# FUJITSU

# Datasheet
## Brocade G610 Switch

## HIGHLIGHTS

- Provides an affordable storage switch that redefines simplicity and flexibility
- Meets the high-throughput, low-latency demands of critical applications with flash-ready performance
- Enables the seamless transition to next-generation NVMe flash arrays, without a disruptive rip and replace
- Starts small and grows on demand, from 8 to 24 ports, to support an evolving storage environment
- Powers up from 16 Gbps to 32 Gbps to deliver increased performance on demand
- Installs in three easy steps with a point-and-click user interface, simplifying deployment and saving time
- Increases resiliency by automatically discovering and recovering from common networking problems
- Proactively monitors and optimizes the health and performance of individual Virtual Machines (VMs), and identifies anomalies with VM Insight
- Leverages Brocade Fabric Vision technology to simplify administration, quickly resolve problems, increase uptime, and reduce costs

### Affordable, No-Compromise Storage Switch for the Modern Data Center

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 32 Gbps 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 Gbps and 3.2 watts per port, the switch delivers 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.

# Features and benefits

## 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.

### 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 Gbps, 8 Gbps, 16 Gbps, and 32 Gbps Fibre Channel speeds. High-speed 32 Gbps and 16 Gbps optics allow organizations to deploy bandwidth on demand to meet growing data center needs.

With its PoD capability, the Brocade G610 provides excellent overall value and the agility needed to enable rapid deployments to meet user demands and support higher growth. In addition, the switch can be easily deployed in just three steps with the Brocade EZSwitchSetup wizard. This tool features a simple user interface that dramatically reduces deployment and configuration times.

### 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 32 Gbps 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 256 Gbps framed-based trunk. This can be achieved through eight individual 32 Gbps 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 (see Figure 1).

To realize the full benefits of flash, organizations will need to transition their high-performance, latency-sensitive workloads to flash-based storage with NVMe. The Brocade G610 is NVMe-ready, allowing organizations to seamlessly integrate Brocade Gen 6 Fibre Channel networks with the next generation of flash storage, without a disruptive rip and replace. The simplicity and efficiency of NVMe over Fibre Channel enable significant performance gains for flash storage. Also, NVMe allows users to achieve faster application response times and harness the performance of solid state drives for better scalability across virtual data centers with flash. Leveraging the efficiency of NVMe over Fibre Channel, combined with the high performance and low latency of Brocade Gen 6 Fibre Channel, organizations can accelerate IOPS to deliver the performance, application response time, and scalability needed for next-generation data centers.
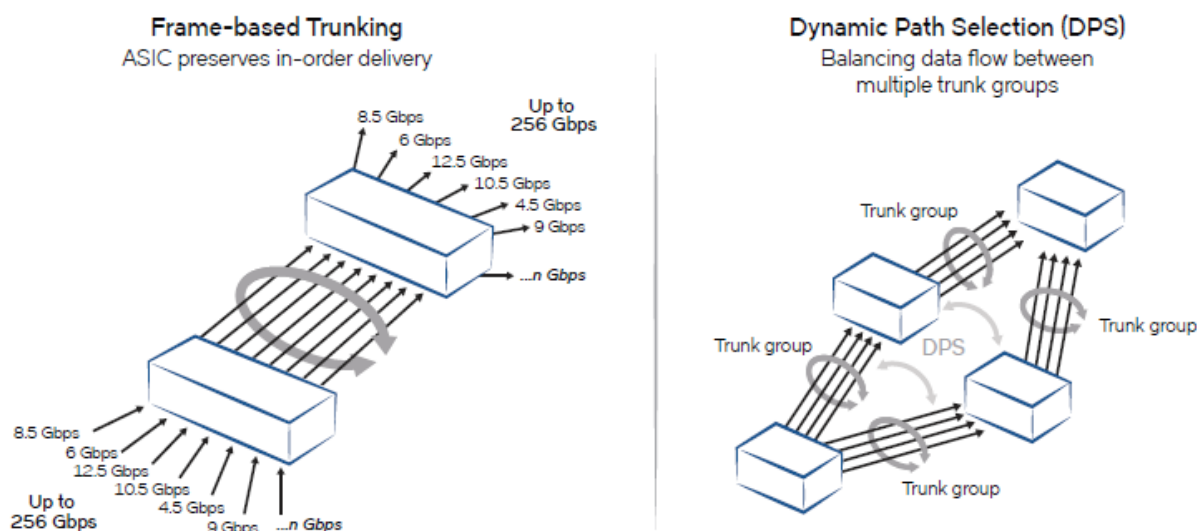


**Figure 1:** Dynamic Path Selection (DPS) augments Brocade ISL Trunking to route data efficiently between multiple trunk groups.

## 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 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.

### 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 percent 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 percent 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

### Simplified Management and Robust Network Analytics

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 (VM) 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. With Flow Vision and VM Insight, administrators set thresholds for VM flow metrics in MAPS policies in order to be notified of VM performance degradation.

- **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. In addition, they can ensure settings do not drift over time with COMPASS configuration and policy violation monitoring within Brocade Network Advisor dashboards.

- **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.

- **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, automatically learns, and non-disruptively monitors flow performance. Administrators can monitor all flows from a specific host to multiple targets or LUNs, from multiple hosts to a specific target/LUN, or across a specific ISL. Additionally, they can perform LUN-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 non-disruptively discover all flows that go to or come from a specific host port or a storage port, or traverse ISLs/IFLs or 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 non-disruptively 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.

**Brocade Network Advisor**

Brocade Network Advisor simplifies Gen 6 Fibre Channel management and helps organizations 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. Dashboards and reports also can be configured to show only the most relevant data, enabling administrators to more efficiently prioritize their actions and maintain network performance.

