BROCADE ACCESS GATEWAY

STORAGE AREA NETWORK

An Innovative Platform for Connecting Servers to SANs

HIGHLIGHTS

- Increases SAN scalability and simplifies the connectivity of standalone or blade servers to any SAN switch using NPIV technology
- Enhances SAN reliability by keeping the fabric size in check and reducing fabric-wide RSCNs
- Enables greater server virtualization with advanced device-based (WWN) mapping and WWN-based security policies
- Provides seamless failover and optimized bandwidth utilization with Brocade Frame-based Trunking
- Simplifies and centralizes end-to-end SAN management with comprehensive diagnostics, monitoring, and automation through Brocade Fabric Vision technology

Gen 5 Fibre Channel is the purpose-built, data center-proven network infrastructure for storage, delivering unmatched reliability, simplicity, and 16 Gbps performance. Brocade Access Gateway running on Brocade 6510 and 6505 Switches with Gen 5 Fibre Channel unleashes the full potential of high-density server virtualization, cloud architectures, and next-generation storage.

IT organizations must continue to evolve the data center infrastructure to keep pace in today's non-stop global economy, leveraging technologies such as virtualization and private clouds to simplify the infrastructure, increase agility, and reduce costs. Storage Area Networks (SANs) continue to be a key technology for connecting virtualized server and storage environments, and Brocade leads the industry with SAN switches (standalone and embedded) that provide a wide range of SAN connectivity options to meet the needs of evolving data center infrastructures.

Growing trends in SAN connectivity include increased deployment of blade servers with low-port-count embedded switches and connecting multiple, small workgroup or departmental SAN switches to larger enterprise fabrics. For these types of server environments, Brocade provides industry-leading 8 Gbps and Gen 5 Fibre Channel standalone SAN switches as well as switch modules embedded in blade server chassis.

SIMPLIFIED SERVER AND STORAGE CONNECTIVITY

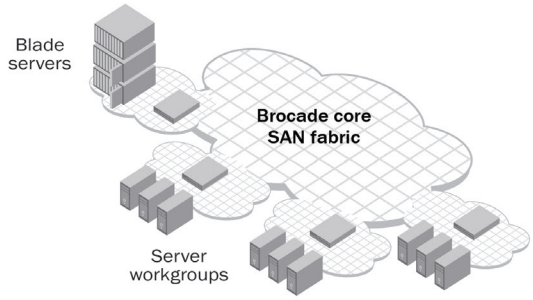
Brocade® Access Gateway simplifies server and storage connectivity by enabling the direct connection of servers to any SAN fabric. This capability enhances scalability by eliminating the switch domain identity and simplifying local switch device management.

To provide the most flexible connectivity solutions with long-term investment protection, Brocade switches supporting Brocade Access Gateway can operate in either Brocade Access Gateway mode or full-fabric switch mode. This means that the behavior of the switch does not have to be decided at the time of purchase, and the mode of the switch can be changed at any time to meet evolving requirements.

For blade server environments, Brocade embedded switch modules provide inherently simpler and more manageable connectivity when running in Brocade Access Gateway mode. Blade servers, and all Virtual Machines (VMs) running on those blades, have direct connectivity to the SAN fabric without another fabric domain residing between them.

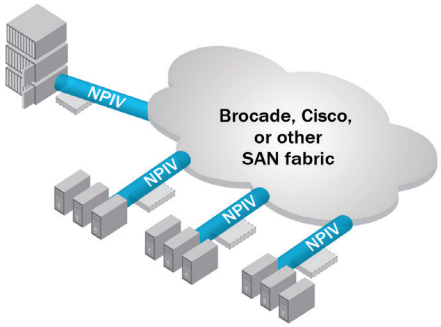
This unique functionality protects investments in existing Brocade switches, enabling IT organizations to select either the traditional full-fabric SAN switch mode or Brocade Access Gateway mode of operation using Brocade Web Tools or the Command Line Interface (CLI). Figure 1 shows how

Traditional Brocade SAN Switch Configuration for Edge and Workgroup Servers



Servers connected to Brocade switches, which extend the core SAN fabric.

Brocade SAN Switches in Brocade Access Gateway Mode



Servers connected to Brocade switches in Brocade Access Gateway mode, providing server access to the SAN fabric without creating new fabric domains.

Figure 1. Brocade alternatives for workgroup server-to-SAN connectivity.

Brocade Access Gateway provides a simple and reliable way to integrate edge servers into heterogeneous SAN environments.

