

# CONNECTRIX ED-DCX7 ENTERPRISE DIRECTORS

64Gb/s Enterprise Directors

## Overview

The Connectrix ED-DCX7 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, the ED-DCX7 Directors maximize the performance of NVMe storage and high-transaction workloads, eliminating I/O bottlenecks and unleashing the full performance of next-generation storage. In addition, the ED-DCX7 Directors lay the foundation for the Connectrix B-Series 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.

ED-DCX7 Directors will provide up to 384 64Gb/s line rate ports when 64Gb/s optics become available. Today, the ED-DCX7 directors deliver up to 512 32Gb/s line rate 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. Connectrix Directors support the concurrent use of both traditional Fibre Channel and NVMe storage traffic, allowing organizations to seamlessly integrate Fibre Channel networks with next-generation NVMe-based storage, without a disruptive rip-and-replace.

## Connectrix ED-DCX7 Chassis Models

There are two Connectrix ED-DCX7 models to address all of your storage networking requirements. To accommodate the requirements of today's data centers, the ED-DCX7 director models provide two airflow options for each chassis. Having two airflow options extends the flexibility for hot/cold aisle network designs. Non-port-side intake to port-side exhaust or port-side intake to non-port-side exhaust options are available.

- **ED-DCX7-8B:** This 14U chassis has eight vertical blade slots to provide up to 384 64Gb/s line rate ports, when 64Gb optics become available, or up to 512 32Gb/s line rate ports for device connectivity. An additional 32 Inter-Chassis Link (ICL) connections provide 128 ports for chassis-to-chassis interconnect.
- **ED-DCX7-4B:** This 8U chassis has four horizontal blade slots to provide up to 192 64Gb/s line rate ports, when 64Gb optics become available, or up to 256 32Gb/s line rate ports for device connectivity. An additional 16 ICL connections provide 64 ports for chassis-to-chassis interconnect.

The following port blades are available for purchase with the ED-DCX7 Directors:

- **ED-DCX7 48-port 64Gb blade:** This Fibre Channel port blade provides 48 x 32Gb/s Fibre Channel ports with backward-compatibility support for 8, 10, 16, and 32Gb/s Fibre Channel connectivity. Short wave and long wave models of this blade are available. When 64Gb/s optics are available, the blade will support 64Gb/s.
- **ED-DCX7 48-port 32Gb blade:** This Fibre Channel port blade provides 48 x 32Gb/s Fibre Channel ports with backward-compatibility support for 4, 8, 10, and 16Gb/s Fibre Channel connectivity. Short wave and long wave models of this blade are available.
- **ED-DCX6/7 64-port blade:** This Fibre Channel port blade is supported with both the ED-DCX6 and ED-DCX7 directors. This blade provides 64 x 32Gb/s Fibre Channel ports with backward-compatibility support for 4, 8, and 16Gb/s Fibre Channel connectivity.
- **ED-DCX6/7 SAN Extension blade:** This extension blade is supported with both the ED-DCX6 and ED-DCX7 directors. Designed to accelerate and harden disaster recovery and data protection storage solutions over long distances, this blade provides flexible Fibre Channel and IP storage replication deployment options with 16 32Gb/s Fibre Channel ports, 16 1/10-GbE ports, and 2 40GbE ports.

ED-DCX7 directors build upon years of innovation and leverage the core technology of Connectrix B-Series systems to consistently deliver five-nines availability in the world's most demanding data centers. Delivering non-disruptive software upgrades, hot-pluggable components, and a no-single-point-of-failure design, the Connectrix ED-DCX7 offers a highly resilient solution for today's enterprise-class storage environments.

## Analyze the SAN to Optimize Performance and Reliability

IT organizations are responsible for delivering non-stop performance and reliability to ensure that service-level agreements (SLAs) are met. They need analytics to help extract actionable intelligence from their environment and simplified management tools to quickly and easily understand the state of their environment. This requires an infrastructure that can automatically learn its performance and health characteristics, identify potential risks, and provide recommended actions to resolve issues.

With ED-DCX7 Directors, a self-learning SAN is enabled that gathers and transforms millions of data points into actionable intelligence to make fast, informed decisions to optimize performance and ensure reliability. Connectrix products proactively monitor I/O performance and behavior data points through integrated network sensors to gain deep insight into the environment. The information captured is displayed in Connectrix SANnav™ Management Portal to quickly identify and isolate problems before they impact application availability. With built-in best practice recommendations, organizations can simplify troubleshooting by identifying and isolating issues to resolve them as fast as possible. Combining these tools with automation, Connectrix technology can detect abnormal traffic behaviors and degraded performance to automatically take corrective action, eliminating the potential impact of this issue. These new autonomous SAN technologies greatly simplify SAN management and enable unparalleled network performance and reliability.

