

Brocade FC16-64 Port Blade



HIGHLIGHTS

- Increases port density by 33 percent for unmatched scalability and performance
- Optimizes data center connectivity with industry-standard, high-performance, energy-efficient QSFPs
- Eliminates issues from unexpected design changes by enabling a quick connection to structured cabling systems
- Delivers industry-leading performance, providing unmatched chassis, slot-to-slot, and port throughput and bandwidth
- Reduces energy expenditures with the industry's lowest power consumption
- Leverages Brocade Fabric Vision technology's powerful monitoring, management, and diagnostic tools to simplify administration, increase uptime, and reduce costs
- Helps pinpoint problems faster and simplify SAN configuration and management with customizable Brocade Network Advisor health and performance dashboard

Industry-Leading, High-Density Fibre Channel Port Blade

The Brocade® FC16-64, a high-density 64-port Fibre Channel port blade, combines industry-leading port density, performance, scalability, and reliability to maximize the benefits of SAN and server consolidation. With the Brocade FC16-64, mid-size to large enterprises can deploy high-density, modular chassis-based solutions that minimize their physical footprint without compromising performance. These Fibre Channel port blades increase chassis density by 33 percent over a chassis populated with 48 port blades, enabling the Brocade DCX® 8510-8 Backbone to scale up to 512 ports and the Brocade DCX 8510-4 to scale up to 256 ports with 16 Gbps performance. In addition, the Brocade FC16-64 Port Blade offers Gen 5 Fibre Channel performance, the industry's lowest power consumption, and, with Brocade Fabric Vision™ technology, extends Brocade Gen 5 Fibre Channel capabilities to maximize SAN reliability, availability, and management.

Effective, High-Density Cable Deployment

To reduce investment costs, energy consumption, and cabling requirements, the Brocade FC16-64 Port Blade uses a space-efficient, four-channel Quad Small Form-Factor Pluggable (QSFP) optic that enables high-density port configurations as well as improved serviceability and ease of use. These QSFPs retain all of the performance and functionality of the standard SFP+ while supporting individual, per-port LED indicators for easy troubleshooting and diagnostics.

The Brocade FC16-64 high-density port blade for the Brocade DCX 8510 Backbone family supports a large number of device ports with simplified cable connectivity. QSFP modules increase port density four times more than SFP+ modules and reduce the number of cables per blade from 64 to 16. As a result, 400 percent fewer cables are required, significantly reducing cable management challenges from previous high-density port blade designs. The QSFP form factor has been widely deployed across the networking industry for Ethernet and Fibre Channel (4x16 Gbps Brocade UltraScale Inter-Chassis Links) connectivity, making cabling options readily available.

The Brocade FC16-64 has 16 QSFP ports with each physical port interface logically configured as a 4x16 Gbps Fibre Channel port that complies with 14.025 Gbps Fibre Channel specifications, and maintains backward compatibility support for two previous generations of Fibre Channel specifications—8.5 Gbps and 4.25 Gbps. By using high-density and low-power QSFPs for connectivity, the Brocade FC16-64 Port Blade enables consolidation of physical ports and a 75 percent reduction in cables, which simplifies cable management and eases scalability for greater business agility.

Lowest Power Consumption

Brocade 4x16 Gbps SWL Fibre Channel-compliant QSFP optical transceivers are hot-swappable, low-voltage (3.3 V), digital diagnostic-capable optical transceivers that comply with the QSFP MSA mechanical specification (SFF-8436). QSFP optical transceivers provide the Brocade FC16-64 with state-of-the-art high density and 285 percent less power consumption than four standard SFPs (1.4 W vs. 4 W), the lowest power draw of any Fibre Channel switching blade. In fact, a Brocade DCX 8510 fully populated with eight Brocade FC16-64 Port Blades not only offers the highest port density, but also draws only 1,902 watts (0.19 W/Gbps). The closest competitive product requires over 40 percent more energy to power 25 percent fewer ports. Through the use of energy-efficient QSFPs, Brocade has enabled IT organizations to achieve new levels of infrastructure consolidation while reducing overall power consumption.

