



The Brocade SilkWorm 4100 Fibre Channel switch combines up to 32 ports of 4 Gbit/sec performance with high availability and Ports on Demand flexibility to support mission-critical Storage Area Networks (SANs).

SILKWORM 4100

Highlights

- Offers Ports on Demand capabilities for fast, easy, and cost-effective scalability from 16 to 32 ports in 8-port increments
- Protects existing investments by providing 4 Gbit/sec technology with auto-sensing capabilities to support earlier 1 and 2 Gbit/sec devices
- Supports full 4 Gbit/sec operations at distances up to 100 kilometers (or 500 kilometers at 1 Gbit/sec) for cost-effective business continuance
- Increases network performance with enhanced Brocade Inter-Switch Link (ISL) Trunking, which enables a high-speed data path up to 32 Gbit/sec
- Meets high-availability requirements with redundant, hot-pluggable components, non-disruptive software upgrades, and hot code activation for a wide range of SAN configurations
- Leverages intelligent Brocade SAN management and monitoring tools to increase operational efficiency and maximize SAN investments
- Provides FICON® support for IBM zSeries server environments, including CUP support

A Flexible High-Performance Switch for a Variety of SAN Environments

The Brocade® SilkWorm® 4100 is a high-performance, high-availability Fibre Channel switch designed for rapidly growing storage requirements in mission-critical environments. With a flexible architecture that supports 1, 2, and 4 Gbit/sec technology with 16, 24, or 32 ports in a 1U package, the SilkWorm 4100 provides excellent value at an affordable price point. As a result, even small organizations can achieve the levels of performance and availability typically attainable only by larger enterprises.

The SilkWorm 4100 provides low-cost access to industry-leading SAN technology as well as support for “pay-as-you-grow” scalability with Ports on Demand. Because it is fully compatible with previous 1 and 2 Gbit/sec devices, it protects existing technology investments while providing a strategic solution for the future.

These capabilities help make the SilkWorm 4100 ideal for branch offices and departments in large enterprises as well as for mid-sized organizations. It can be used as the foundation of small standalone SANs or as an edge switch in larger core-to-edge SAN infrastructures for enterprise-class applications such as ERP, MRP, data warehousing, billing, and e-mail.

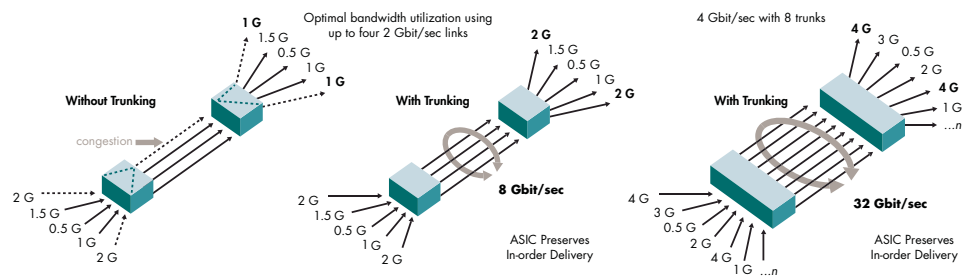
INDUSTRY-LEADING PERFORMANCE

The SilkWorm 4100 provides best-in-class performance for midrange SAN switches to support mission-critical applications. It features a non-blocking architecture with as many as 32 ports concurrently active at 4 Gbit/sec full duplex to provide an aggregate bandwidth of 256 Gbit/sec.

The SilkWorm 4100 utilizes new ASIC technology featuring four 8-port groups. As a result, an Inter-Switch Link (ISL) trunk can have up

HIGH PERFORMANCE

Figure 1.
ISL Trunking with 1, 2, and 4 Gbit/sec links



to eight ports supplying as much as 32 Gbit/sec of data throughput (see Figure 1). In addition to reducing congestion between switches and providing greater total bandwidth, enhanced ISL Trunking utilizes ISLs more efficiently to free up the number of usable switch ports.

