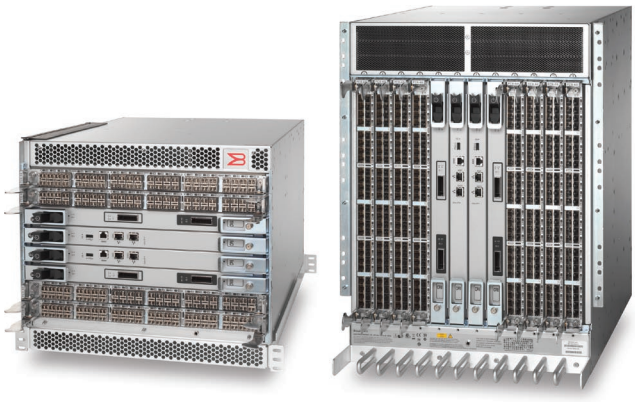
Brocade DCX Backbone Family

A platform for Evolving Data Center Fabrics



Highlights

- Provides a highly robust 8Gb platform in two modular form factors for enterprise data centers supporting open system and System z environments
- Delivers over four times the performance of competitive offerings to meet data growth and access demands, expand virtualization, and consolidate resources
- Provides a future-built multi-protocol architecture for consolidating server connectivity as low-latency, lossless technology options such as FCoE and CEE emerge
- Delivers ten times the energy efficiency of competitive offerings, enabling data centers to support more server and storage equipment
- Offers fabric-based applications, including secure data encryption and Adaptive Networking that helps optimize fabric behavior and maximize service levels
- Enables logical partitioning of platforms and fabrics into virtual data and management domains without sacrificing performance, scalability, security, or reliability
- Extends ROI by operating natively with Brocade B-Series and M-Series fabrics, and with common management tools

Brocade® DCX® Backbones are highly robust network switching platforms that combine breakthrough performance, scalability, and energy efficiency with long-term investment protection. Supporting open systems and System z environments, Brocade DCX Backbones are designed to address the data growth and application demands of evolving enterprise data centers; enable server, SAN, and data center consolidation; and reduce infrastructure and administrative costs.

Choice at the core and at the edge

Brocade DCX Backbones are available in two modular form factors. Built for large enterprise networks, the 14U Brocade DCX has eight vertical blade slots to provide up to 384 Fibre Channel ports using Brocade-branded 4Gb or 8Gb SFPs. Built for midsize networks, the 8U Brocade DCX-4S has four horizontal blade slots to provide up to 192 Fibre Channel ports.

Both models feature ultra-high-speed Inter-Chassis Link (ICL) ports to connect two backbones, providing extensive scalability and flexibility at the network core. At the network edge, organizations can utilize Brocade 8Gb switches, Brocade 48000 Directors, or—for complete backbone-class capabilities—the Brocade DCX-4S.

Highest performance and scalability

Both Brocade DCX models provide 256 Gbit/sec of bandwidth per slot (512 Gbit/sec aggregate data rate). When combined with unique Brocade local switching capabilities—data traffic within the same port group does not consume slot bandwidth—the Brocade DCX family provides over four times the performance of competitive offerings. Performance capabilities include:

Brocade DCX:

- 384 ports operating simultaneously at full 8Gb speed
- 3 Tbit/sec of chassis bandwidth
- 512 Gbit/sec of ICL bandwidth (freeing up to 64 8Gb ports per chassis for server, storage, and fabric connections)

Brocade DCX-4S:

- 192 ports operating simultaneously at full 8Gb speed
- 1.5 Tbit/sec of chassis bandwidth
- 256 Gbit/sec of ICL bandwidth (freeing up to 32 8Gb ports per chassis)

FLEXIBLE, MULTIPROTOCOL ARCHITECTURE

Brocade DCX Backbones include a Virtual Fabrics feature that enables partitioning of a physical SAN into logical fabrics and isolation by application, business group, customer, or traffic type. Optional Fibre Channel Integrated Routing alleviates the need for special-purpose blades or routers to connect servers and storage in separate fabrics. And optional SAN extension over long-distance IP connections accelerates offsite replication, backup, and restore.