FLEXIBLE SAN CONNECTIVITY

Facilitating broad connectivity for highly scalable, reliable, and manageable SAN environments, Brocade Access Gateway offers a wide range of features and benefits for Brocade switches, including:

- Seamless fabric interoperability
- Improved scalability for virtualization
- Cost savings
- Simplified management
- Automatic failover and failback
- Multiple fabric support
- Brocade Frame-based Trunking
- Advanced Device Security (ADS)
- Cascading
- Adaptable port capabilities
- Device-based mapping
- Quality of Service (QoS)
- Proactive monitoring and alerting
- Robust network analytics

Seamless Fabric Interoperability

Brocade Access Gateway helps eliminate traditional heterogeneous switch-to-switch interoperability challenges. It utilizes N_Port ID Virtualization (NPIV) switch standards to present server Fibre Channel connections as logical devices directly to SAN fabrics. By attaching to NPIV-enabled switches and directors, Brocade switches in Brocade Access Gateway mode can seamlessly connect servers to Brocade, Cisco, or other SAN fabrics.

Improved Scalability for Virtualization

Servers have traditionally connected to SANs one physical device at a time, each time consuming physical switched ports in the fabric and increasing the required number of fabric domains. Connecting each blade chassis has meant adding two more switch domains to the fabric. Increasing the number of physical servers or adding multiple virtual servers to each server chassis creates similar management challenges, which are compounded even further by the increased mobility of virtual servers.

To address this challenge, Brocade Access Gateway simplifies server-to-SAN attachment by presenting Fibre Channel connections (rather than switch domains) to the SAN fabric. Multiple connections per port are obtained through NPIV, enabling VMs to seamlessly connect to the SAN fabric without additional hardware requirements. (NPIV is supported in VMware 3.5 and higher.)

With 8 Gbps and Gen 5 Fibre Channel options available, Brocade Access Gateway-capable switches offer ample bandwidth to provide multiple VMs with high-performance access to the SAN through a single physical Fibre Channel port.

By increasing the number of logical device ports that can be connected to a single fabric port, Brocade Access Gateway can also support a much larger fabric. Unlike Fibre Channel pass-through solutions, it can do so without substantially increasing the number of switches (see Figure 2).

Cost Savings

In blade server environments, using a Brocade blade switch in Brocade Access Gateway mode in place of a Fibre Channel pass-through module reduces fabric management and costs. Moreover, this savings does not compromise seamless compatibility in heterogeneous SAN fabrics. As shown in Figure 2, organizations can reduce their optics and cabling costs by more than 80 percent.

Simplified Management

Using Brocade Access Gateway to connect servers to SAN fabrics eliminates certain management tasks associated with traditional SAN switches. The core SAN fabric knows only about the devices connected to Brocade Access Gateway, and nothing about the switch hardware itself. In addition, Brocade Access Gateway eliminates the potential for fabric disruptions that can result from incremental switches or domains joining an existing fabric. Together, these capabilities significantly reduce management workload and administrative complexity.

Automatic Failover and Failback

To enhance availability, Brocade Access Gateway can fail over automatically and dynamically to a preferred I/O connectivity path in case one or more fabric connections fail. This approach helps ensure that I/O operations finish to completion, even during link failures.

Moreover, Brocade Access Gateway can automatically fail back to the preferred fabric link after the connection is restored, helping to maximize bandwidth utilization. Organizations can configure Brocade

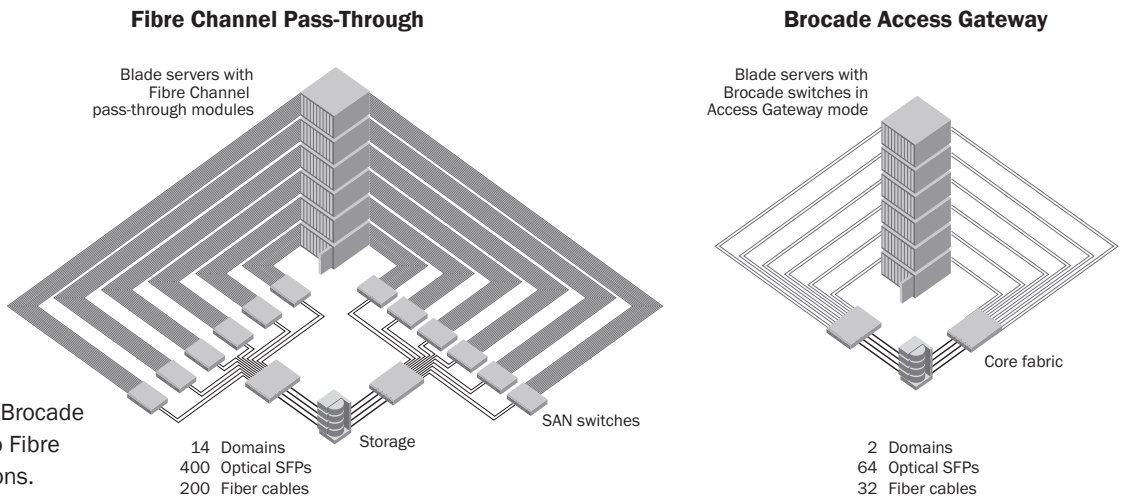


Figure 2. The advantages of Brocade Access Gateway compared to Fibre Channel pass-through solutions.

Access Gateway for fully automated failover, failover on a server-by-server basis, or a combination of these options.

