BROCADE DCX 8510 BACKBONE FAMILY

DATA CENTER

A Foundation for Private Cloud Storage Networks

HIGHLIGHTS

- Unleashes the full potential of private cloud storage with unmatched scalability, performance, and reliability
- Enables simpler, flatter, low-latency chassis connectivity to reduce network complexity, management, and costs
- Optimizes data center connectivity over distance with integrated high-performance metro and global connectivity
- Simplifies and centralizes end-to-end SAN management with comprehensive diagnostics, monitoring, and automation
- Maximizes performance for I/O- and bandwidth-intensive applications
- Protects investments in existing SAN fabrics and automation tools while reducing operational costs and minimizing business disruption

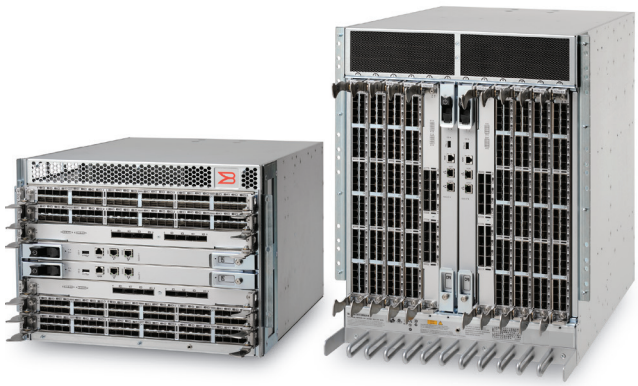
Brocade® DCX® 8510 Backbones are the industry's most powerful Fibre Channel switching infrastructure, providing the most reliable, scalable, high-performance foundation for private cloud storage and highly virtualized environments. They are designed to increase business agility while providing non-stop access to information and reducing infrastructure and administrative costs.

Networks need to evolve in order to support the growing demands of highly virtualized environments and private cloud architectures. Fibre Channel, the de facto standard for storage networking, is evolving with the data center. The introduction of Brocade DCX 8510 Backbones with 16 Gbps Fibre Channel delivers a new level of scalability and advanced capabilities to this robust, reliable, and high-performance technology. This enables organizations to continue leveraging their existing IT investments as they grow their businesses. In addition, they can consolidate their Storage Area Network (SAN) infrastructures to simplify management and reduce operating costs.

MAXIMUM FLEXIBILITY AND RELIABILITY

Brocade DCX 8510 Backbones are available in two modular form factors. Built for large enterprise networks, the 14U Brocade DCX 8510-8 has eight vertical blade slots to provide up to 384 16 Gbps Fibre Channel ports. Built for midsize networks, the 8U Brocade DCX 8510-4 has four horizontal blade slots to provide up to 192 16 Gbps Fibre Channel ports. The Brocade DCX 8510 family supports 2, 4, 8, 10, and 16 Gbps Fibre Channel, FICON®, and 1/10 Gbps Fibre Channel over IP (FCIP).

The Brocade One® strategy helps simplify networking infrastructures through innovative technologies and solutions. The Brocade DCX 8510 Backbone family supports this strategy by providing the foundation for cloud-optimized networks and highly virtualized data centers.



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BROCADE

To help minimize downtime costs, Brocade DCX 8510 Backbones build upon years of innovation and leverage the core technology of Brocade systems performing at greater than 99.999 percent uptime in the world's most demanding data centers.

SIMPLIFIED SCALE-OUT NETWORK DESIGN

Networks are evolving in order to adapt to rapid growth and change in the server and storage infrastructure. New optical Inter-Chassis Links (ICLs) can connect up to 10 Brocade DCX 8510 Backbones, enabling flatter, faster, and simpler fabrics that increase consolidation while reducing network complexity and costs.

ICLs enable scalable core-edge and active-active mesh chassis topologies. These high-density chassis topologies reduce inter-switch cabling by 75 percent and free up to 33 percent of ports for server and storage. This maximizes overall port density in the lowest amount of rack space.

