



Brocade Fabric OS provides a robust operating system for high-performance, scalable Storage Area Networks (SANs) based on the Brocade SilkWorm family of 1 and 2 Gbit/sec switches.

BROCADE FABRIC OS

Highlights

- Provides high-speed access to mission-critical information
- Builds highly resilient, fault-tolerant multiswitch Brocade SAN fabrics
- Enables hosts to dynamically share storage resources
- Scales Brocade SAN fabrics by enabling the addition of new devices without reconfiguration
- Integrates existing 1 Gbit/sec SAN fabrics with 2 Gbit/sec switches and devices
- Supports private loops, hosts, and devices within SAN fabrics
- Enables optional Brocade Advanced Fabric Services such as Advanced Performance Monitoring, Advanced Zoning, Fabric Watch, Extended Fabrics, ISL Trunking, and QuickLoop/Fabric Assist

The Platform for Intelligent SAN Fabrics

Brocade® Fabric OS is the operating system firmware that provides the core infrastructure for deploying robust Storage Area Networks (SANs). As the foundation for the entire Brocade SilkWorm® family of Fibre Channel switches, Fabric OS helps ensure the reliable and high-performance data transport that is critical for scalable SAN fabrics interconnecting thousands of servers and storage devices. By leveraging advanced Fabric OS capabilities to simplify SAN implementation and management, today's organizations can significantly enhance the Return On Investment (ROI) for their overall storage infrastructures.

With ultra-high-availability features such as non-disruptive hot code activation, Fabric OS is designed to support mission-critical enterprise environments. Accordingly, it provides a variety of enhanced Reliability, Availability, and Serviceability (RAS) capabilities. A highly flexible solution, Fabric OS is built on a proven base of features such as universal port support, self-discovery of new devices, continuous port monitoring, and Brocade Zoning. In addition to providing a wide range of basic fabric services, Fabric OS provides a reliable foundation for Brocade Advanced Fabric Services offerings.

ULTRA-HIGH AVAILABILITY

FOUNDATION FABRIC SERVICES FOR MISSION-CRITICAL SAN ENVIRONMENTS

To support highly scalable, reliable, and manageable enterprise SAN environments, Fabric OS provides a wide range of mission-critical services for:

- Ultra-high availability
- Strong SAN fabric security
- Simplified management
- Reliable support and diagnostics
- Efficient connectivity and data routing

Ultra-High-Availability Services

Fabric OS provides ultra-high-availability services designed specifically for enterprise SAN environments, including:

- **Non-disruptive hot code activation:** Supports the stringent availability requirements of mission-critical environments by enabling operating system upgrades without downtime or disruption to data traffic in the SAN. This capability is available for SilkWorm 3900 and SilkWorm 12000 fabric switches.
- **Director-class support for the SilkWorm 12000:** Enables background monitoring of standby control processors. In the event of a failure, non-disruptive failover of control processors occurs automatically while traffic flows uninterrupted through the SAN. In addition, World Wide Name (WWN) card hot-swap capabilities support a robust core for core-to-edge SAN implementations.

Strong SAN Fabric Security Services

Fabric OS enables the most secure SAN environments possible by supporting Secure Shell (SSH) for encrypted telnet sessions to switches and by supporting the optional Brocade Secure Fabric OS® and Advanced Zoning products.

Simplified Management Services

Fabric OS includes a comprehensive set of capabilities for complete end-to-end SAN management, including:

- **State Change Notification (SCN) filtering:** Reduces SCN traffic in the SAN by filtering SCNs and sending them only to other members of a given zone, rather than throughout the entire SAN.
- **Simple Name Server (SNS):** Incorporates the latest Fibre Channel standards, registering information about SAN hosts and storage devices as well as providing a Registered State Change Notification (RSCN) when a device state changes or a new device is introduced.
- **Alias Server:** Supports the multicast services that broadcast data to all members of a group.
- **Time Services:** Provide fabric-wide time synchronization from an external timeserver—enabling time correlation of fabric events.
- **Port naming:** Simplifies management tasks by enabling administrators to associate specific switch ports with symbolic and meaningful names.

- **Legacy environment support:** Enables the management of legacy environments through the Brocade SCSI-3 Enclosure Services (SES) facility.
- **Simple Network Management Protocol (SNMP)-based services:** Include services such as:
 - An SNMP agent and a set of comprehensive Management Information Bases (MIBs) that help monitor and configure switches. This capability enables seamless integration with enterprise management frameworks, and an extensive set of trap conditions alerts administrators about critical exception conditions.
 - Management is enabled via in-band (over IP or a Fibre Channel link) and out-of band (via external Ethernet interfaces) mechanisms. A management server based on FC-GS-3 allows in-band access for fabric discovery. These methods enable the communication of SNMP information to all switches in the fabric through a single connection.
 - A syslog daemon directs exception messages to as many as six recipients for seamless integration with host-based management frameworks.
- **Fabric Device Management Interface (FDMI) support:** Enables Host Bus Adapter (HBA) management through the SAN fabric. The emerging FDMI standard will support HBA firmware downloads, authenticate HBAs to the

fabric by using digital certificates, and increase security between end devices and the fabric.

