Brocade® G610 Switch
Affordable, No-Compromise Storage Switch for the Modern Data Center

Overview

Today’s organizations are under pressure to digitize everything to be more competitive, maximize revenue growth, and increase productivity. Yet explosive data growth, coupled with user expectations of unlimited access from anywhere, at any time, on any device, is pushing storage environments to the limit. To meet these dynamic business demands, the network must evolve to improve speed, efficiency, and costs. This requires looking beyond legacy infrastructure, which was not designed to support the performance requirements of evolving workloads and flash-based storage technology—and will therefore impede the performance of an all-flash data center. Organizations need a new approach to storage networking to enable databases, virtual servers, desktops, and critical applications, and to unlock the full capabilities of flash. By treating the network as a strategic part of a storage environment, organizations can maximize their productivity and efficiency, even as they rapidly grow their environments.

The Brocade® G610 provides an affordable storage switch without compromising on performance and reliability. Leveraging the power of Gen 6 Fibre Channel technology, it delivers a flash-ready solution for the always-on, digital business. With its combination of up to 32G performance, unmatched simplicity, and enterprise-class functionality, the Brocade G610 provides exceptional price/performance value in an entry-level switch.

The Brocade G610 offers small to midsized data centers affordable access to industry-leading Gen 6 Fibre Channel technology. Organizations gain the best of both worlds: high-performance access to industry-leading storage technology, and the ability to start small and grow on demand, from 8 to 24 ports, to support an evolving storage environment. The Brocade G610 is also easy to use and install, with a point-and-click user interface that simplifies deployment and saves time.

Designed in an efficient 1U package, starting with 8 ports and low energy consumption at 0.10 watts per Gb/s and 3.2 watts per port, the switch delivers a low total cost of ownership (TCO) for Gen 6. To help further control costs, the Brocade G610 provides real-time monitoring to enable users to actively monitor the switch’s power usage.

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

The Brocade G610 features up to 24 Fibre Channel ports, delivering industry-leading Gen 6 Fibre Channel technology in a flexible, simple, and easy-to-use solution. Designed for maximum flexibility, this entry-level switch offers pay-as-you-grow capability to easily and cost-effectively scale from 8 to 24 ports with Ports on Demand (PoD). Moreover, each of the 24 SFP+ ports supports 4, 8, 16, and 32G Fibre Channel speeds. High-speed 32G and 16G optics allow organizations to deploy bandwidth on demand to meet growing data center needs.
Gen 6 Fibre Channel

Brocade Gen 6 Fibre Channel is the purpose-built network infrastructure for mission-critical storage, delivering breakthrough performance, operational stability, and increased business agility to accelerate data access, adapt to evolving requirements, and drive always-on business operations. The Brocade G610 with Gen 6 Fibre Channel technology is an affordable storage switch, delivering simplified operations, flash-ready performance, and always-on reliability to grow with the demands of your business.

Flash-Ready Performance for Evolving Storage Requirements

Faced with increased competition and the need to deliver differentiated services, organizations rely on leading technology to help them catapult their businesses and grow revenue. Brocade Gen 6 Fibre Channel delivers advanced 32G performance to redefine the limits of application performance and to unleash the full potential of new storage technologies.

The Brocade G610 combines market-leading Gen 6 throughput and low latency with an affordable switch form factor, making it ideal for small to midsized businesses. Using this switch, organizations can build a flash-ready infrastructure that adapts to their expanding business requirements.

Administrators can achieve optimal bandwidth utilization, high availability, and load balancing by combining up to eight inter-switch links (ISLs) in a 256Gb/s trunk. This can be achieved through eight individual 32G SFP+ ports. Moreover, 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. This augments Brocade ISL Trunking to provide more effective load balancing in certain configurations.