OPTIMIZED DATA CENTER CONNECTIVITY OVER DISTANCE

Connecting distributed data centers enables data mobility for advanced data protection solutions. Brocade DCX 8510 Backbones include integrated metro and global SAN extension that provides application agility and flexible business continuity and disaster recovery solutions.

The Brocade DCX 8510 family enables high-speed replication and backup solutions over metro or WAN links with native Fibre Channel (10/16 Gbps) and optional FCIP (1/10 GbE) extension support. The integrated metro connectivity includes in-flight compression and encryption to optimize bandwidth and minimize the risk of unauthorized access.

SIMPLIFIED DEPLOYMENT AND CENTRALIZED MANAGEMENT

Automating and simplifying SAN management enables data centers to quickly adapt to change and overcome disruptions in a private cloud infrastructure. Brocade DCX 8510 advanced diagnostics, monitoring, and management reduce end-to-end SAN management complexities and costs.

The Brocade DCX 8510 helps reduce operating costs through simpler server provisioning and change management, advanced cable and optics diagnostics, and comprehensive management. Several technologies support these capabilities, including:

- **Dynamic Fabric Provisioning:** Combines Brocade backbone and adapter technology to reduce or eliminate the need to reconfigure zoning and Logical Unit Number (LUN) masking when adding or replacing servers
- **Diagnostic Ports (D_Ports):** Help identify and isolate optics and cable problems, reducing fabric deployment and diagnostic times
- **Brocade Network Advisor:** Provides comprehensive management of data center fabrics, including configuration, monitoring, and management of Brocade backbones, switches, and adapters

INDUSTRY-LEADING PERFORMANCE

Emerging and evolving critical workloads and higher density virtualization are continuing to push the limits of SAN infrastructure. The Brocade DCX 8510 features industry-leading 16 Gbps performance and 8.2 Tbps chassis bandwidth to address next-generation I/O- and bandwidth-intensive applications.

Brocade DCX 8510 Backbones provide unmatched chassis, slot-to-slot, and port performance and bandwidth. In addition, local switching capabilities ensure that data traffic within the same port group does not consume slot bandwidth, maximizing the number of line-rate ports. Performance capabilities include:

- Brocade DCX 8510-8:
  - Up to 384 ports (equivalent to 512 with ICLs) at 16 Gbps
  - 8.2 Tbps chassis bandwidth
    - 6.1 Tbps universal ports
    - 2.1 Tbps ICL bandwidth
  - 512 Gbps bandwidth per slot
- Brocade DCX 8510-4:
  - Up to 192 ports (equivalent to 256 with ICLs) at 16 Gbps
  - 4.1 Tbps chassis bandwidth
    - 3.1 Tbps universal ports
    - 1 Tbps ICL bandwidth
  - 512 Gbps bandwidth per slot

ENTERPRISE-CLASS RELIABILITY, AVAILABILITY, AND SERVICEABILITY

The Brocade DCX 8510 features advanced monitoring, diagnostics, and RAS capabilities to maximize availability, optimize performance, and simplify administration. These enterprise-class features include:

- Critical diagnostic and monitoring capabilities to help ensure early problem detection and recovery
- Non-intrusive and non-disruptive monitoring on every port to provide a comprehensive end-to-end view of the entire fabric
- Forward Error Correction (FEC) to recover from bit errors in ISLs, enhancing transmission reliability and performance
- Additional buffers to overcome performance degradation and congestion due to buffer credit loss
- Real-time bandwidth consumption by hosts/applications on ISLs to easily identify hot spots and potential network congestion

UNMATCHED MAINFRAME TECHNOLOGY INNOVATION AND LEADERSHIP

The Brocade DCX 8510 matches the highest-performing and most reliable FICON infrastructure with the industry's fastest and most scalable System z mainframes. Brocade builds on more than 25 years of mainframe leadership that includes designing the FICON standard and authoring many FICON patents.