## Connectrix ED-DCX7 Directors

System Architecture	Technical Specification
Chassis	<p>Single chassis</p> <ul style="list-style-type: none"> <li>• <b>ED-DCX7-8B:</b> Non-blocking architecture <ul style="list-style-type: none"> <li>○ ED-DCX7-8B Director with 48 64Gb/s port blades, when 64Gb optics are available: 31Tb/s of aggregate chassis bandwidth (384 device ports with a 64Gb/s data rate plus 32 Inter-Chassis Links (ICLs))</li> <li>○ ED-DCX7-8B Director with 64 32Gb/s port blades: 22.8Tb/s of aggregate chassis bandwidth (512 device ports with a 32Gb/s data rate plus 32 Inter-Chassis Links (ICLs))</li> </ul> </li> <li>• <b>ED-DCX7-4B:</b> Non-blocking architecture <ul style="list-style-type: none"> <li>○ ED-DCX7-4B Director with 48 64Gb/s port blades, when 64Gb optics are available: 15.5Tb/s of aggregate chassis bandwidth (192 device ports with a 64Gb/s data rate plus 16 Inter-Chassis Links (ICLs))</li> <li>○ ED-DCX7-4B Director with 64 32Gb/s port blades: 11.4Tb/s of aggregate chassis bandwidth (256 device ports with a 32Gb/s data rate plus 16 Inter-Chassis Links (ICLs))</li> </ul> </li> </ul> <p>Each provides support for (E, F, D, M, SIM, and EX) Fibre Channel ports using 48-port 64Gb/s Fibre Channel blades.</p>
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 Fabric OS® (FOS) fabrics; larger fabrics certified as required
Fibre Channel blade models	<p><b>PB-DCX7-FC6464GSW:</b> 48 x 64/32/16/10/8 Gb/s 64 Gb/s port blade fully populated with 64 Gb/s short wave SFP+ optics. 4 Gb/s Fibre Channel is not supported with this blade</p> <p><b>PB-DCX7-FC6432GSW:</b> 48 x 64/32/16/10/8 Gb/s 64 Gb/s port blade fully populated with 32 Gb/s short wave SFP+ optics. 4 Gb/s Fibre Channel is not supported with this blade</p> <p><b>PB-DCX7-FC6432GLW:</b> 48 x 64/32/16/10/8 Gb/s 64 Gb/s port blade fully populated with 32 Gb/s long wave SFP+ optics. 4 Gb/s Fibre Channel is not supported with this blade</p> <p><b>PB-DCX7-FC32-SW:</b> 48 x 32/16/10/8/4 Gb/s port blade fully populated with 32 Gb/s short wave SFP+ optics</p> <p><b>PB-DCX7-FC32-LW:</b> 48 x 32/16/10/8/4 Gb/s port blade fully populated with 32 Gb/s long wave SFP+ optics</p> <p><b>PB-DCX6-64P32G:</b> 64 x 32/16/10/8/4 Gb/s port blade half populated with 8 4x32 Gb/s short wave QSFP optics</p>
Extension blade	<b>PB-DCX6-SX6-SW:</b> Extension blade provides Fibre Channel extension (16x32Gb/s Fibre Channel ports) and IP extension over IP networks (16x1GbE/10GbE and 2x40GbE ports). This blade can be used in ED-DCX6 directors as well.
Performance	<p><b>PB-DCX7-FC64:</b> Port Blade: Autosensing of 8, 16, and 32Gb/s speeds with 32 Gb/s SFP+ optics. 10 Gb/s port speeds with dedicated SFPs.</p> <p><b>PB-DCX7-FC32</b> Port Blade: Autosensing of 8, 16, and 32Gb/s port speeds with 32 Gb/s SFP+ optics. 10Gb/s port speeds with dedicated SFPs.</p> <p><b>PB-DCX6-64P32G</b> Port Blade: Autosensing of 4, 8, 16, and 32Gb/s port speeds (depending on SFPs used).</p>
ISL trunking	Frame-based trunking with up to eight 64Gb/s ports per ISL trunk; up to 256Gb/s per ISL trunk; exchange-based load balancing across ISLs with DPS included in FOS