Rely On the Network That Delivers Always-On Business Operations

Brocade Gen 6 technology leverages a rich heritage of Fibre Channel innovation to deliver industry-leading reliability for the world’s most demanding data centers. Brocade Gen 6 and Fabric Vision technology provide a breakthrough hardware and software solution that helps organizations simplify monitoring, maximize network availability, and gain insight into issues to speed resolution and meet critical service-level agreements (SLAs). VM Insight is the newest feature in Fabric Vision technology, enabling proactive visibility into...
Brocade Fabric Vision Technology

Brocade Fabric Vision technology with VM Insight, an extension of Gen 6 Fibre Channel, provides unprecedented insight and visibility across the storage network. Its powerful, integrated monitoring, management, and diagnostic tools enable organizations to:

- Simplify monitoring:
  - Deploy more than 20 years of storage networking best practices with a single click.
  - Leverage integrated network sensors to gain visibility into VM storage performance metrics to maintain SLA compliance.
  - Gain comprehensive visibility into the fabric using browser-accessible dashboards with drill-down capabilities.

- Increase operational stability:
  - Avoid 50% of common network problems with proactive monitoring.
  - Identify hot spots and automatically mitigate network problems—before they impact application performance.
  - Monitor performance for each VM and identify performance anomalies to facilitate fault isolation and troubleshooting.

- Dramatically reduce costs:
  - Eliminate nearly 50% of maintenance costs through automated testing and diagnostic tools.
  - Save up to millions of dollars on CapEx costs by eliminating the need for expensive third-party tools through integrated network sensors, monitoring, and diagnostics.
  - Simplify network planning and provisioning based on VM workload requirements to reduce costs.

Brocade Fabric Vision technology provides unprecedented insight and visibility across the storage network with powerful integrated monitoring, management, and diagnostic capabilities. These innovative features enable administrators to avoid problems before they impact operations, helping their organizations meet SLAs. Fabric Vision technology includes:

- VM Insight: Seamlessly monitors virtual machine performance throughout a storage fabric with standards-based, end-to-end VM tagging. Administrators can quickly determine the source of VM/application performance anomalies, as well as provision and fine-tune the infrastructure based on VM/application requirements to meet service-level objectives.
- Monitoring and Alerting Policy Suite (MAPS): Leverages prebuilt, rule-/policy-based templates within MAPS to simplify fabric-wide threshold configuration, monitoring, and alerting. Administrators can configure the entire fabric (or multiple fabrics) at one time using common rules and policies, or customize policies for specific ports or switch elements.
- Fabric Performance Impact (FPI) Monitoring: Leverages predefined MAPS policies to automatically detect and alert administrators to different latency severity levels, and to identify slow drain devices that could impact network performance. This feature identifies various latency severity levels, pinpointing exactly which devices are causing or are impacted by a bottlenecked port, and quarantines slow drain devices automatically to prevent buffer credit starvation.
- 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.
- Configuration and Operational Monitoring Policy Automation Services Suite (COMPASS): Simplifies deployment, safeguards consistency, and increases operational efficiencies of larger environments with automated switch and fabric configuration services. Administrators can configure a template or adopt an existing configuration to seamlessly deploy a configuration across the fabric.
- Brocade ClearLink Diagnostics: Ensures optical and signal integrity for Fibre Channel optics and cables, simplifying deployment and support of high-performance fabrics. ClearLink Diagnostic Port (D_Port) is an advanced capability of Fibre Channel platforms.

The health and performance of individual virtual machines (VMs) through integrated sensors. By leveraging this capability, administrators can quickly identify abnormal VM behaviors to facilitate troubleshooting and fault isolation, helping to ensure maximum performance and operational stability.

Forward Error Correction (FEC) capabilities further increase resiliency by automatically detecting and recovering network transmission errors. To ensure predictable performance prior to deployment, organizations can validate infrastructure with Brocade ClearLink™ Diagnostics and Flow Generator features.

