To meet dynamic and growing business demands, data centers are evolving into highly virtualized environments and cloud-based architectures. This approach enables organizations to consolidate and simplify their IT resources, resulting in increased business agility and lower capital and operating expenses. However, enterprise data centers must keep pace with the changes driven by increasingly virtualized workloads and storage resources. Selecting the right network is therefore key to realizing the full benefits of these cloud-based architectures. By treating the network as a strategic part of a highly virtualized environment, organizations can increase optimization and efficiency even as they rapidly scale their environments.

Today, Brocade® Fibre Channel switches are the de facto storage networking standard for mission-critical workloads and highly virtualized environments. Based on years of successful deployment in enterprise data centers around the globe, Brocade Fibre Channel SANs provide highly resilient, scalable, and simplified network infrastructure for storage.

The Brocade 6520 Switch meets the demands of growing, dynamic workloads and private cloud storage environments by delivering market-leading Gen 5 Fibre Channel technology and capabilities. The Brocade 6520 is a high-density, purpose-built, foundational building block for large and growing Storage Area Network (SAN) infrastructures. It provides industry-leading
scalability, reliability, and 16 Gbps performance in a flexible, easy-to-deploy enterprise-class switch, enabling greater data center consolidation, operational efficiency, and business continuity. In addition to increased throughput, it helps improve bandwidth utilization, security, and network visibility and management through in-flight data compression and encryption and advanced diagnostics. It’s an ideal switch for bandwidth-intensive workloads, evolving virtualized data centers, and private cloud architectures.

EXCEPTIONAL SCALABILITY FOR DEMANDING WORKLOADS AND DATA CENTER CONSOLIDATION

The Brocade 6520 features 96 Fibre Channel ports in a 2U form factor, delivering industry-leading port density and space utilization for data center consolidation. Designed for maximum flexibility, this enterprise-class switch offers “pay-as-you-grow” scalability with Ports on Demand (PoD). Organizations can quickly, easily, and cost-effectively scale from 48 to 96 ports in 24-port increments, each supporting 2, 4, 8, 10, or 16 Gbps. In addition, flexible, high-speed 16 Gbps and 8 Gbps optics allow organizations to deploy bandwidth on demand to meet growing data center needs. For maximum flexibility, the switch also features dual-direction airflow options to support the latest hot aisle/cold aisle configurations.

INDUSTRY-LEADING PERFORMANCE FOR GROWING WORKLOADS

The Brocade 6520 delivers exceptional performance for growing and dynamic workloads through a combination of market-leading throughput and bandwidth utilization. With the unpredictability of virtualized workloads and cloud services, throughput becomes critical to ensuring that the network does not become the bottleneck. With 96 ports, the Brocade 6520 provides an aggregate 1536 Gbps full-duplex throughput. Up to eight ISLs can be combined together in a 128 Gbps framed-based trunk. In addition, 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). This augments Brocade ISL Trunking to provide more effective load balancing in certain configurations. Moreover, the enterprise-class capabilities of this switch yield 40 percent higher performance compared to 10 Gigabit Ethernet (GbE) alternatives at a similar cost.

SIMPLIFIED MANAGEMENT AND ROBUST NETWORK ANALYTICS

Brocade Fabric Vision technology, an extension of Brocade Gen 5 Fibre Channel, introduces a breakthrough hardware and software technology that maximizes uptime, simplifies SAN management, and provides unprecedented visibility and insight across the storage network. Offering innovative diagnostic, monitoring, and management capabilities, the Brocade 6520 with Fabric Vision technology helps administrators avoid problems, maximize application performance, and reduce operational costs. Brocade Fabric Vision technology includes:

- Brocade ClearLink Diagnostics: Ensures optical and signal integrity for Gen 5 Fibre Channel optics and cables, simplifying deployment and support of high-performance fabrics. It leverages ClearLink Diagnostic Port (D_Port) capabilities of Gen 5 Fibre Channel platforms.
- Bottleneck Detection: Identifies and alerts administrators to device or ISL congestion as well as abnormal levels of latency in the fabric. This feature works in conjunction with Brocade Network Advisor to automatically monitor and detect network congestion and latency in the fabric, providing visualization of bottlenecks in a connectivity map and product tree, and identifying exactly which devices and hosts are impacted by a bottlenecked port.
- Integration into Brocade Network Advisor: Provides customizable health and performance dashboard views to pinpoint problems faster, simplify SAN configuration and management, and reduce operational costs.
- Critical diagnostic and monitoring capabilities: Help ensure early problem detection and recovery.
- Non-intrusive and non-disruptive monitoring on every port: Provides a comprehensive end-to-end view of the entire fabric.
- Forward Error Correction (FEC): Enables recovery from bit errors in ISLs, enhancing transmission reliability and performance.
- Additional buffers: Help overcome performance degradation and congestion due to buffer credit loss.
- Real-time bandwidth consumption by hosts/applications on ISLs: Helps easily identify hot spots and potential network congestion.

Figure 1.

Dynamic Path Selection (DPS) augments Brocade ISL Trunking to route data efficiently between multiple trunk groups.
A BUILDING BLOCK FOR VIRTUALIZED, PRIVATE CLOUD STORAGE
The Brocade 6520 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 6520 also supports multitenancy in cloud environments through Virtual Fabrics, Quality of Service (QoS), and fabric-based zoning features.

The Brocade 6520 enables secure metro extension to virtual private or hybrid clouds with 10 Gbps Dense Wavelength Division Multiplexing (DWDM) link support, as well as in-flight encryption and data compression to optimize bandwidth and minimize the risk of unauthorized access. With four times more in-flight encryption and compression ports than the Brocade 6510 Switch, the Brocade 6520 supports higher data volumes over long distance. The switch also features on-board data security and acceleration, minimizing the need for separate acceleration appliances.

BROCADE 6520 SPECIFICATIONS

<table>
<thead>
<tr>
<th>System Architecture</th>
<th>Fibre Channel ports</th>
<th>Switch mode (default): 48-, 72-, and 96-port configurations (24-port increments through Ports on Demand (PoD) licenses); E, F, M, D, EX ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scalability</td>
<td>Full fabric architecture with a maximum of 239 switches</td>
<td></td>
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<tr>
<td>Certified maximum</td>
<td>6000 active nodes; 56 switches, 19 hops in Brocade Fabric OS* fabrics; larger fabrics certified as required</td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>ISL trunking</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Aggregate bandwidth</td>
<td>1536 Gbps: 96 ports × 16 Gbps data rate</td>
<td></td>
</tr>
<tr>
<td>Fabric latency</td>
<td>Latency for locally switched ports is 700 ns; latency between port groups is 2.1 μsec, cut-through routing at 16 Gbps between locally switched groups. Encryption/compression is 5.5 μsec per node; Forward Error Correction (FEC) adds 400 ns between E_Ports (enabled by default).</td>
<td></td>
</tr>
<tr>
<td>Maximum frame size</td>
<td>2112 byte payload</td>
<td></td>
</tr>
<tr>
<td>Frame buffers</td>
<td>8192 dynamically allocated</td>
<td></td>
</tr>
<tr>
<td>Classes of service</td>
<td>Class 2, Class 3, Class F (inter-switch frames)</td>
<td></td>
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</tbody>
</table>

To support distance extension, Internal fault-tolerant and enterprise-class RAS features help minimize downtime to support mission-critical cloud environments.

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.

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.

ACCELERATING FABRIC DEPLOYMENT WITH DIAGNOSTIC PORTS
ClearLink Diagnostic Ports (D_Ports) are a port type that enables administrators to quickly identify and isolate optics and cable problems, reducing fabric deployment and diagnostic times. Organizations also can use ClearLink Diagnostics to run a variety of tests through Brocade Network Advisor or Command Line Interface (CLI) to test ports, SFPs, and cables for faults, latency, and distance.