ICL trunking	<p>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:</p> <ul style="list-style-type: none"> <li>Up to four QSFP ports in a trunk group between two CR64-4 blades. For trunks that contain four or fewer QSFP ports, ports in a trunk must be located in the same port group on each blade.</li> <li>Up to four QSFP ports in a trunk group between a CR64-4 blade and a CR64-8 blade. For trunks that contain four or fewer QSFP ports, ports in a trunk must be located in the same port group on each blade.</li> </ul> <p>A minimum of two QSFP connections are required for a trunk, and up to four QSFP trunks between pairs of CR64-8 (CR64-4) and CR32-8 (CR32-4).</p>
Multi-chassis ICL ports	Up to 4608 Fibre Channel ports; 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
Slot bandwidth	ED-DCX7-8B: 31Tb/s per chassis with 384 device ports + 32 ICL connections supporting 128 ports ED-DCX7-4B: 15.5Tb/s per chassis with 192 device ports + 16 ICL connections supporting 64 ports
Switch latency	<p>PB-DCX7-FC64 at 64Gb/s speeds: 460 ns (including FEC); any-port-to-any-port local switching and 1.6 <math>\mu</math>s blade to blade at 64Gb/s, cut-through routing</p> <p>PB-DCX7-FC32 at 32Gb/s speeds: 560 ns (including FEC); any-port-to-any-port local switching and 1.9 <math>\mu</math>s blade to blade at 32Gb/s, cut-through routing</p> <p>PB-DCX6-SX6-SW blade and PB-DCX6-64P32G port blade: 780 ns (including FEC) and 2.6 <math>\mu</math>s any-port-to-any-port at 32Gb/s, cut-through routing</p>
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	Class 2, Class 3, Class F (inter-switch frames)
Data traffic types	Fabric switches supporting unicast, multicast (255 groups), and broadcast
Media types	<p>PB-DCX7-FC64 port blade: Supports hot-pluggable Fibre Channel SFP+ at 8/10/16/32Gb/s SWL/LWL/ELWL and 64Gb/s SWL.</p> <p>PB-DCX7-FC32 port blade: Supports hot-pluggable Fibre Channel SFP+ at 4/8/10/16/32Gb/s SWL/LWL/ELWL.</p> <p>PB-DCX6-64P32G port blade: Supports hot-pluggable QSFP connector; 4<math>\times</math>32Gb/s SWL and 4<math>\times</math>16Gb/s SWL, MPO 1<math>\times</math>12 ribbon cable connector (66m OM3, 100m OM4); 4<math>\times</math>32Gb/s QSFP (fixed 4<math>\times</math>32Gb/s speed and SMF LC); FC32-64 QSFPs support only 4/8/16/32Gb/s (no 10Gb/s Fibre Channel); 10GbE, 25GbE, or 40GbE FCoE QSFP.</p> <p>PB-DCX6-SX6-SW Extension Blade: Supports hot-pluggable Fibre Channel SFP28 at 32Gb/s SWL/LWL; SFP+ at 16Gb/s SWL/LWL/ELWL; SFP at 10Gb/s FC SWL/LWL and Ethernet SFP+ at 1GbE copper, 1GbE 1000BASE-SX/LX/CWDM, SFP+ at 10GbE SR/LR; SFP+ at 10GbE tunable DWDM 80 km, and QSFP at 40GbE SR4/LR4/ER4.</p> <p>Core Routing (CR) blades, CR64-4 and CR64-8: Support hot-pluggable Fibre Channel Gen7 SWL QSFP, 4<math>\times</math>32Gb/s SWL QSFP, and 4<math>\times</math>32Gb/s QSFP for ICL connections.</p>
USB	One USB port per control processor for firmware download, support save, and configuration upload or download
Fabric services	Adaptive Networking (QoS); BB Credit Recovery; Advanced Zoning (Default Zoning, Port/WWN Zoning); Dynamic Path Selection (DPS); Extended Fabrics; Fabric Congestion Notification; Fabric Vision; FDMI; FICON CUP; Flow Vision; FSPF; Integrated Routing; ISL Trunking; Management Server; N_Port Trunking; NPIV; NTP v3; Peer Zoning; Port Fencing; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Simple Name Server (SNS); Syslog; Target-Driven Zoning; Traffic Optimizer; Virtual Fabrics (Logical Switch, Logical Fabric).