The Brocade DCX family supports 1/2/4/8/10Gb Fibre Channel and FICON,® FCIP, and IPFC. To consolidate server connectivity using emerging Fibre Channel over Ethernet (FCoE) and Converged Enhanced Ethernet (CEE), organizations will simply be able to add a planned FCoE/CEE blade or connect to a planned FCoE/CEE top-of-rack switch.

Plug-in fabric-based applications

The Brocade FA4-18 Application Blade delivers continuous data protection without impacting server resources through tight third-party application integration. Transparent Frame Redirection enables implementation of fabric-based applications using current zoning practices and across heterogeneous environments.

Intelligent management and monitoring

To help maximize network performance and reduce operational expense, Brocade Data Center Fabric Manager (DCFM™) provides intuitive system configuration, comprehensive management, and a topology-centric view across Brocade data center solutions. Brocade DCFM Enterprise supports both backbone models, while the no-cost Brocade DCFM Professional supports the Brocade DCX-4S.

Traffic measurement and adaptive networking

The Brocade DCX family offers Top Talkers (part of Advanced Performance Monitoring) and Adaptive Networking, a suite of tools including Ingress Rate Limiting, Traffic Isolation, and QoS. Managed through DCFM or a command line interface, these advanced capabilities help optimize fabric behavior and ensure ample bandwidth for critical applications.

Top Talkers measures the top bandwidth-consuming traffic in real time over a physical device connection or throughout a network switch. Ingress Rate Limiting restricts data flow from less-critical hosts at preset bandwidths. Traffic Isolation dedicates paths in the fabric to high-bandwidth data flows. And QoS expedites critical traffic in the event of congestion while keeping all traffic flowing.

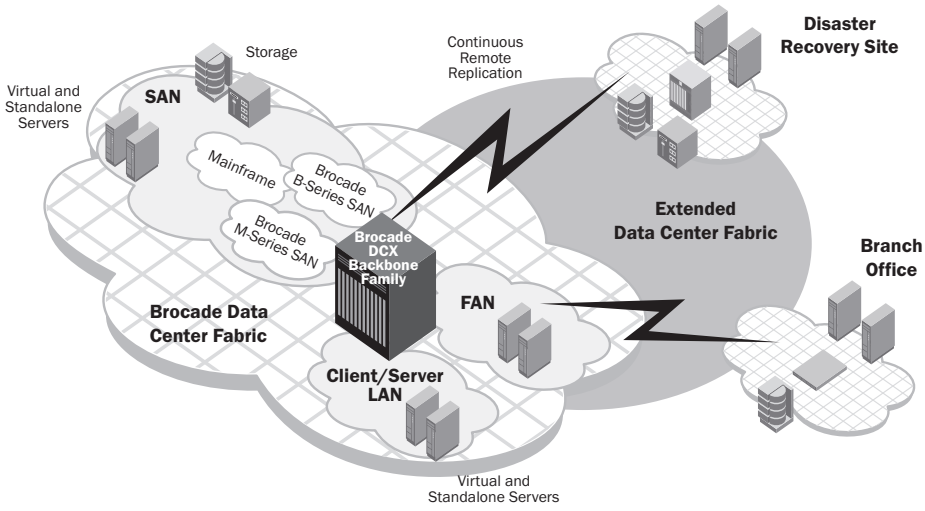


Figure 1. Brocade DCX Backbones provide the core platform of the Brocade Data Center Fabric (DCF) architecture.

Energy efficiency, reliablity, and investment protection

Brocade DCX Backbones are highly effective at reducing power consumption, cooling, and carbon footprint in data centers. While providing unmatched performance and scale, both models use less than one-half watt per Gbit/sec—making them 10 times more efficient than competitive offerings.

To help minimize downtime costs, the Brocade DCX family builds upon years of innovation and leverages the core technology of Brocade systems performing at greater than 99.999 percent uptime in the world's most demanding data centers. And to maximize return on existing investments, Brocade DCX Backbones connect natively to Brocade B- and M-Series fabrics without disruption. Unlike competitive offerings that claim interoperability through reverse engineering, Brocade enables expansion and consolidation of existing fabrics with minimum risk or training.

Complete, best-in-class solutions

Through longstanding partner relationships and extensive compatibility testing, Brocade provides organizations with broad choice to implement best-in-class solutions. Moreover, Brocade and its partners offer complete solutions that include cable management, education, support, and services. For more information, contact a Brocade sales partner or visit www.brocade.com.