Simplified Management and Robust Network Analytics

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• 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, automatic learning, and nondisruptive monitoring of a flow’s performance. Administrators can monitor all flows from a specific host to multiple targets or volumes, from multiple hosts to a specific target/volume, or across a specific ISL. Additionally, they can perform volume-level monitoring of specific frame types to identify resource contention or congestion that is impacting application performance. With VM Insight, administrators can monitor network throughput statistics for each VM.
  - Flow Learning: Enables administrators to nondisruptively discover all flows that go to or come from a specific host port or a storage port, or traverse ISLs/IFLs (inter-fabric links) or Fibre Channel over Internet Protocol (FCIP) tunnels, to monitor fabric-wide application performance. In addition, administrators can discover top and bottom bandwidth-consuming devices and manage capacity planning.
  - Flow Generator: Provides a built-in traffic generator for pretesting and validating the data center infrastructure for robustness—including route verification and integrity of optics, cables, ports, back-end connections, and ISLs—before deploying applications.

- Flow Mirroring: Provides the ability to nondisruptively create copies of specific application and data flows or frame types that can be captured for in-depth analysis.
- Forward Error Correction (FEC): Enables recovery from bit errors in device connections and ISLs, enhancing transmission reliability and performance.
- Credit Loss Recovery: Helps overcome performance degradation and congestion due to buffer credit loss.

**Improve Efficiency with Fabric Automation**

IT organizations spend nearly half of their time performing repetitive daily management tasks, such as zoning, inventory reporting, and operational validation checks. By automating these repetitive tasks, IT organizations can significantly improve their efficiency and dramatically decrease the risk of operational mistakes. Automation in large-scale IT environments integrates diverse infrastructure components with consistency and predictability to deliver greater operational efficiency and agility. With more than 20 years of storage networking experience, Brocade, a Broadcom Inc. Company, understands the nuances that go into infrastructure management and the tasks that can benefit from automation. By introducing REST APIs directly into its switch and management products, Brocade offers a broad range of choices to enable any SAN management solution. IT organizations that couple Brocade’s robust data collecting capabilities with automation and orchestration tools (such as Ansible) gain the ability to automate configuration tasks and the visibility to monitor and detect any performance or health changes.

Brocade automation solutions are based on these pillars:
• Make standard REST APIs available directly from the switch in order to automate repetitive daily tasks, such as fabric inventory, provisioning, and operational state monitoring.
• Leverage Ansible to easily scale automation and orchestration across the entire infrastructure.

**Brocade SANnav™: Next-Generation SAN Management**

Brocade SANnav™ Management Portal and SANnav Global View empower IT administrators by providing comprehensive visibility across the entire SAN, from a global view down to local environments. These tools streamline management workflows to accelerate the deployment of new applications, switches, hosts, and targets. They also increase operational efficiencies with a modernized graphical user interface (GUI) that enables enhanced monitoring, faster troubleshooting, and advanced analytics.

Brocade Gen 6 Fibre Channel hardware includes integrated network sensors that nondisruptively gather millions of real-time metrics that SANnav Management Portal uses to identify, monitor, and analyze the overall health and performance of the SAN. SANnav Management Portal contextualizes this data into visual dashboards, enabling administrators to quickly detect and isolate points of interest for both troubleshooting and performance optimization.
Brocade Access Gateway Mode

The Brocade G610 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). Brocade 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 Brocade Access Gateway transparent to the SAN fabric, greatly reducing management of the network edge. The Brocade G610 in Brocade Access Gateway mode can connect servers to NPIV-enabled SAN fabrics.

Organizations can easily enable Brocade Access Gateway mode via Brocade SANnav Management Portal. Key benefits of Brocade Access Gateway mode include:

- Improved scalability for large or rapidly growing server and virtual server environments
- Reduced management of the network edge, since Brocade 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
- Brocade Lifetime Warranty

The Brocade G610 helps to protect critical applications with the industry’s only lifetime warranty. (Note: for Brocade G610 Switches sold with a lifetime warranty, the lifetime warranty begins from the date the product is shipped from Broadcom manufacturing facilities until the end-of-support (EOS) date, as announced by Broadcom, and it is subject to terms and conditions.) The G610 delivers peace of mind with industry-leading reliability, an unprecedented lifetime warranty, and unmatched product support. This lifetime warranty delivers access to technical experts 24x7 to troubleshoot and solve issues, eliminating the costs and complexities of post-warranty support.