Extension	Supports DWDM, CWDM, and FC-SONET Devices; Fibre Channel; In-flight Compression (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)

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System Components	Technical Specification
Fibre Channel ports	ED-DCX7-8B: Up to 384 64Gb/s ports or up to 512 32Gb/s ports, universal (E_Port, F_Port, EX_Port, M_Port, D_Port, SIM Port, FICON) ED-DCX7-4B: Up to 192 64Gb/s ports or up to 256 32Gb/s ports, universal (F_Port, E_Port, EX_Port, M_Port, D_Port, SIM Port, FICON)
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)
Fabric initialization	Complies with FC-SW 5.0
Port-to-port latency	Local switching: 460 ns at 64Gb/s (including FEC as part of the FC standard). Blade to blade: 1.6 $\mu$ s

## Connectrix ED-DCX7 Directors

High Availability	Technical Specification
Architecture	Non-blocking shared memory; passive backplane; redundant active/passive control processor; redundant active/active core switching blades; redundant WWN cards
Chassis power	<p><b>ED-DCX7-8B</b></p> <ul style="list-style-type: none"> <li>Four power supplies required for AC low-line (100 VAC to 120 VAC).</li> <li>Two power supplies required for AC high-line (200 VAC to 240 VAC).</li> <li>Two power supplies required for high voltage AC (200 VAC to 277 VAC) or high voltage DC (240 VDC to 380 VDC).</li> <li>Chassis ships empty only. PSU and fans must be ordered separately. Three PSUs are required for 2+1 redundancy. Two PSUs provide system power, but four PSUs must be installed to provide power efficiency and 2+2 redundancy.</li> </ul> <p><b>ED-DCX7-4B</b></p> <ul style="list-style-type: none"> <li>Two power supplies required for AC low-line (100 VAC to 120 VAC).</li> <li>One power supply required for AC high-line (200 VAC to 240 VAC).</li> <li>One power supply required for high voltage AC (200 VAC to 277 VAC) or high voltage DC (240 VDC to 380 VDC).</li> <li>Chassis ships empty only. PSU and fans must be ordered separately. One PSU provides system power, but both PSUs must be installed to provide power efficiency and 1+1 redundancy.</li> </ul>
Cooling	<p><b>ED-DCX7-8B</b></p> <ul style="list-style-type: none"> <li>Requires three fan tray assemblies. A failure condition is one failed fan from any fan tray.</li> <li>Each assembly contains two fans for a total of six fans. The system requires five of six functioning fans for the system requires five of six functioning fans for operation in the DCX7-8. One fan tray assembly can be hot-swapped and should be replaced immediately in the event of a failure.</li> </ul> <p><b>ED-DCX7-4B</b></p> <ul style="list-style-type: none"> <li>Requires two fan tray assemblies. A failure condition is one failed fan from any fan tray.</li> <li>Each assembly contains two fans for a total of four fans. The system requires three of four functioning fans for operation in the DCX7-4. One fan assembly can be hot-swapped and should be replaced immediately in the event of a failure.</li> </ul>
Airflow	Non-port-side intake (NPI) to port-side exhaust and port-side intake to non-port-side exhaust (NPE) options are available
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

## Connectrix ED-DCX7 Directors

Management	Technical Specification
Management	HTTP; SNMP v1/v3 (FE MIB, FC Management MIB); SSH; Auditing; Syslog; Advanced Web Tools; SANnav Management Portal and SANnav Global View; Command Line Interface (CLI); SMI-S compliant; RESTful API; trial licenses for add-on capabilities
Security	AES-GCM-256 encryption on ISLs; DH-CHAP (between switches and end devices); FCAP switch authentication; FIPS 140-2 compliant; HTTPS; IP filtering; LDAP with IPv6; OpenLDAP; Device Connection Control (DCC); RADIUS; user-defined Role-Based Access Control (RBAC); Secure Copy (SCP); SFTP; SSH v2; TLS v1.2/v1.3; Switch Binding; TACACS+; Fabric Configuration Server (FCS); USGv6 compliant; Secure Boot
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 SANnav Management Portal
Diagnostics	IO Insight for SCSI and NVMe monitoring (PB-DCX7-FC32 blade and PB-DCX7-FC64 blade only); ClearLink® optics and cable diagnostics, including electrical/optical loopback, link traffic/latency/distance; built-in flow generator; POST and embedded online/offline diagnostics, including environmental monitoring, FCping, and Pathinfo (FC traceroute); flow mirroring; frame viewer; non-disruptive daemon restart; optics health monitoring; power monitoring; RAStace logging; and Rolling Reboot Detection (RRD).

