BROCADE 6510 FIBRE CHANNEL SWITCH

The Brocade 6510 Fibre Channel Switch delivers industry-leading 16 Gb/sec performance within a flexible, cost-effective, and easy-to-use 1U form factor. Additionally, the Brocade 6510 Fibre Channel Switch provides exceptional price/performance for growing SAN workloads as well as a critical building block for highly virtualized, private cloud storage environments.

Flexible, Easy-to-Use Enterprise-Class SAN Switch for Private Cloud Storage

To remain competitive, IT organizations must keep pace with ever-increasing workloads without a similar increase in their budgets or resources. While virtualization has provided some relief by enabling the benefits of faster deployment and consolidation, it also tends to put additional stress on data center networks. In addition, the move toward cloud computing, which promises greater efficiency and a more service-oriented business model, means that these networks will face even greater demands.

The Brocade 6510 Fibre Channel Switch meets the demands of hyper-scale, private cloud storage environments by delivering market-leading 16 Gb/sec Fibre Channel (FC) technology and capabilities that support highly virtualized environments. Designed to enable maximum flexibility and investment protection, the Brocade 6510 Fibre Channel Switch is configurable in 24, 36, or 48 ports and supports 2, 4, 8, 10, or 16 Gb/sec speeds in an efficiently designed 1U package. It also provides a simplified deployment process and a point-and-click user interface—making it both powerful and easy to use. The Brocade 6510 Fibre Channel Switch offers low-cost access to industry-leading SAN technology while providing pay-as-you-grow scalability to meet the needs of an evolving storage environment.

Exceptional Price/Performance for Growing SAN Workloads

The Brocade 6510 Fibre Channel Switch delivers exceptional price/performance for growing SAN workloads through a combination of market-leading throughput and an affordable switch form factor. The 48 ports produce an aggregate 768 Gb/sec full-duplex throughput; up to eight 16 Gb links can be combined to form a single 128 Gb trunk group. Exchange-based Dynamic Path Selection (DPS) optimizes fabric-wide performance and load balancing by automatically routing data to the most efficient available path in the fabric (see Figure 1). It augments Inter-Switch Link (ISL) trunking to provide more effective load balancing in certain configurations.

Moreover, a 24-port base configuration, easy administration, 1U footprint, and low-energy consumption—0.14 watts per Gb/sec and 2.3 watts per port—provide a low TCO. Enterprise-class capabilities combined with a low TCO yield 40 percent higher performance compared to 10 GbE storage alternatives at a similar cost.

Industry-Leading Technology That is Flexible, Simple, and Easy to Use

The Brocade 6510 Fibre Channel Switch delivers industry-leading SAN technology within a flexible, simple, and easy-to-use solution. The base configuration includes 24 ports, with up to 48 Ports on Demand. In addition to providing best-in-class scalability, the Brocade 6510 Fibre Channel Switch is easy to deploy with the Brocade EZSwitchSetup wizard and Diagnostic Port (D_Port) feature, which simplifies setup.
For maximum flexibility, the switch also features a 1U case less than 18 inches deep and dual-direction airflow options to support the latest hot aisle/cold aisle configurations.

Figure 1. Dynamic Path Selection (DPS) augments ISL trunking to route data efficiently among multiple trunk groups.

**A Building Block for Virtualized, Private Cloud Storage**

The Brocade 6510 Fibre Channel Switch provides a critical building block for today’s highly virtualized, private cloud storage environments. It simplifies server virtualization and virtual desktop infrastructure (VDI) management while meeting the high-throughput demands of solid state disks (SSDs). The Brocade 6510 Fibre Channel Switch also supports multitenancy in cloud environments through virtual fabrics, quality of service (QoS), and fabric-based zoning features.

The Brocade 6510 Fibre Channel Switch enables secure metro extension to virtual private or hybrid clouds with 10 Gb/sec dense wavelength division multiplexing (DWDM) link support, as well as in-flight encryption and data compression. The switch also features onboard data security and acceleration, minimizing the need for separate acceleration appliances to support distance extension. Internal fault-tolerant and enterprise-class RAS features help minimize downtime to support mission-critical cloud environments.

**Brocade Access Gateway Mode**

The Brocade 6510 Fibre Channel Switch can be deployed as a full-fabric switch or as a Brocade Access Gateway, which simplifies fabric topologies and heterogeneous fabric connectivity (the default mode setting is a switch). Access Gateway mode utilizes N_Port ID virtualization (NPIV) switch standards to present physical and virtual servers directly to the core of SAN fabrics. This makes it transparent to the SAN fabric, greatly reducing management of the network edge. The Brocade 6510 Fibre Channel Switch in Access Gateway mode* can connect servers to NPIV-enabled Brocade B-Series, Brocade M-Series, or other SAN fabrics.

Organizations can easily enable Access Gateway mode via Brocade Network Advisor or a command line interface. Key benefits of Access Gateway mode include:

- Improved scalability for large or rapidly growing server and virtual server environments.
- Reduced management of the network edge, since Access Gateway does not have a domain identity and appears transparent to the core fabric.
- Support for heterogeneous SAN configurations without reduced functionality for server connectivity.