Brocade DCX Backbone Specifications

System Architecture

Chassis	• Single chassis: Up to 384 (Brocade DCX) or 192 (Brocade DCX-4S) 8Gb universal (E, F, FL, M, EX) Fibre Channel ports using up to eight 16-, 32-, or 48-port Fibre Channel blades Dual-chassis: Up to 768 (Brocade DCX) or 384 (Brocade DCX-4S) 8Gb universal Fibre Channel ports; ICL ports (four per chassis, copper pin) connect two Brocade DCX chassis, two Brocade DCX-4S chassis, or a Brocade DCX-4S chassis to a Brocade DCX chassis
Scalability	• Redundant (active/standby) control processor modules
Certified Maximum	• 6000 active nodes; 56 switches, 19 hops in Brocade FOS fabrics; 31 switches, 3 hops in Brocade M-EOS fabrics; larger fabrics certified as required
Special-purpose blades	• FC10-6 Blade provides six 10Gb Fibre Channel ports (up to eight blades • FR4-18i SAN Extension Blade provides Fibre Channel routing and SAN extension over IP networks (16 4Gb Fibre Channel ports and two Gigabit Ethernet ports per blade; up to eight blades and 64 EX_Ports) • FA4-18 Application Blade is integrated with EMC RecoverPoint to provide continuous data protection (16 4Gb Fibre Channel ports and two Gigabit Ethernet ports per blade; up to four blades)
Performance	• 1.063 Gbit/sec line speed, full duplex; 2.125 Gbit/sec line speed, full duplex; 4.25 Gbit/sec line speed, full duplex; 8.50 Gbit/sec line speed, full duplex; auto sensing of 1, 2, 4, and 8Gb port speeds; optionally programmable 1, 2, 4, and 8Gb ports; 10.5 Gbit/sec line speed, full duplex
ISL Trunking	• Frame-based trunking with up to eight 8Gb ports per ISL trunk; up to 64 Gbit/sec per ISL trunk Exchange-based load balancing across ISLs with DPS included in Fabric OS
Chassis bandwidth	• Brocade DCX: 3.072 Tbit/sec per chassis (384 ports x 8 Gbit/sec data rate) Brocade DCX-4S: 1.536 Tbit/sec per chassis (192 ports x 8 Gbit/sec data rate)
Slot bandwidth	• 256 Gbit/sec (data rate)
Local switching	• 128 Gbit/sec for FC8-16: 16 ports x 8 Gbit/sec (data rate) • 256 Gbit/sec for FC8-32: 32 ports x 8 Gbit/sec (data rate) • 384 Gbit/sec for FC8-48: 48 ports x 8 Gbit/sec (data rate)
ICL bandwidth	• Brocade DCX: 512 Gbit/sec; 4 ICLs x 16 8Gb Fibre Channel connections • Brocade DCX-4S: 256 Gbit/sec; 4 ICLs x 8 8Gb Fibre Channel connections • Both models: ICL bandwidth is load balanced using eight 8-port frame-based trunks and DPS
Switch latency	• Locally switched ports 700 ns; blade-to-blade latency is 2.1 µsec
Maximum frame size	• 2112-byte payload
Frame buffers	• 2048 per 16-port group on 16/32-port blades and up to 2048 per 24-port group on 48-port blades, dynamically allocated
Classes of service	• Class 2, Class 3, Class F (inter-switch frames)
Port types	• FL_Port (except FC8-48), F_Port, M_Port (Mirror Port), E_Port, EX_Port (Fibre Channel Integrated Routing); self-discovery based on switch type (U_Port); optional port type control
Data traffic types	• Fabric switches supporting unicast, multicast (255 groups), and broadcast
Media types	• 4Gb: FC8-16, -32, and -48; FR4-18i; FA4-18; and FS8-18 blades require Brocade hot-pluggable, Small Form-factor Pluggable (SFP), LC connector; 4Gb Short-Wavelength Laser (SWL); 4Gb Long-Wavelength Laser (LWL); 4Gb Extended Long-Wavelength Laser (ELWL) • 8Gb: FC8-16, -32, and-48; and FS8-18 blades require Brocade hot-pluggable SFP+, LC connector; 8Gb SWL; 8Gb LWL • 10Gb: FC10-6 blades utilize non-Brocade hot-pluggable, 10Gb Small Form Factor Pluggable (XFP), LC connector; 10Gb SWL; 10Gb LWL • 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	• Advanced Performance Monitoring (including Top Talkers); Adaptive Networking (Ingress Rate Limiting, Traffic Isolation, QoS); BB credit recovery; Brocade Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning); Dynamic Path Selection (DPS); Extended Fabrics; Fabric Watch; FDMI; Frame Redirection; FSPF; Integrated Routing (FR4-18i SAN Extension blade not required for routing); IPoFC; ISL Trunking; Management Server; N_Port Trunking; NPIV; NTP v3; Port Fencing; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Simple Name Server (SNS); Virtual Fabrics (Logical Switch, Logical Fabric)
Extension	• Supports DWDM, CWDM, and FC-SONET devices; FCIP, data compression, Fast Write, Tape Write and Read Pipelining, QoS, BB credit recovery
FICON	• FICON, FICON cascading (FOS: Brocade DCX, DCX-4S; and M-EOS: Brocade DCX only), FICON CUP; Brocade Accelerator for FICON (FICON XRC emulation and read/write Tape Pipelinings