Additional performance capabilities include the following:

- Eight virtual channels on each ISL enhance Quality of Service traffic prioritization and anti-starvation capabilities at the port level to avoid performance degradation.
- 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 2). It augments ISL Trunking to provide more effective load balancing in certain configurations, such as routing data between

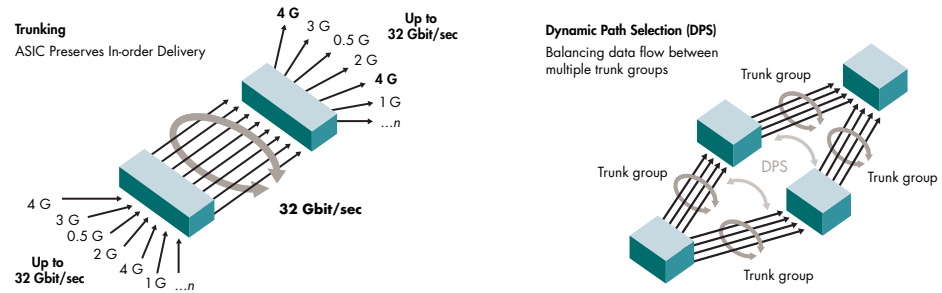
multiple trunk groups. As a result, a combination of DPS and ISL Trunking provides the greatest design flexibility and the highest degree of load balancing in the fabric.

ENTERPRISE-CLASS AVAILABILITY FOR BUSINESS CONTINUANCE

With enterprise-class availability features such as hot-swappable redundant fans and power supplies, the SilkWorm 4100 provides a reliable foundation for disaster recovery and business continuance. Moreover, hot code activation helps maximize application uptime with faster system upgrades and maintenance that reduce the dependency on scheduled outages. Combined with a wide range of Brocade diagnostic and monitoring functions, these capabilities help provide a high-availability SAN environment.

To support disaster recovery and business continuance operations, the SilkWorm 4100 enables unprecedented distances between

Figure 2. Dynamic Path Selection augments ISL Trunking to route data efficiently between multiple trunk groups.



servers and storage devices. Support for distances up to 500 kilometers at 1 Gbit/sec and 100 kilometers at 4 Gbit/sec facilitates the deployment of high-performance, long-distance SAN solutions such as data center consolidation.

HIGH SCALABILITY WITH PORTS ON DEMAND

Delivering up to 32 ports in a 1U form factor, the SilkWorm 4100 combines the cost-effectiveness of a switch designed for a variety of SAN environments with highly scalable Ports on Demand capabilities. The SilkWorm 4100 comes with a minimum of 16 ports enabled, and organizations can easily expand the number of ports to 24 or 32 by activating a license as their requirements change. Because the SilkWorm 4100 is easily upgradeable, it extends the Brocade modular “pay-as-you-grow” approach to support cost-effective business growth.

SUPERIOR ROI AND INVESTMENT PROTECTION

The SilkWorm 4100 combines strategic performance, availability, and scalability advantages with investment protection for existing SAN environments. For instance, auto-sensing capabilities for 1, 2, and 4 Gbit/sec ports enable rapid implementation in existing SAN environments—reducing both deployment cost and complexity.

The SilkWorm 4100 utilizes the same Brocade Fabric OS® code stream that supports the SilkWorm product line—from the base 8-port SilkWorm 200E to the 256-port SilkWorm 48000. This helps ensure full forward and backward compatibility among SilkWorm switches while simplifying software maintenance and field upgrades. As a result, the SilkWorm 4100 enables organizations to better leverage their current training, tools, devices, and processes.

OPEN SAN MANAGEMENT

By networking Fibre Channel switches such as the SilkWorm 4100 under a common platform, Fabric OS greatly simplifies SAN management. An embedded real-time operating system, Fabric OS includes standard management interfaces, a full range of management tools, and support for third-party SAN management applications.

To simplify SAN administration and reduce costs, the SilkWorm 4100 supports switch management through a command line interface, Brocade Web Tools, or Brocade Fabric Manager. It also leverages Brocade Advanced Fabric Services to improve the utilization of existing storage and server assets, increase administrator efficiency, and lower the cost of storage management.

To facilitate deployment, the SilkWorm 4100 integrates easily into heterogeneous environments such as Windows NT, UNIX, Linux, Solaris, and AIX. It also provides FICON support on a flexible port-by-port basis in IBM zSeries server environments. FICON capabilities include FICON intermix modes, cascaded FICON fabrics, and CUP support for monitoring tools.

HIGHER FABRIC SECURITY FOR CRITICAL INFORMATION

The SilkWorm 4100 is designed for the highest level of SAN fabric security to help organizations safeguard their critical information. It utilizes Brocade Zoning, Brocade Advanced Zoning, and Secure Fabric OS® to help organizations simplify administration and significantly increase their control over data access.

