

Intelligent fabric switch with enterprise performance for midrange and large storage networks



## IBM TotalStorage SAN Switch F16



High port density packaging helps save rack space

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### Highlights

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- **Can be used as a departmental switch, a core fabric switch or an edge switch with large enterprise SANs**
- **Provides broad range of IBM open server and storage support including fabric, loop and private loop attachments**
- **Designed to provide high performance with up to 2 Gigabit/sec. (Gbps) throughput per port and Inter-Switch Link (ISL) Trunking with aggregate speed up to 8 Gbps**
- **Offers 16-port Fibre Channel switch with rack space saving Small Form-Factor Pluggable (SFP) transceivers**
- **Offers Advanced Security with comprehensive, policy-based security capabilities**
- **Offers advanced fabric services such as end-to-end performance monitoring and advanced zoning**

### IBM TotalStorage SAN Switch F16

The IBM® TotalStorage® SAN Switch F16 provides 2 Gbps Fibre Channel performance and advanced functions to support demands for improved security, performance and manageability as the SAN fabric grows to include thousands of devices. It is based on next-generation switch technology that is designed to be fully interoperable with IBM TotalStorage SAN Switch S08 and S16 and next generation F08, F32 and M12 Switches. You can configure scalable solutions that help address your needs for high performance and reliability for environments ranging from small workgroups to very large, integrated enterprise SANs.

### Industry-standard Fibre Channel

The IBM SAN Switch F16 is designed to provide Fibre Channel connectivity to:

- IBM @server pSeries® and selected RS/6000® servers
- IBM @server xSeries® and selected Netfinity® servers
- IBM @server iSeries™

- *IBM TotalStorage Network Attached Storage 300G*
- *Other Intel®-based servers with Microsoft™ Windows NT® and Windows 2000®, Netware and Linux*
- *Selected Sun and HP servers*
- *IBM TotalStorage® Enterprise Storage Server™ (ESS)*
- *IBM TotalStorage FAStT Storage Servers*
- *IBM TotalStorage Enterprise Tape System 3590 and IBM TotalStorage Enterprise Tape Library 3494*
- *IBM 3583 Ultrium Tape Library and IBM 3584 UltraScalable Tape Libraries*
- *IBM SAN Switches M12, F16, F08, S16, S08 and SAN Managed Hub<sup>1</sup>*

The F16 Switch supports the interconnection of multiple IBM TotalStorage SAN Switch M12s, F32s, F16s, S16s and S08s. The interconnection of IBM and compatible (Brocade® SilkWorm® 2400, 2800, 3800, 3900 and 12000) switches can help create a scalable core-to-edge SAN fabric that can provide high performance, scalability, and fault tolerance required by the most demanding

e-business applications and enterprise storage management applications—such as storage consolidation, data protection, disaster tolerance and data sharing.

#### **IBM TotalStorage SAN Switches**

IBM SAN Switch S08 and S16 support ANSI-standard Fibre Channel protocol at 1 Gbps. The F16 Switch is built upon a next-generation switch technology that supports link speeds of 1 and 2 Gbps. Each port supports either 100 MB/sec or 200 MB/sec, full-duplex data transfers. Auto-sensing ports automatically negotiate to the highest speed supported by the attached server, storage or switch.

The F16 Switch is suited for disaster tolerance solutions such as remote tape vaulting and remote disk mirroring. F16 Switches can provide up to twice the throughput of S16 Switches. This performance capability can be used to either reduce the number of expensive “between site” ISL connections or to improve the performance with the same number of connections.

F16 Switch fabrics can provide up to twice the performance of S16 Switch fabrics. Customers can now deploy F16 Switches that are ready to exploit the performance potential of newer servers and storage devices with 2 Gbps capabilities.

The F16 Switch provides a complete solution for an entry or departmental SAN fabric, a small core connecting multiple fabrics, or as an edge switch extending the each of an enterprise core-to-edge SAN built around the M12 Core Fabric Switch. F16 Switches can be used to expand an existing core-to-edge SAN fabric infrastructure. As F16 Switches are added to the core installed, SAN Switches can be migrated to the edge. This approach supports scalable network growth in a modular, cost-effective and non-disruptive manner with investment protection for installed switches.

#### **Common SAN Switch functions and features**

IBM TotalStorage SAN Switches include universal ports that can automatically determine the port type when connected to a fabric port (F\_port), fabric loop port (FL\_port) or

expansion port (E\_port). Fabric services include automatic self-discovery of new devices and dynamic path selection based upon Fabric Shortest Path First (FSPF), which is designed to select the most efficient routing in a SAN fabric. A mixture of shortwave and longwave ports can be configured. Rack-mounted installation is standard, and desktop installation is available. High availability is supported by hot pluggable cooling fans and optics. An additional power supply provides redundant power and dual line cords.