BROCADE GLOBAL SERVICES

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 15 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, and education services, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

BROCADE DCX 8510 BACKBONE SPECIFICATIONS

Systems Architecture	
Chassis	Single chassis: Up to 384 (Brocade DCX 8510-8) or 192 (Brocade DCX 8510-4) 16 Gbps universal (E, F, D, M, and EX) Fibre Channel ports using 48-port 16 Gbps Fibre Channel blades. Up to 512 (Brocade DCX 8510-8) or 256 (Brocade DCX 8510-4) 8 Gbps universal (E, F, D, M, and EX) Fibre Channel ports using 64-port 8 Gbps Fibre Channel blades. Multi-chassis with ICL ports: Up to 3456 16 Gbps universal Fibre Channel ports (using 16 Gbps 48-port blades); up to 4608 8 Gbps universal Fibre Channel ports (using 8 Gbps 64-port blades); ICL ports (32 or 16 per chassis, optical QSFP) connect up to nine chassis in a full mesh topology or up to 10 chassis in a core-edge topology. Connecting five or more chassis via ICLs requires an Enterprise ICL license.
Control processor	Redundant (active/standby) control processor modules
Scalability	Full fabric architecture of 239 switches
Certified maximum	6000 active nodes; 56 switches, 19 hops in Brocade Fabric OS® fabrics; 31 switches, three hops in Brocade M-EOS fabrics; larger fabrics certified as required
Special-purpose blades	Brocade FS8-18 Encryption Blade provides plug-in encryption of data on disk or tape, supporting industry-standard AES-256 and DataFort-compatible encryption mode (16 8 Gbps Fibre Channel ports; up to four blades; requires Brocade Network Advisor). Brocade FX8-24 Extension Blade provides SAN extension over IP networks (12 8 Gbps Fibre Channel ports, 10 1 GbE ports with license option for up to two 10 GbE ports per blade; up to four blades).
Performance	Fibre Channel: 2.125 Gbps line speed, full duplex; 4.25 Gbps line speed, full duplex; 8.5 Gbps line speed, full duplex; 10.53 Gbps line speed, full duplex; 14.025 Gbps line speed, full duplex; auto-sensing of 2, 4, 8, and 16 Gbps port speeds; 10 Gbps and optionally programmable to fixed port speed
ISL trunking	Frame-based trunking with up to eight 16 Gbps ports per ISL trunk; up to 128 Gbps per ISL trunk Exchange-based load balancing across ISLs with DPS included in Brocade Fabric OS
Chassis bandwidth	Brocade DCX 8510-8: 8.2 Tbps per chassis (384 ports × 16 Gbps data rate + 2.048 Tbps ICL bandwidth) Brocade DCX 8510-4: 4.1 Tbps per chassis (192 ports × 16 Gbps data rate + 1.024 Tbps ICL bandwidth)
Slot bandwidth	512 Gbps (data rate)
Local switching bandwidth	512 Gbps for Brocade FC16-32: 32 ports × 16 Gbps (data rate) 768 Gbps for Brocade FC16-48: 48 ports × 16 Gbps (data rate) 256 Gbps for Brocade FC8-32E: 32 ports × 8 Gbps (data rate) 384 Gbps for Brocade FC8-48E: 48 ports × 8 Gbps (data rate) 512 Gbps for Brocade FC8-64: 64 ports × 8 Gbps (data rate)
ICL bandwidth	Brocade DCX 8510-8: 2.048 Tbps; 32 ICL ports provide the equivalent of 128 16 Gbps ports. Each ICL port provides 64 Gbps bandwidth over a QSFP (4×16 Gbps) link. Brocade DCX 8510-4: 1.024 Tbps; 16 ICLs provide the equivalent of 64 16 Gbps ports. Each ICL port provides 64 Gbps bandwidth over a QSFP (4×16 Gbps) link. Both models: Frame-based trunking is enabled between four ICLs. DPS distributes exchanges across all frame trunks.
Switch latency	Locally switched port latency is 700 ns; blade-to-blade latency is 2.1 µsec; encryption/compression is 5.5 µsec per node; Forward Error Correction (FEC) adds 400 ns between E_Ports (enabled by default).
Maximum frame size	2112-byte payload
Frame buffers	8192 per 16-port group on 32-port blades and up to 8192 per 24-port group on 48-port blades, dynamically allocated
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Fibre Channel port types	D_Port (Diagnostic Port), E_Port, EX_Port, F_Port, M_Port (Mirror Port); self-discovery based on switch type (U_Port); optional port type control
Data traffic types	Fabric switches supporting unicast
Media types	16 Gbps: Brocade FC16-32 and -48 require Brocade hot-pluggable SFP+, LC connector; 16 Gbps SWL, LWL 10 Gbps: Brocade FC16-32 and -48 require Brocade hot-pluggable SFP+, LC connector; 10 Gbps SWL, LWL 8 Gbps: Brocade FC16-32 and -48; Brocade FC8-32E and -48E; Brocade FX8-24; and Brocade FS8-18 blades require Brocade hot-pluggable SFP+, LC connector; 8 Gbps SWL, LWL, ELWL 8 Gbps: Brocade FC8-64 blades require Brocade hot-pluggable mSFP, mSFP LC connector; 8 Gbps SWL only ICL QSFP: Brocade CR16-8 and CR16-4 require Brocade hot-pluggable QSFP, MTP connector; 4×16 Gbps SWL Fibre Channel distance subject to fiber-optic cable and port speed
USB	1 USB port per control processor for firmware download, support save, and configuration upload/download
Fabric services	Brocade Advanced Performance Monitoring (APM) (including Top Talkers for E_Ports, F_Ports, and Fabric mode); Brocade Adaptive Networking (Ingress Rate Limiting, Traffic Isolation, QoS); Bottleneck Detection; Brocade Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning); Dynamic Fabric Provisioning (DFP); Dynamic Path Selection (DPS); Brocade Extended Fabrics; Enhanced BB credit recovery; Brocade Fabric Watch; FDMI; Frame Redirection; Frame-based Trunking; FSPF; Integrated Routing; IPoFC; Brocade ISL Trunking; Management Server; NPIV; NTP v3; Port Fencing; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Brocade Server Application Optimization (SAO); Simple Name Server (SNS); Virtual Fabrics (Logical Switch, Logical Fabric)
Extension	Supports DWDM, CWDM, and FC-SONET devices; Fibre Channel, in-flight compression (Brocade LZO) and encryption (AES-GCM-256) BB credit recovery; FCIP, Adaptive Rate Limiting (ARL), data compression, Fast Write, read/write Tape Pipelining, QoS
FICON	FICON cascading (Brocade Fabric OS: Brocade DCX 8510-8, DCX 8510-4); support for lossless DLS; FICON CUP; Advanced Accelerator for FICON (FICON Global Mirror and XRC emulation and read/write Tape Pipelining). The Brocade FC8-64 blade does not support FICON.
High Availability	
Architecture	Passive backplane; redundant active/passive control processor; redundant active/active core switching blades; redundant WWN cards
Chassis power	Two 2000 W AC power supply modules (100 to 240 V auto-sensing), 2N redundancy; Brocade DCX 8510-8 supports two additional power modules
Cooling	Brocade DCX 8510-8: Three blower assembly modules (two required for operation) Brocade DCX 8510-4: Two blower assembly modules (one required for operation)

