solutions/TT1149

Related product families

Product families related to this document are the following:

- DB Series SAN Switches
- Rack SAN Switches

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