**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 Network Advisor or a CLI. 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 Global Services**

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 20 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, and education services, 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.

# Technical details

| BROCADE G610 Switch Specifications | |
|---|---|
| **System Architecture** | |
| Fibre Channel ports | 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 |
| Scalability | Full-fabric architecture with a maximum of 239 switches |
| Certified maximum | 9,000 active nodes; 56 switches, 19 hops in Brocade Fabric OS® fabrics; larger fabrics certified as required |
| 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 Gbps, 8 Gbps, 16 Gbps, and 32 Gbps port speeds |
| ISL trunking | Frame-based trunking with up to eight 32 Gbps ports per ISL trunk; up to 256 Gbps per ISL trunk Exchange-based load balancing across ISLs with DPS included in Brocade Fabric OS |
| Aggregate bandwidth | 768 Gbps end-to-end full duplex |
| Maximum fabric latency | Latency for locally switched ports is 900 ns (including FEC) |
| Maximum frame size | 2,112-byte payload |
| Frame buffers | 2,000 dynamically allocated |
| Classes of service | Class 2, Class 3, Class F (inter-switch frames) |
| Port types | 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 |
| Data traffic types | Fabric switches supporting unicast |
| Media types | 32 Gbps: Brocade G610 requires Brocade hot-pluggable SFP+, LC connector; 32 Gbps SWL, LWL 16 Gbps: Brocade G610 requires Brocade hot-pluggable SFP+, LC connector; 16 Gbps SWL, LWL, ELWL Fibre Channel distance subject to fiber-optic cable and port speed |
| USB | One USB port for system log file downloads or firmware upgrades |
| Fabric services <br><br> Note: Some fabric services do not apply or are unavailable in Brocade Access Gateway mode. | Monitoring and Alerting Policy Suite (MAPS); Flow Vision; Brocade Adaptive Networking (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; Brocade ISL Trunking; Management Server; NPIV; NTP v3; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Simple Name Server (SNS); Read Diagnostics Parameter (RDP), VM Insight |
| **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/Professional Plus; Command Line Interface (CLI); SMI-S compliant; Administrative Domains; trial licenses for add-on capabilities |
| Security | DH-CHAP (between switches and end devices), FCAP switch authentication; HTTPS, IPsec, IP filtering, LDAP with IPv6, OpenLDAP, Port Binding, RADIUS, TACACS+, User-defined Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, Secure Syslog, SFTP, SSH v2, SSL, Switch Binding, Trusted Switch |
| Management access | 10/100/1000 Mbps Ethernet (RJ-45), in-band over Fibre Channel, serial port (RJ-45) and one USB port |
| Diagnostics | ClearLink optics and cable diagnostics, including electrical/optical loopback, link traffic/latency/distance; flow mirroring; built-in flow generator; POST and embedded online/offline diagnostics, including environmental monitoring, FCping and Pathinfo (FC traceroute), frame viewer, non-disruptive daemon restart, optics health monitoring, power monitoring, RAStrace logging, and Rolling Reboot Detection (RRD) |

## BROCADE X6 Director Specifications(Continued)

### Mechanical

| | |
|---|---|
| Enclosure | Back-to-front airflow (non-port-side intake); power from back, 1U |
| Size | Width: 428.8 mm (16.88 in.)<br>Height: 42.9 mm (1.69 in.)<br>Depth: 306.6 mm (12.07 in.) |
| System weight | 5.75 kg (12.67 lb) with one integrated power supply, without transceivers |

### Environment

| | |
|---|---|
| Operating environment | Temperature: 0°C to 40°C/32°F to 104°F<br>Humidity: 10% to 85% (non-condensing) |
| Non-operating environment | Temperature: -25°C to 70°C/-13°F to 158°F<br>Humidity: 10% to 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<br>Non-operating: Half sine, 33 G 11 ms, 3G axis |
| Vibration | Operating: 0.5 g sine, 0.4 grms random, 5 Hz to 500 Hz<br>Non-operating: 2.0 g sine, 1.1 grms random, 5 Hz to 500 Hz |
| Heat dissipation | 24 ports at 215 BTU/hr |

### Power

| | |
|---|---|
| Power supply | Base switch includes a single, fixed power supply with four integrated system cooling fans |
| AC input | 90 V to 264 V |
| Maximum input current | 2.2 A |
| Input line frequency | Input line frequency |
| Power consumption | 76.52 W with all 24 ports populated with 32 Gbps SWL optics<br>55.83 W for idle configuration (all optics loaded but not initialized) |

# More information

## Fujitsu platform solutions

In addition to Brocade G610 Switch, Fujitsu provides a range of platform solutions. They combine reliable Fujitsu products with the best in services, know-how and worldwide partnerships.

Dynamic Infrastructures
With the Fujitsu Dynamic Infrastructures approach, Fujitsu offers a full portfolio of IT products, solutions and services, ranging from clients to datacenter solutions, Managed Infrastructure and Infrastructure-as-a-Service. How much you benefit from Fujitsu technologies and services depends on the level of cooperation you choose. This takes IT flexibility and efficiency to the next level.

Computing products
www.fujitsu.com/global/services/computing/
- PRIMERGY: Industry standard server
- SPARC Enterprise: UNIX server
- PRIMEQUEST: Mission-critical IA server
- ETERNUS: Storage system
Software
www.fujitsu.com/software/
- Interstage: Application infrastructure software
- Systemwalker: System management software

## More information

Learn more about Brocade G610 Switch, please contact your Fujitsu sales representative, Fujitsu business partner, or visit our website.
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