Optimized Data Center Connectivity

The Brocade FC16-64 uses QSFPs to facilitate best practices in structured cabling design. Using standard cables,

connections can start at the switch and terminate at the central cross connect, where all administration can be performed. This helps reduce overall costs and installation time, and increases flexibility for future scalability. Moreover, proper fiber connectivity design results in an end-to-end solution that is easier to maintain—helping to improve the availability of data center fabrics supporting mission-critical applications.

Simplified Management and Robust Network Analytics

Brocade Fabric Vision technology provides a breakthrough hardware and software solution that helps simplify monitoring, maximize network availability, and dramatically reduce costs. Featuring innovative monitoring, management, and diagnostic capabilities, Fabric Vision technology enables administrators to avoid problems before they impact operations, helping their organizations meet Service Level Agreements (SLAs). The Brocade FC16-64 Port Blade supports the following Brocade Fabric Vision technology features:

- **Monitoring and Alerting Policy Suite (MAPS):** Provides a pre-built, policy-based threshold monitoring and alerting tool that proactively monitors storage extension network health based on a comprehensive set of metrics per circuit. Administrators can configure multiple fabrics at one time using pre-defined or customized rules and policies for specific ports or switch elements.
- **Fabric Performance Impact (FPI) Monitoring:** Uses pre-defined thresholds and alerts in conjunction with MAPS to automatically detect and alert administrators to severe levels of latency, and identifies slow drain

devices that might impact the network. This feature uses advanced monitoring capabilities and intuitive MAPS dashboard reporting to indicate various latency severity levels, pinpointing exactly which devices are causing or are impacted by a bottlenecked port.

- **Dashboards:** Provides integrated dashboards that display an overall SAN health view, along with details on out-of-range conditions, to help administrators easily identify trends and quickly pinpoint issues occurring on a switch or in a fabric.
- **Brocade ClearLink Diagnostics:** Ensures optical and signal integrity for Gen 5 Fibre Channel optics and cables, simplifying deployment and support of high-performance fabrics.
- **Flow Vision:** Enables administrators to identify, monitor, and analyze specific application flows in order to simplify troubleshooting, maximize performance, avoid congestion, and optimize resources. Flow Vision includes:
 - **Flow Monitor:** Provides comprehensive visibility into flows across a storage extension network, including the ability to automatically learn flows and non-disruptively monitor flow performance. Administrators can monitor all flows from a specific storage device that is writing to or reading from a destination storage device or LUNs, or across a storage extension network. Additionally, they can perform LUN-level monitoring of specific frame types to identify resource contention or congestion that is impacting application performance.
- **Credit Loss Recovery:** Helps overcome performance degradation and congestion due to buffer credit loss.

Brocade Network Advisor

Brocade Network Advisor simplifies Gen 5 Fibre Channel management and helps users proactively diagnose and resolve issues to maximize uptime, increase operational efficiency, and reduce costs. The wizard-driven interface dramatically reduces deployment and configuration times by allowing fabrics, switches, and ports to be managed as groups. Customizable dashboards graphically display performance and health indicators out of the box, including all data captured using Brocade Fabric Vision technology. To accelerate troubleshooting, administrators can use dashboard playback to quickly review past events and identify problems in the fabric. In addition, dashboards and reports

can be configured to show only the most relevant data, enabling administrators to more efficiently prioritize their actions and maintain network performance.

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, network monitoring services, and education, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

Affordable Acquisition Options

Brocade Capital Solutions helps organizations easily address their IT requirements by offering flexible network acquisition and support alternatives. Organizations can select from purchase, lease, Brocade Network Subscription, and Brocade Subscription Plus options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.Brocade.com/Capital.