Brocade Global Support

Brocade Global Support has the expertise to help organizations build resilient, efficient SAN infrastructures. Leveraging 20+ years of expertise in storage networking, Global Support delivers world-class technical support, implementation, and migration services to enable organizations to maximize their hardware and software investments, accelerate new technology deployments, and optimize the overall performance of their network.

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.broadcom.com/brocade

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

Brocade G610 Switch Specifications

<table>
<thead>
<tr>
<th>System Architecture</th>
<th>Description</th>
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<tbody>
<tr>
<td>Fibre Channel Ports</td>
<td>Switch mode (default): 8-, 16-, and 24-port configurations (8-port increment through Ports on Demand [PoD] license); E_Ports, F_Ports, M_Ports, and D_Ports Brocade Access Gateway default port mapping: 16 F_Ports, 8 N_Ports</td>
</tr>
<tr>
<td>Scalability</td>
<td>Full-fabric architecture with a maximum of 239 switches</td>
</tr>
<tr>
<td>Certified Maximum</td>
<td>6000 active nodes; 56 switches, 19 hops in Brocade Fabric OS® fabrics; larger fabrics certified as required</td>
</tr>
<tr>
<td>Performance</td>
<td>Fibre Channel: 4.25Gb/s line speed, full duplex; 8.5Gb/s line speed, full duplex; 14.025Gb/s line speed, full duplex; 28.05Gb/s line speed, full duplex; auto-sensing of 4, 8, 16, and 32G port speeds.</td>
</tr>
<tr>
<td>ISL Trunking</td>
<td>Frame-based trunking with up to eight 32G SFP+ ports per ISL trunk; up to 256Gb/s per ISL trunk. Exchange-based load balancing across ISLs with DPS included in Brocade Fabric OS fabrics</td>
</tr>
<tr>
<td>Aggregate Bandwidth</td>
<td>768Gb/s</td>
</tr>
<tr>
<td>Maximum Fabric Latency</td>
<td>Latency for locally switched ports is &lt;780 ns (including FEC)</td>
</tr>
<tr>
<td>Maximum Frame Size</td>
<td>2112-byte payload</td>
</tr>
<tr>
<td>Frame Buffers</td>
<td>2000 dynamically allocated</td>
</tr>
<tr>
<td>Classes of Service</td>
<td>Class 2, Class 3, Class F (inter-switch frames)</td>
</tr>
<tr>
<td>Port Types</td>
<td>F_Port, E_Port, M_Port, D_Port (ClearLink Diagnostic Port) on 24 SFP+ ports Brocade Access Gateway mode: F_Port and NPIV-enabled N_Port</td>
</tr>
</tbody>
</table>
### System Architecture (cont.)

<table>
<thead>
<tr>
<th>Data Traffic Types</th>
<th>Fabric switches supporting unicast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Types</td>
<td>32G FC SFP+ LC connector: SWL, LWL, ELWL&lt;br&gt;16G FC SFP+ LC connector: 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 Note: Some fabric services do not apply or are unavailable in Brocade Access Gateway mode.</td>
<td>BB Credit Recovery; Brocade Advanced Zoning (Default Zoning, Port/WVN Zoning, Peer Zoning); Congestion Signaling; Dynamic Path Selection (DPS); Extended Fabrics; Fabric Performance Impact Notification (FPIN); Fabric Vision; FDMI; Flow Vision; F_Port Trunking; FSPF; Integrated Routing; ISL Trunking; Management Server; Name Server; NPIV; NTP v3; Port Decommission/Fencing; QoS; Registered State Change Notification (RSCN); Target-Driven Zoning; VMID and AppServer</td>
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</table>