High Availability

Architecture	• Passive backplane; separate and redundant control processor and core switching blades (two of each); redundant WWN cards
Chassis power	• Two 2000 W AC power supply modules (100 to 240 V auto-sensing), 2N redundancy; Brocade DCX supports two additional power modules
Cooling	• Brocade DCX: Three blower assembly modules (two required for operation • Brocade DCX-4S: 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

Brocade DCX Backbone Specifications

Management

Ports	• HTTP, SNMP v1/v3 (FE MIB, FC Management MIB), Telnet; Auditing, Syslog; Brocade Advanced Web Tools, Brocade Fabric Watch; Brocade Data Center Fabric Manager (DCFM) Enterprise (Brocade DCX, DCX-4S) or DCFM Professional (Brocade DCX-4S only), Brocade Fabric Manager (optional, FOS environments only), Brocade EFCM 9.x (optional), command line interface; SMI-S compliant; Administrative Domains; trial licenses for add-on capabilities
Security	• DH-CHAP (between switches and end devices), FIPS 140-2 L2-compliant, HTTPS, IPsec, IP filtering, LDAP, Port Binding, RADIUS, Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, 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 DCFM, EFCM, and Fabric Manager
Diagnostics	• POST and embedded online/offline diagnostics, including RAStrace logging, environmental monitoring, non-disruptive daemon restart, FCping and Pathinfo (FC traceroute), port mirroring (SPAN port)

Mechanical Specifications

Enclosure	• Rear panel-to-door airflow; Brocade DCX-4S ships with 1U exhaust shelf
Mounting	• Rack-mountable in a standard 19-inch EIA cabinet
Size	• Brocade DCX 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-4S 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	• 13.7 kg (30.2 lb) with two power supplies, no SFPs

Environmentals	Operating	Non-Operating
Temperature	• 0°C to 40°C (32° F to 104° F)	-25°C to 70°C (–13° F to 158° F)
Humidity	• 20 to 85%, RH non-condensing at 40°C (104° F)	10 to 93%, non-condensing at 70°C (158° F)
Altitude	• Up to 3000 meters (9842 feet)	
Shock	• 20 g, 6 ms, half sine	33 g, 11 ms, half sine
Vibration	• 0.5 g p-p (5-500-5Hz)	2.0 g p-p (5-500-5Hz)
Heat dissipation	• Brocade DCX Min: 16-port configuration of 505 W, 1722 BTU/hr Max: 384-port configuration of 1337 W, 4564 BTU/hr • Brocade DCX-4S Min: 16-port configuration of 363 W, 1239 BTU/hr Max: 192-port configuration of 753 W, 2570 BTU/hr	
CO_2 emissions	• Brocade DCX 4.9 metric tonnes per year (with 384 ports at 0.42 kg/kWh) 1.6 kg per Gbit/sec per year • Brocade DCX-4S M2.8 metric tonnes per year (with 192 ports at 0.42 kg/kWh) 1.8 kg per Gbit/sec per year	

Power

AC input	• 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 currency	• 20 Amps maximum, peak
Frequency	• 47 to 63 Hz

Learn More

To learn more about the Brocade DCX Backbone Family, visit sun.com/storagetek/networking

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