Multiple Fabric Support

With Brocade Fabric OS® (FOS) 6.0.0 and higher, Brocade Access Gateway supports connectivity to multiple fabrics of any kind. Organizations can connect to as many fabrics as is feasible for a specific switch. On a standalone SAN switch, the practical limit is half of the available ports on that switch.

Brocade embedded switches can support the same number of fabrics as external ports on a given switch model. Organizations can use this multiple fabric support feature to isolate servers with special bandwidth requirements, even if there is only one fabric.

Frame-based Trunking

With Brocade FOS 6.1.0 and higher, Brocade Access Gateway can connect to a Brocade FOS-based fabric using Brocade Frame-based Trunking. The trunk is a masterless trunk, which allows it to operate as long as at least one connection on the trunk is online. An optional feature, Brocade Access Gateway Trunking enables seamless failover during individual link failures while providing the utilization and performance benefits associated with Brocade E_Port Trunking.

Advanced Device Security (ADS)

With Brocade FOS 6.1.0 and higher, Brocade Access Gateway supports device-based authorization. This policy enables Device Connection Control (DCC) extension to servers, as well as to all VMs running on those servers (as long as they use NPIV technology).

Cascading

Organizations can cascade two or more Brocade SAN switch modules operating in Brocade Access Gateway mode into a single module before connecting them to the fabric. This feature enables more efficient utilization of available bandwidth. Cascaded Brocade Access Gateway switches still appear as only one device to the core fabric. This feature is not supported on Brocade 6510 or 6505 Switches.

Adaptable Port Capabilities

Some Brocade SAN switches include the Ports on Demand (PoD) feature, which enables “pay-as-you-grow” scalability. After the required ports are enabled, organizations can leverage the flexible Dynamic Ports on Demand (DPoD) feature, which allows them to utilize ports wherever they need them, regardless of the physical location on the switch.

Device-based Mapping

The Brocade Access Gateway device-based mapping technology enables organizations to further increase server virtualization. With this feature, organizations can assign either physical or virtual servers using the server WWN.

Quality of Service (QoS)

With Brocade FOS 6.3.0 and higher, Brocade Access Gateway supports Brocade Adaptive Networking services, including Quality of Service (QoS) and Ingress Rate Limiting, to help ensure bandwidth availability for critical servers or applications and to avoid congestion. An optional license, Adaptive Networking in Brocade Access Gateway works in conjunction with the QoS feature on Brocade fabrics, providing a mechanism to assign traffic priority (high, medium, or low) for a given source and destination traffic flow.

Proactive Monitoring and Alerting

To enable proactive fabric health and performance monitoring, Brocade Access Gateway supports Brocade Fabric Watch and Advanced Performance Monitoring (APM). As optional licensed features, Fabric Watch and APM provide sophisticated performance monitoring and threshold-based alerting capabilities that help ensure network availability, optimize bandwidth utilization, and maximize fabric performance.

Robust Network Analytics

With Brocade FOS 7.1.0 and higher, Brocade Access Gateway running on Brocade 6510 and 6505 Switches with Gen 5 Fibre Channel supports Brocade Fabric Vision technology. An extension of Gen 5 Fibre Channel, Fabric Vision technology 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, Brocade Access Gateway with Fabric Vision technology helps administrators avoid problems, maximize application performance, and reduce operational costs. 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.

BROCADE ACCESS GATEWAY SPECIFICATIONS

Operating system	Brocade Fabric OS 5.2.1 or higher
NPIV fabric support	• Brocade Fabric OS 5.1 or higher (Brocade Fabric OS 5.2.1 recommended) • Cisco OS 3.0 or higher
NPIV limits	Up to 255 NPIV IDs per Brocade Access Gateway external port
Scalability	Limited by the fabric's NPIV capabilities (port-based, switch-based, and fabric-based limits)
Management capabilities	• Configured and managed through Brocade Web Tools • Management through Brocade Network Advisor • Configured and managed through the Brocade Command Line Interface (CLI) • Management Information Block (MIB) support • Simple Network Management Protocol (SNMP)-based services • Fabric Device Management Interface (FDMI) for managing attached Brocade 1860 Fabric Adapters or Fibre Channel Host Bus Adapters (HBAs) • RASlog for event recording and auditing • Secure Shell (SSH) for encrypted telnet sessions • RADIUS, LDAP, OpenLDAP, and TACACS+ for enhanced user authentication • Registered State Change Notification (RSCN) filtering

Usage Note

Certain Brocade switch features are not applicable in Brocade Access Gateway mode, including Admin Domains, Brocade Advanced Zoning, Fibre Channel Arbitrated Loop (FCAL) support, FICON®, IP over Fibre Channel, Brocade Extended Fabrics, Management Services, Name Services (SNS), port mirroring, and SMI-S.

For information related to SFF Committee documentation, visit www.sffcommittee.org.

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

For information about switch and device interoperability, visit www.brocade.com/interoperability.

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, 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. For more information, contact a Brocade sales partner or visit www.brocade.com.

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