Solution availability	Designed to provide 99.999 percent 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	HTTP, SNMP v1/v3 (FE MIB, FC Management MIB), SSH; Auditing, Syslog; Brocade Advanced Web Tools, Brocade APM, Brocade Fabric Watch; Brocade Network Advisor SAN Enterprise (Brocade DCX 8510-8, Brocade DCX 8510-4) or Brocade Network Advisor SAN Professional/Professional Plus (Brocade DCX 8510-4 only); Command Line Interface (CLI); SMI-S compliant; Administrative Domains; 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 L2-compliant, HTTPS, IPsec, IP filtering, LDAP with IPv6, Port Binding, RADIUS, User-defined Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, SFTP, SSH v2, SSL, Switch Binding, Trusted Switch
Management access	10/100/1000 Ethernet (RJ-45) per control processor, in-band over Fibre Channel; serial port (RJ-45) and one USB per control processor module; call-home integration enabled through Brocade Network Advisor
Diagnostics	D_Port offline diagnostics, including electrical/optical loopback, link traffic/latency/distance; POST and embedded online/offline diagnostics, including environmental monitoring, FCping and Pathinfo (FC traceroute), frame viewer, non-disruptive daemon restart, port mirroring, optics health monitoring, power monitoring (16 Gbps blades-only), RAStrace logging, and Rolling Reboot Detection (RRD)