## Connectrix ED-DCX7 Directors

Mechanical	Technical Specification
Enclosure	<p><b>ED-DCX-8B:</b> 14U rack-mountable chassis; 27 in. to 31 in. and 22 in. rail kits for the four-post rack; mid-mount kit for the two-post rack.</p> <p><b>ED-DCX-4B:</b> 8U rack-mountable chassis; 27 in. to 31 in. rail, 18 in. to 24 in. rail, and airflow diversion rack-mount kits for the four-post rack; mid-mount kit for the two-post rack.</p>
Mounting	Rack-mountable in a standard 19-inch EIA cabinet.
Size	<p><b>ED-DCX-8B</b> Height: 61.23 cm (24.11 in., 14U) Width: 43.74 cm (17.23 in.) Depth: 61.04 cm (24.04 in.)</p> <p><b>ED-DCX-4B:</b> Height: 34.45 cm (13.56 in., 8U) Width: 43.74 cm (17.23 in.) Depth: 61.04 cm (24.04 in.)</p> <p><b>ED-DCX-4B with airflow diversion rack-mount kit</b> Height: 40.00 cm (15.75 in., 9U) Width: 43.74 cm (17.23 in.) Depth: 61.29 cm (24.09 in.)</p>
System weight	<p><b>ED-DCX-8B</b> 35.61 kg (78.5 lb) for chassis 145.8 kg (321.5 lb) maximum fully populated configuration</p> <p><b>ED-DCX-4B</b> 24.5 kg (54 lb) for chassis 68.95 kg (152.0 lb) maximum fully populated configuration</p>

## Connectrix ED-DCX7 Directors

Environment	Technical Specification
Temperature	<p>Operating: 0°C to 40°C (32°F to 104°F) Non-operating: -25°C to 70°C (-13°F to 158°F)</p>
Humidity	<p>Operating humidity: 5% to 93% RH non-condensing at 40°C (104°F) with a maximum gradient of 10% per hour Non-operating humidity: 10% to 93% RH non-condensing at 70°C (158°F)</p>
Altitude	Up to 3000 meters (9842 feet)
Shock	<p>Operating: 10g, 11 ms, half sine wave Non-operating: 20g, 11 ms, half sine wave</p>
Vibration	<p>Operating: 5 Hz to 10 Hz at +5 dB/oct; 10 Hz to 200 Hz at 0.0005 grms; 200 Hz to 500 Hz at -5 dB/oct; scale 0.05 grms</p> <p>Non-operating: 3 Hz to 10 Hz at +5 dB/oct; 10 Hz to 200 Hz at 0.0065 grms; 200 Hz to 500 Hz at -5 dB/oct; scale 1.12 grms</p>
Heat dissipation	<p><b>ED-DCX7-8B</b> 512-port configuration: Typical: 10,010 Btu/hr; Max: 18,362 Btu/hr. Power consumed: Typical: 2693W; Max: 4046W. Note: Input power is at 200 VAC with full PSU redundancy.</p> <p><b>ED-DCX7-4B</b> 256-port configuration: Typical: 5283 Btu/hr; Max: 10,049 Btu/hr. Power consumed: Typical: 1443W; Max: 2264W. Note: Input power is at 200 VAC with full PSU redundancy.</p>

## Connectrix ED-DCX7

Power	Technical Specification	
Supported power range	<b>Standard AC Power Supplies</b> <i>Input Voltage</i>  Standard AC input: Range: 90 VAC to 264 VAC auto-volt Nominal: 100 VAC to 240 VAC  <i>Power</i>  85 VAC to 132 VAC: 1450W 180 VAC to 264 VAC: 2870W  <i>80 PLUS Platinum certified</i>	<b>High Voltage (HV) Power Supplies</b> <i>Input Voltage</i>  Range: 90 VAC to 132 VAC Nominal: 100 VAC to 120 VAC  Range: 180 VAC to 305 VAC Nominal: 200 VAC to 277 VAC  Range: 192 VDC to 400 VDC Nominal: 240 VDC to 380 VDC  <i>Power</i>  90 VAC to 132 VAC: 1450W 180 VAC to 305 VAC: 2870W  192 VDC to 400 VDC: 2870W
	In-rush current	35A maximum, peak
Frequency	50 Hz to 60 Hz (Nominal: 50 Hz to 60 Hz)	



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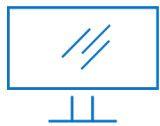
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