### **Common firmware functions and features**

The common IBM SAN Switch firmware simplifies SAN fabric expansion. Standards-based Management Server and Simple Name Server support in-band discovery of SAN fabric changes. Management access of SNMP information is provided via an external Ethernet interface or in-band over a Fibre Channel link through a single fabric connection.

Device-level zoning of the SAN fabric enables an administrator to create separate segments or zones within the SAN fabric to separate different application servers and devices in heterogeneous SAN environments.

Zones may be dynamically created and changed from any switch in the fabric. Advanced security functions such as WWN hardware-enforced zoning are standard.

*Extended Fabrics Activation* extends SAN fabrics beyond the Fibre Channel standard 10 km. This enables high-performance applications over extended distances for storage consolidation, data protection, disaster tolerance and data sharing. ISLs using extended longwave transceivers, Fibre Channel repeaters and Dense Wave Division Multiplexing (DWDM) devices can provide Metropolitan Area Network (MAN) connectivity distances. Extended Fabrics Activation helps optimize switch buffering to provide high performance by configuring gateway switch ISLs with additional buffer credits.

*Remote Switch Activation* extends the distance of SAN fabrics by enabling two Fibre Channel switches to interconnect over an ATM Wide Area Network (WAN). With this feature, one can stage and manage data transfers across a pair of Fibre Channel switches connected to a pair of Fibre Channel to WAN Gateways.

*QuickLoop* enables servers with Fibre Channel A bit rated Loop (FC-AL) private loop Host Bus Adapters (HBAs) to communicate with FC-AL storage devices through IBM SAN Switches. Individual switch ports may be designated as FL\_Ports, allowing a private host initiator to communicate with FC-AL storage devices as though they were all contained in one logical loop.

### **Switch configuration options**

Eight shortwave (500 M at 1 Gbps, 300 M at 2 Gbps) universal ports are standard. In addition, a mixture of shortwave and longwave (10 km) ports can be configured by adding up to eight SFP optical transceivers. SFP LC connectors provide higher port density and cut rack space height requirements in half.

Inter-Switch Link (ISL) Trunking enables as many as four Fibre Channel links between F08, F16, F32 and M12 Switches to be combined to form a single logical ISL with an aggregate speed of up to 8 Gbps. These high-speed trunks help optimize bandwidth utilization and enhance availability.

Load balancing can help balance the load across all of the ISLs through trunking. This enables administrators to focus on overall network performance rather than individual link congestion from multiple higher performance devices sharing a single link. Administrators need only to monitor the trunk performance rather than specific devices being routed across it. Increased network reliability and performance is supported because failed links do not require rerouting of traffic.

### **End-to-end performance monitoring**

Next-generation switching technology enables Frame Filtering, which is based upon additional information in several fields in the packet header. Frame Filtering enables new intelligent fabric services such as end-to-end performance analysis.

IBM S08 and S16 Switches provide performance information at the switch or port level. IBM F16 Switches with Frame Filtering provide detailed information at the frame level. This information can be used to monitor performance end-to-end across the entire core-to-edge SAN fabric—from a specific server to a specific storage

device port. This enhanced performance monitor can enable more detailed Service Level Agreement (SLA) monitoring and billing.

Performance Bundle Activation provides support for ISL Trunking- and Frame Filtering-based Performance Monitoring tools for enhanced end-to-end performance monitoring. As core-to-edge SAN fabrics scale up to thousands of devices, ISL Trunking and Frame Filtering can help to greatly simplify storage management and reduce the overall cost of the storage infrastructure.

### **Advanced security**

As entry level and departmental SAN islands evolve into large enterprise SANs, which may be interconnected over Wide Area Networks (WANs), advanced security is required to control and manage fabric access. External threats and internal operational events can compromise valuable enterprise data assets and create data integrity exposures. Advanced Security Activation feature can help create a secure storage networking infrastructure required for multiple protocol operation and SAN island consolidation. Advanced Security extends basic fabric security

provided by Advanced Zoning hardware-enforced WWN zoning. It provides a comprehensive, policy-based security system for IBM SAN Switch fabrics with Fabric OS versions 3.1 and 4.1. Prior generation switch investment protection is provided with support for Fabric OS version 2.6.1. All switches in an Advanced Security fabric must be upgraded before Advanced Security can be deployed.