Mechanical Specifications

Enclosure	Rear panel-to-door airflow; Brocade DCX 8510-4 ships with 1U exhaust shelf
Mounting	Rack-mountable in a standard 19-inch EIA cabinet
Size	Brocade DCX 8510-8 Width: 43.74 cm (17.22 in.) Height: 61.24 cm (24.11 in., 14U) Depth (without door): 61.19 cm (24.09 in.) Depth (with door): 73.20 cm (28.82 in.) Brocade DCX 8510-4 Width: 43.74 cm (17.22 in.) Height: 35.00 cm (13.78 in., 8U) plus 4.37 cm exhaust shelf (1.72 in, 1U) Depth without door: 61.19 cm (24.09 in.) Depth with door: 73.20 cm (28.82 in.)
System weight	Brocade DCX 8510-8 103.50 kg (228.20 lb) for 384-port configuration fully populated 39.55 kg (82.20 lb) for chassis Brocade DCX 8510-4 68.04 kg (150.00 lb) for 192-port configuration fully populated 25.76 kg (56.80 lb) for chassis

Environment

Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating: –25°C to 70°C (–13°F to 158°F)
Humidity	Operating: 20% to 85% RH non-condensing at 40°C (104°F) Non-operating and storage (non-condensing): 10% to 93% at 70°C (158°F)
Altitude	Up to 3000 meters (9842 feet)
Shock	Operating: 20 g, 6 ms, half sine Non-operating: 33 g, 11 ms, half sine
Vibration	Operating: 0.5 g p-p, 5 to 500 Hz Non-operating: 2.0 g p-p, 5 to 500 Hz
Heat dissipation	Brocade DCX 8510-8 Min: 32-port configuration (no QSFP), 986 W, 3365 BTU/hr Max: 384-port configuration (fully loaded with QSFPs), 2429 W, 8283 BTU/hr Brocade DCX 8510-4 Min: 32-port configuration, 713 W, 2433 BTU/hr Max: 192-port configuration (fully loaded with QSFPs), 1347 W, 4592 BTU/hr
CO_2 emissions	Brocade DCX 8510-8 7.8 metric tonnes per year (with 384 ports at 0.42 kg/kWh) 0.95 kg per Gbps per year Brocade DCX 8510-4 4.3 metric tonnes per year (with 256 ports at 0.42 kg/kWh) 1.04 kg per Gbps per year

Power

Supported power range	Voltage Range: 85 to 264 VAC Auto-volt Nominal: 100 to 240 VAC Power 85 to 132 VAC: 1000 W 180 to 264 VAC: 2000 W
In-rush current	20 Amps maximum, peak
Frequency	47 to 63 Hz (Nominal: 50 to 60 Hz)

For information about supported SAN standards, visit www.brocade.com/sanstandards.

For information about switch and device interoperability, visit www.brocade.com/interoperability.

For information about hardware regulatory compliance, visit www.brocade.com/regulatorycompliance.

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