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.

SILKWORM 4100

Systems Architecture

Fibre Channel ports	32 ports, universal (E, F, and FL)
Scalability	Full fabric architecture with 239 switches maximum
Certified maximum	Combination of 56 switches, 19 hops; larger fabrics certified as required; consult Brocade or OEM SAN design documents for configuration details
Interoperability	Any SilkWorm 2000 family switch, SilkWorm 3000 family switch, SilkWorm 4000 family switch, SilkWorm 200E, SilkWorm 12000, SilkWorm 24000, and SilkWorm 48000
Performance	Auto-sensing of 1 Gbit/sec, 2 Gbit/sec, and 4 Gbit/sec port speeds; optionally programmable to fixed port speed; speed matching between 1, 2, and 4 Gbit/sec ports
ISL Trunking	Up to eight 4 Gbit/sec ports per ISL trunk; up to 32 Gbit/sec per ISL trunk
Aggregate bandwidth	256 Gbit/sec end to end
Fabric latency	<2.1 μ sec. with no contention, cut-through routing at 4 Gbit/sec
Maximum frame size	2112-byte payload
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Port types	FL_Port, F_Port, and E_Port; self-discovery based on switch type (U_Port)
Data traffic types	Fabric switches supporting unicast and broadcast
Media types	Small Form-factor Pluggable (SFP) media; short-wave up to 500 meters (1640 feet); long-wave up to 10 kilometers (6.2 miles); extended long-wave up to 100 km (62.1 mi). Distance depends on fiber optic cable and port speed.
Fabric services	Simple Name Server; Registered State Change Notification (RSCN). Optional fabric services include: Brocade Advanced Zoning; Brocade Fabric Watch; Brocade Extended Fabrics; Brocade Remote Switch; Brocade ISL Trunking; Brocade Advanced Performance Monitoring; Brocade Web Tools; FICON Control Unit Port (CUP)
Options	SFP Media

Management

Management software supported	Telnet; SNMP (FE MIB, FC Management MIB); Brocade Advanced Web Tools (optional); Brocade Fabric Manager (optional)
Management access	10/100 Ethernet port (RJ-45); Serial port (RS-232); in-band through Management Server
Diagnostics	POST and embedded online/offline diagnostics

Mechanical Specifications

Enclosure	Back-to-front airflow (non-Fibre Channel port side to Fibre Channel port side). Power from rear. 1.0U, 19-inch EIA compliant
Size	Width: 42.90 cm (16.89 in) Height: 4.24 cm (1.67 in) Depth: 58.42 cm (23.00 in)
System weight	9.25 kg (20.4 lb) with single power supply, no SFP 10.16 kg (22.4 lb) with dual power supplies, no SFP
Environment	
Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating: -25°C to 70°C (-13°F to 158°F)
Humidity	Operating: 20 to 85 percent non-condensing at 40°C (104°F)
Altitude	Operating: Up to 3000 meters (9842 feet) Storage: Up to 12 kilometers (39,370 feet)
Shock	Operating: 20 g, 6 ms half-sine Non-operating: 15 g, 12-18 ms trapezoid
Vibration	Operating: 0.5 g sine, 0.4 grms random, 5 to 500 Hz Non-operating: 2.0 g sine, 1.1 grms random, 5 to 500 Hz
Airflow	
High speed	40 CFM (cu. ft./min)
Low speed (65%)	27.5 CFM
Power	
Maximum output	210 Watts
System power consumption	120 Watts max, 80 Watts typical
Nominal input voltage	100 to 240 VAC, Universal
Input line frequency	47 to 63 Hz
Minimum input voltage	90 VAC
Maximum input voltage	260 VAC
BTU rating (80% efficiency)	512 BTU/hr
Inrush current	Maximum of 15 amps for period between 10 to 150 ms at 50° Celsius (122° Fahrenheit)

Safety

The SilkWorm 4100 complies with the following safety certifications: UL 60950-1: 2003, First Edition (Underwriters Laboratory); CSA 60950-1-03 (Canadian Standards Association); Nemko EN60950: 2000; TUV EN60950: 2000 / IEC60950:1999 (TUV "GS" for Germany, TUV "S" for Argentina); GOST (Russia); Low Voltage Directive (73/23/EEC) for CE Marking in European Union

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



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