### **Open fabric management**

IBM SAN Switch management framework is designed to support the widest range of solutions—from the very small workgroup SANs up to very large enterprise SAN fabrics with thousands of devices. Small SANs require rapid deployment and plug-and-play simplicity. Very large SAN fabrics require centralized management and automated administration. IBM SAN Switch management options include a browser-based SAN Switch Web Tool and open standards-based interfaces to enterprise SAN managers. With an industry-standard SNMP interface, customers know that IBM TotalStorage SAN Switches can gain the benefits of being centrally managed with Tivoli® SAN management software.

SAN Switch Web Tools are designed to provide a comprehensive set of management tools that support a Web browser interface for flexible, easy-to-use integration into existing enterprise storage management structures. WEBTOOLS supports security and data integrity by limiting (zoning) host system attachment to specific storage systems and devices.

Fabric Watch is a standard function on M12, F32, F16, S16\* and S08\* Switches. Fabric Watch threshold monitoring tracks the health of switches and SAN fabric. Fabric Watch monitors fabric resources, port traffic, switch environmental values and operational values for GigaBit Interface Converters (GBIC) and optical transceivers. This information is accessible from WEBTOOLS and Fabric Manager. When used with IBM SAN Switches, WEBTOOLS provides

an easy-to-use interface to intelligent fabric features such as end-to-end performance monitoring and ISL Trunking.

#### **Fabric Manager**

Fabric Manager 4.1 can help simplify management, reduce cost of administration and accelerate deployment and provisioning. It builds upon Fabric Manager 3 by offering new capabilities:

- *Configuration change management with fabric snapshot and compare*
- *Secure Fabric OS management including security policy control, audit and reporting*
- *SAN topology visualization and at-a-glance views*
- *Call home facility sends email notification to support personnel as events occur*

Fabric Manager provides a Java-based application that can help simplify management of complex, multiple switch fabric. SAN Switch Web Tools and Fabric Manager work together on the same management server which can be attached to any switch in the core/edge fabric. It can also manage up to eight separate fabrics. Fabric Manager requires a Windows NT/2000 or Sun Solaris 7 server with Netscape or Internet Explore web browser.

#### **Enterprise SAN fabric management**

Fabric Watch can send alerts to enterprise SAN fabric management software from vendors such as Computer Associates, Hewlett Packard, Tivoli, and VERITAS. Brocade Fabric Access Layer API server agents are available on IBM SAN Switches. Only a single connection to the fabric is required to access any switch or fabric-wide resource.

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## IBM TotalStorage SAN Switch F16 at a glance

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### Physical characteristics

Height (rack-mount)	4.33 cm/1.72 in (1U)
Height (table-top)	4.72 cm/1.86 in (1U)
Width	42.9 cm/16.9 in
Depth	62.2 cm/24.5 in
Weight (single power)	10.65 kg/23.5 lb
(dual power supply)	12.7 kg/28.0 lb

### Operating environment

Temperature	0° to 40° C/32° to 104° F
Relative humidity	5% to 80% at 40° C/104° F

### Power requirements

Power range	85 to 264 VAC, 47 to 63 Hz
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### Product numbers

2109 F16—IBM TotalStorage SAN Switch with eight shortwave transceivers. One to eight additional shortwave or longwave transceivers are optional.

FC 2210 (PN 19K1271)—Shortwave Transceiver

FC 2220 (PN 19K1272)—Longwave Transceiver

FC 9205—Non-rack mount install

FC 5605 (PN 19K1248)—Fibre Channel cable, LC/LC, multimode optical, 50.0u, 5 meters

FC 5625 (PN 19K1249)—Fibre Channel cable, LC/LC, multimode optical, 50.0u, 25 meters

FC 5701—Fibre Channel SC male/LC female coupling cable, multimode optical, 50.0u, 2 meters

FC 5702 (PN 19K1250)—Fibre Channel LC male/SC female coupling cable, multimode optical, 50.0u, 2 meters

FC 6203 (PN 18P3576)—Additional power supply

FC 7202 (PN 18P6019)—Fabric manager 3

FC 7203—Fabric manager 4

FC 7204 (PN 17P7183)—Fabric manager 3 to 4.1

Upgrade

FC 7302 (PN 18P3579)—Remote Switch Activation

FC 7303 (PN 18P3580)—Extended Fabric Activation

FC 7421 (PN 18P3590)—Performance Bundle

FC 7423 (PN 18P3596)—F16 Advanced Security Activation

RPQ 8S0521—QuickLoop

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<sup>1</sup> For specific availability dates, configuration options, server models, operating system levels and attachment capabilities, please consult the Web at: [ibm.com/storage/fcswitch](http://ibm.com/storage/fcswitch)

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