### Management

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<thead>
<tr>
<th>Management</th>
<th>HTTP/HTTPS; SNMP v1/v3 (FE MIB, FC Management MIB); SSH; Brocade Advanced Web Tools; Brocade SANnav Management Portal and SANnav Global View; Command Line Interface (CLI); RESTful API; trial licenses for add-on capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>DH-CHAP (between switches and end devices), FCAP switch authentication; HTTPS, IP filtering, LDAP with IPv6, OpenLDAP, Port Binding, RADIUS, TACACS+, User-defined Role-Based Access Control (RBAC), Secure Copy (SCP), Secure Syslog, SFTP, SSH v2, SSL, Switch Binding, Trusted Switch</td>
</tr>
<tr>
<td>Management Access</td>
<td>10/100/1000 Mb/s Ethernet (RJ-45), in-band over Fibre Channel, serial port (RJ-45) and one USB port</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Active Support Connectivity (ASC) and Brocade Support Link (BSL); built-in flow generator; ClearLink optics and cable diagnostics, including electrical/optical loopback, link traffic/latency/distance; Fabric Performance Impact Monitoring (FPI); flow mirroring; Forward Error Correction (FEC); frame viewer; Monitoring and Alerting Policy Suite (MAPS); nondisruptive daemon restart; optics health monitoring; POST and embedded online/offline diagnostics, including environmental monitoring, FCping and Pathinfo (FC traceroute); power monitoring; RASTrace logging; Rolling Reboot Detection (RRD); Syslog/Audit Log; VM Insight</td>
</tr>
</tbody>
</table>

### Mechanical

| Enclosure       | Back-to-front airflow (non-port-side intake); power from back, 1U |
| Size            | Width: 428.80 mm (16.88 in.)<br>Height: 42.90 mm (1.69 in.)<br>Depth: 306.60 mm (12.07 in.) |
| System Weight   | 5.75 kg (12.67 lb) with one integrated power supply, without transceivers |

### Environment

<table>
<thead>
<tr>
<th>Operating Environment</th>
<th>Temperature: 0°C to 40°C/32°F to 104°F&lt;br&gt;Humidity: 10% to 85% (non-condensing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-operating Environment</td>
<td>Temperature: -25°C to 70°C/-13°F to 158°F&lt;br&gt;Humidity: 10% to 90% (non-condensing)</td>
</tr>
<tr>
<td>Operating Altitude</td>
<td>Up to 3000m (9842 ft)</td>
</tr>
<tr>
<td>Storage Altitude</td>
<td>Up to 12 km (39,370 ft)</td>
</tr>
<tr>
<td>Shock</td>
<td>Operating: Up to 20G, 6 ms half-sine&lt;br&gt;Non-operating: Half sine, 33G 11 ms, 3G axis</td>
</tr>
<tr>
<td>Vibration</td>
<td>Operating: 0.5g sine, 0.4 grms random, 5 Hz to 500 Hz&lt;br&gt;Non-operating: 2.0g sine, 1.1 grms random, 5 Hz to 500 Hz</td>
</tr>
<tr>
<td>Heat Dissipation</td>
<td>24 ports at 215 BTU/hr</td>
</tr>
</tbody>
</table>

### Power

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<thead>
<tr>
<th>Power Supply</th>
<th>Base switch includes a single, fixed power supply with four integrated system cooling fans</th>
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</thead>
<tbody>
<tr>
<td>AC Input</td>
<td>90V to 264V, maximum input current: 2.2A</td>
</tr>
<tr>
<td>AC Input Line Frequency</td>
<td>47 Hz to 63 Hz</td>
</tr>
<tr>
<td>AC Power Consumption (System)</td>
<td>76.52W with all 24 ports populated with 32G SWL optics&lt;br&gt;55.83W for idle configuration (all optics loaded but not initialized)</td>
</tr>
</tbody>
</table>