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 FC16-64 Specifications

System Architecture

Fibre Channel ports	16 QSFP ports (64 total ports); E_Ports, F_Ports, M_Ports, EX_Ports, and FL_Ports
Scalability	Full fabric architecture with 239 switches maximum
Certified maximum	6,000 active nodes; 56 switches, 19 hops in Brocade Fabric OS® fabrics; 31 switches, larger fabrics certified as required
Fibre Channel performance	Fibre Channel: 4.25 Gbps line speed, full duplex; 8.5 Gbps line speed, full duplex; 14.025 Gbps line speed, full duplex; auto-sensing of 4, 8, and 16 Gbps port speeds
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
Fibre Channel aggregate bandwidth	512 Gbps (data rate)
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	2,112-byte payload
Frame buffers	8,192 per 64-port blades, dynamically allocated
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Fibre Channel port types	E_Port, EX_Port, F_Port, M_Port (Mirror Port), and D_Port (limited ClearLink Diagnostic port capabilities); optional port type control
Cables supported	MTP/MPO to LC break-out cables and MTP/MPO to MTP/MPO standard cables
Data traffic types	Fabric switches supporting unicast
Media types	Brocade hot-pluggable QSFP connector; 4×16 Gbps SWL, MPO 1×12 ribbon cable connector (66 m OM3, 100 m OM4; Brocade FC16-64 QSFPs support only 4/8/16 Gbps [not 2 Gbps or 10 Gbps])

Brocade FC16-64 Specifications (continued)

Fabric services	Brocade Fabric Vision technology; Monitoring and Alerting Policy Suite (MAPS); Flow Vision; Brocade Adaptive Networking (Ingress Rate Limiting, Traffic Isolation, QoS); Fabric Performance Impact (FPI) Monitoring; Slow Drain Device Quarantine (SDDQ); Brocade Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning, peer zoning, target driven zoning); Dynamic Fabric Provisioning (DFP); Dynamic Path Selection (DPS); Brocade Extended Fabrics; Enhanced BB Credit Recovery; FDMI; Frame Redirection; Frame-based Trunking; FSPF; Integrated Routing; IPoFC; Brocade ISL Trunking; Management Server; NPIV; Time Server; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Simple Name Server (SNS); Virtual Fabrics (Logical Switch, Logical Fabric); Read Diagnostics Parameter (RDP)
Management	
Supported management software	HTTP, SNMP v1/v3 (FE MIB, FC Management MIB), SSH; Auditing, Syslog; Brocade Advanced Web Tools, Brocade Network Advisor SAN Enterprise or Brocade Network Advisor SAN Professional Plus; 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, OpenLDAP, Port Binding, RADIUS, user-defined Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, SFTP, SSH v2, SSL, Switch Binding, TACACS+, Trusted Switch
Diagnostics	Built-in flow generator, ClearLink cable diagnostics (no support for electrical/optical loopback), link traffic/latency/distance; POST and embedded online/offline diagnostics, including environmental monitoring, FCping and Pathinfo (FC traceroute), flow mirroring, frame viewer, non-disruptive daemon restart, port mirroring, optics health monitoring, power monitoring (16 Gbps blades-only), RAStace logging, and Rolling Reboot Detection (RRD)
Mechanical	
Size	Width: 3.6 cm (1.4 in.) Height: 42.1 cm (16.6 in.) Depth: 29.9 cm (11.8 in.) Occupies one slot in a Brocade DCX 8510 Backbone family chassis
System weight	3.56 kg (7.85 lb) without QSFP
Environmental	
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: 10% to 85% non-condensing Non-operating: 10% to 90% non-condensing
Altitude	Operating: Up to 3,000 m (9,842 ft) Storage: Up to 12 km (39,370 ft)
Shock	Operating: 20 g, 6 ms half-sine Non-operating: 33 g, 11 ms, half-sine, 3/eg axis
Vibration	Operating: 0.5 g sine, 0.4 grms random, 5 to 500 Hz Non-operating: 2.0 g sine, 1.1 grms random, 5 to 500 Hz
Power	
Maximum power	118 watts when fully populated with 16 standard SWL QSFP 134 watts maximum power consumption

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