- **Brocade WEB TOOLS:** Provides an easy-to-use GUI for managing individual switches and small fabrics in the SAN.
- **A comprehensive Command Line Interface (CLI):** Enables task automation through scripting mechanisms via the front panel, serial port, or telnet.

Reliable Support and Diagnostic Services for Fault Isolation

Key Fabric OS support services include:

- **Call Home capability:** Enables the fabric to proactively report critical exception conditions so administrators can correct potential problems before they disrupt operations.
- **Switch beaconing:** Streamlines problem resolution by identifying an individual switch in a group of remotely managed fabric elements.
- **A comprehensive loop diagnostic facility:** Helps isolate faults for legacy loop-attached devices.

Efficient Connectivity and Routing Services for the Enterprise

To help increase availability and maximize performance, Fabric OS dynamic routing services provide the following capabilities:

- **In-order frame delivery:** Guarantees that frames arrive in order.
- **Dynamic path selection via link state protocols:** Uses the industry-standard Fabric Shortest Path First (FSPF) algorithm to select the most

efficient route for transferring data in multiswitch environments.

- **Load sharing to maximize throughput across ISLs:** Increases throughput by supporting multiple Inter-Switch Links (ISLs) between switches.
- **Automatic path failover:** Reconfigures alternate paths when a link fails. Fabric OS distributes the new configuration fabric-wide and reroutes traffic without manual intervention.
- **Automatic rerouting of frames:** Reroutes traffic to alternative paths in the fabric when a fault occurs—without interrupting service or causing data loss.
- **Automatic reconfiguration:** Reroutes data traffic onto new ISLs as they join the SAN fabric.
- **Static routing support:** Enables the configuration of fixed routes for certain data traffic and helps ensure resiliency during link failures.
- **Routing support for link costs:** Enables the manual configuration of link costs of individual ISLs to influence traffic flow patterns across the fabric.
- **Support for high-priority protocol frames:** Helps ensure that certain frames receive priority routing to minimize latency, a capability that is particularly useful for clustering applications.
- **Seamless integration into WAN gateways via an E_Port:** Enables the specification of R_RDY flow control for use by gateways, and is configurable on a port-by-port basis.

OPTIONAL ADVANCED FABRIC SERVICES

To address the most challenging storage network requirements, Brocade offers a unique family of optional Advanced Fabric Services that build upon the foundation services of Fabric OS. These innovative services include:

- **Brocade Advanced Performance Monitoring:** Enables more effective end-to-end SAN performance analysis to enhance performance tuning, increase productivity, optimize resource utilization, and lower costs.
- **Brocade Advanced Zoning:** Enables organizations to automatically group SAN fabric-connected devices into logical zones that restrict access to “member” devices in the zone. Advanced Zoning uses hardware enforcement at both the port and WWN level to provide more robust security.
- **Brocade Fabric Watch:** Continuously monitors SAN fabrics for potential faults based on thresholds set for a variety of SAN fabric elements and events—automatically alerting administrators to potential problems before they become costly failures.
- **Brocade ISL Trunking:** Optimizes the performance and availability of SAN fabrics while simplifying ISL management. Two 2 Gbit/sec SilkWorm switches can automatically group up to four ISLs into a single logical “trunk” with a total throughput of up to 8 Gbit/sec.
- **Brocade Extended Fabrics:** Supports the reliable, high-speed connectivity of SilkWorm switches over dark fiber or Dense Wave Division Multiplexing (DWDM) equipment at distances up to 120 kilometers to enhance business continuance operations.
- **Brocade QuickLoop/Fabric Assist:** Provides a strategic migration path to integrate legacy loop products into switched fabric SANs.
- **Brocade Secure Fabric OS:** Provides a comprehensive security solution to help protect mission-critical data. Key features include centralized policy-based security management, encryption of management data, and authentication to create a fabric-wide trusted environment with control over all levels of fabric access and communication.

MAXIMIZING SAN INVESTMENTS

Brocade and its partners offer complete SAN solutions to meet a wide range of technology and business requirements. These solutions include education and training, support, service, and professional services to help optimize SAN investments.

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



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