SIMPLIFYING SERVER DEPLOYMENT WITH DYNAMIC FABRIC PROVISIONING
Dynamic Fabric Provisioning (DFP) allows organizations to eliminate fabric reconfiguration when adding or replacing servers through the virtualization of host World Wide Names (WWNs). It combines Brocade switch and adapter technology to reduce or eliminate the need to modify zoning or Logical Unit Number (LUN) masking when replacing a server (or an HBA). In addition, DFP enables pre-provisioning of virtual WWNs, helping organizations eliminate time-consuming steps when deploying new equipment.

<table>
<thead>
<tr>
<th>Port types</th>
<th>D_Ports (ClearLink Diagnostic Port), E_Ports, EX_Ports, F_Ports, M_Ports (Mirror Port); optional port type control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data traffic types</td>
<td>Fabric switches supporting unicast</td>
</tr>
<tr>
<td>Media types</td>
<td>16 Gbps: Brocade 6520 requires Brocade hot-pluggable SFP+, LC connector; 16 Gbps SWL, LWL, ELWL</td>
</tr>
<tr>
<td></td>
<td>10 Gbps: Brocade 6520 requires Brocade hot-pluggable SFP+, LC connector; 10 Gbps SWL, LWL</td>
</tr>
<tr>
<td></td>
<td>8 Gbps: Brocade 6520 requires Brocade hot-pluggable SFP+, LC connector; 8 Gbps SWL, LWL, ELWL</td>
</tr>
<tr>
<td>USB</td>
<td>One USB port for system log file downloads or firmware upgrades</td>
</tr>
<tr>
<td>Fabric services</td>
<td>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; Enhanced Group Management (EGM); Brocade Fabric Watch; FDMI; Frame Redirection; Frame-based Trunking; FSPF; Integrated Routing; IPoFC; Brocade ISL Trunking; Management Server; NPV; 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)</td>
</tr>
</tbody>
</table>
**BROCADE 6520 SPECIFICATIONS (CONTINUED)**

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

### Management
- **Supported management software**: HTTP, SNMP v1/v3 (FE MIB, FC Management MIB), SSH v2; 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, OpenLDAP, Port Binding, RADIUS, TACACS+, User-defined Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, TFTP, SSH v2, SSL, Switch Binding, Trusted Switch Management access

### Diagnostics
- ClearLink optics and cable diagnostics, including electrical/optical loopback, link traffic/latency/distance; FOST 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, RAStrace logging, and Rolling Reboot Detection (RRD)

### Mechanical
- **Enclosure**: Front-to-back airflow; power from back, 2U
- **Size**
  - Width: 429.25 mm (16.90 in.)
  - Height: 86.74 mm (3.42 in.)
  - Depth: 609.75 mm (24.01 in.)
- **System weight**: 16.92 kg (37.3 lb) with two power supply FRUs, without transceivers

### Environment
- **Operating environment**: Temperature: 0°C to 40°C/32°F to 104°F
  - Humidity: 10% to 85% (non-condensing)
- **Non-operating environment**: Temperature: −25°C to 70°C/−13°F to 158°F
  - Humidity: 10% to 90% (non-condensing)
- **Operating altitude**: Up to 3000 m (9842 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 Hz to 500 Hz
  - Non-operating: 2.0 g sine, 1.1 grms random, 5 Hz to 500 Hz
- **Heat dissipation**: 96 ports at 1582 BTU/hr
- **Airflow**: Three hot-swappable, redundant fans; reversible airflow options (front-to-back and back-to-front); maximum 109 CFM (cu. ft./min); nominal 33 CFM

### Power
- **Power supply**: Dual, hot-swappable redundant power supplies with integrated system cooling fans
- **AC input**: 85 V to 264 V ~5 A to 2.5 A
- **Input line frequency**: 47 Hz to 63 Hz
- **Power consumption**: 464 W with all 96 ports populated with 16 Gbps SWL optics
  - 183 W for empty chassis with no optics

For information about supported SAN standards, visit [www.brocade.com/sanstandards](http://www.brocade.com/sanstandards).
For information about switch and device interoperability, visit [www.brocade.com/interoperability](http://www.brocade.com/interoperability).
For information about hardware regulatory compliance, visit [www.brocade.com/regulatorycompliance](http://www.brocade.com/regulatorycompliance).