*Access Gateway mode for the Brocade 6510 Fibre Channel Switch is supported only in 48-port configurations.
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Brocade 6510 Fibre Channel Switch Specifications

<table>
<thead>
<tr>
<th>Systems Architecture</th>
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<tbody>
<tr>
<td><strong>Fibre Channel ports</strong></td>
</tr>
<tr>
<td>* Switch mode (default): 24-, 36-, and 48-port configurations (12-port increments through Ports on Demand licenses); universal (E, F, M, D, EX) ports</td>
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<tr>
<td>* Brocade Access Gateway default port mapping: 40 F_Ports, 8 N_Ports</td>
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<tr>
<td><strong>Scalability</strong></td>
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<tr>
<td>* Full fabric architecture with a maximum of 239 switches</td>
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<tr>
<td><strong>Certified maximum</strong></td>
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<tr>
<td>* 6,000 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</td>
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<tr>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td>* Auto-sensing of 2, 4, 8, and 16 Gb/sec port speeds; 10 Gb/sec and optionally programmable to fixed port speed</td>
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<tr>
<td><strong>ISL trunking</strong></td>
</tr>
<tr>
<td>* Frame-based trunking with up to eight 16 Gb/sec ports per ISL trunk; up to 128 Gb/sec per ISL trunk. Exchange-based load balancing across ISLs with Dynamic Path Selection included in Fabric OS. There is no limit to how many trunk groups can be configured in the switch.</td>
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<tr>
<td><strong>Aggregate bandwidth</strong></td>
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<tr>
<td>* 768 Gb/sec end-to-end full duplex</td>
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<tr>
<td><strong>Maximum fabric latency</strong></td>
</tr>
<tr>
<td>* Latency for locally switched ports is 700 ns; encryption/compression is 5.5 µsec per node; forward error correction (FEC) adds 400 ns between E_Ports (enabled by default).</td>
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<tr>
<td><strong>Maximum frame size</strong></td>
</tr>
<tr>
<td>* 2112 byte payload</td>
</tr>
<tr>
<td><strong>Frame buffers</strong></td>
</tr>
<tr>
<td>* 8,192 dynamically allocated</td>
</tr>
<tr>
<td><strong>Classes of service</strong></td>
</tr>
<tr>
<td>* Class 2, Class 3, Class F (interswitch frames)</td>
</tr>
<tr>
<td><strong>Port types</strong></td>
</tr>
<tr>
<td>* Diagnostic Port (D_Port), E_Port, EX_Port, F_Port, M_Port (Mirror Port); self-discovery based on switch type (U_Port); optional port type control</td>
</tr>
</tbody>
</table>
**Brocade Access Gateway mode:** F_Port and NPIV-enabled N_Port

### Data traffic types
- Fabric switches supporting unicast

### Media types
- Hot-pluggable, industry-standard small form-factor pluggable (SFP+), LC connector; short wavelength (SWL), long wavelength (LWL); extended long wavelength (ELWL); distance depends on fiber optic cable and port speed. Supports SFP+ (2, 4, 8, 10, 16 Gb/sec) optical transceivers.

### USB
- One USB port for system log file downloads or firmware upgrades

### Fabric services
*Note: Some fabric services do not apply or are unavailable in Brocade Access Gateway mode.*
- 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); Extended Fabrics; Enhanced BB credit recovery; Brocade Fabric Watch; FDMI; Frame Redirection; Frame-based Trunking; FSPF; Integrated Routing; IPoFC; ISL Trunking; Management Server; NPIV; NTP v3; Port Fencing; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Server Application Optimization (SAO); Simple Name Server (SNS); Virtual Fabrics (Logical Switch, Logical Fabric)

### Extension
- Fibre Channel, in-flight compression (Brocade LZO) and encryption (AES-GCM-256); integrated 10 Gb/sec Fibre Channel for DWDM MAN connectivity

### Management

#### Supported management software
- HTTP, SNMP v1/v3 (FE MIB, FC Management MIB), SSH; Auditing, Syslog; Brocade Advanced Web Tools, APM, Brocade Fabric Watch; Brocade Network Advisor SAN Enterprise or Brocade Network Advisor SAN Professional/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, 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 Mb/sec Ethernet (RJ-45), in-band over Fibre Channel, serial port (RJ-45), and one USB port

#### 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 (SPAN port), optics health monitoring, power monitoring, RAStrace logging, and Rolling Reboot Detection (RRD)

### Mechanical Specifications

#### Enclosure
### Back-to-front airflow; power from back; 1U

**Size**
- Width: 438 mm (17.23 in.)
- Height: 43 mm (1.7 in.)
- Depth: 443 mm (17.45 in.)

**System weight**
- 9.16 kg (20.20 lb.) with two power supply FRUs, without transceivers

### Environment

**Operating environment**
- Temperature: 0–40°C
- Humidity: 10%–85% (non-condensing)

**Non-operating environment**
- Temperature: -25–70°C
- Humidity: 10%–90% (non-condensing)

**Operating altitude**
- Up to 3,000 m (9,842 ft.)

**Storage altitude**
- Up to 12 km (39,370 ft.)

**Shock**
- Operating: Up to 20 G, 6 ms half-sine
- Non-operating: Half sine, 33 G 11 ms, 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

**Heat dissipation**
- 48 ports at 338 BTU/hr.

### Power

**Power supply**
- Dual, hot-swappable redundant power supplies with integrated system cooling fans

**AC input**
- 85 v–264 v ~5 A–2.5 A

**Input line frequency**
- 47 Hz–63 Hz

**Power consumption**
- 110 watts with all 48 ports populated with 16 Gb/sec SWL optics
- 72 watts for empty chassis with no optics
Contact Us
For more information about the Brocade 6510 Fibre Channel Switch, visit oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.