IBM

IBM TotalStorage SAN256B

Improved port density enables up to 384 ports in 14U vertical rack space to maximize datacenter efficiency

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Highlights

- **High availability with built-in redundancy designed to avoid single points of failure**

- **Highly scalable director with 16, 32 or 48 ports per port switch blade and from 16 to 384 ports in a single domain**

- **Multiprotocol router blade with sixteen Fibre Channel (FC) ports and two Internet Protocol (IP) ports for SAN routing and distance extension over IP**

- **iSCSI blade enables servers to access storage over IP (Ethernet) in a highly integrated, cost-effective manner for storage consolidation**

- **10 Gbps Fibre Channel blade provides extended distance ISL connectivity between directors over dark fibre or DWDM**

- **Sixteen and thirty-two port switch blades support IBM FICON® Director switching with Fibre Channel/FICON intermix, FICON CUP (Control Unit Port) and FICON cascading**

The IBM TotalStorage® SAN256B is designed to provide outstanding performance, enhanced scalability and a design ready for high-performance 4 Gbps and 10 Gbps capable hardware and expanded capability features. The SAN256B is well suited to address enterprise SAN customer requirements for infrastructure simplification and improved business continuity.

The SAN256B director interoperates with other members of the IBM TotalStorage SAN b-type family. It can be configured with a wide range of highly scalable solutions that address demands for integrated IBM System z™ and open system server enterprise SANs.

High availability design
The SAN256B director is designed to provide director-class high availability with redundant, hot-pluggable components to avoid single points of

failure. Redundant control processors, power supplies and fans provide a design for concurrent hardware and firmware maintenance and upgrade without disruption to network operation. Fabric Operating System firmware is designed to enable non-disruptive stateful control processor failover and concurrent firmware activation. Advanced security features can enforce fabric-wide change control policies that can help reduce potential downtime due to operator errors. Optional Fabric Manager software provides Call Home capabilities.

Enhanced performance

The SAN256B director is built upon technology that provides Fibre Channel link speeds of 10, 4, 2 and 1 Gigabits per second (Gbps) (requires storage system hardware that supports 4 Gbps throughput). Each FC switch port supports 400 MBps, 200 MBps or 100 MBps full-duplex, non-blocking performance. Auto-sensing ports are capable of automatically negotiating to the highest speed supported by the attached server, storage system, switch, router or director. IP ports support one Gigabit Ethernet (GbE). Each iSCSI blade can provide IP (Ethernet) access via GbE, while each 10 Gbps FC port can provide local or extended distance ISL connectivity between directors.

The SAN256B can be used to expand an existing core-to-edge SAN fabric infrastructure. As SAN256B directors are added to the core, installed SAN switches or directors can be migrated to the edge. The high density of the SAN256B also makes it suitable for installation at the edge of the SAN for server aggregation. These approaches help support scalable network growth in a modular, cost-effective and non-disruptive manner while customers continue to derive benefit from installed SAN infrastructure devices.

Enhanced scalability

The SAN256B is scalable from 16 to 384 Fibre Channel (FC) ports, up to four Internet Protocol (IP) ports or up to 48 10 Gbps FC ISL ports in a single domain. This capability provides three times the number of switch ports compared to the prior generation IBM TotalStorage SAN Switch M14, making for fewer elements to manage in large-scale SANs. The *M14/M48 16-port 4 Gbps Switch Blade* feature expands connectivity in sixteen port increments. The *M48 32-port 4 Gbps Switch Blade* feature expands connectivity in thirty-two port increments. And the *M48 48-port 4 Gbps Switch Blade* expands connectivity in forty-eight port increments. The *M48 FC Routing Blade* expands connectivity in sixteen port increments

plus adds two GbE IP ports. The two GbE ports enable reliable SAN extension across suboptimal Wide Area Networks (WANs) through the use of Fast Write, hardware-based compression and storage-optimized protocol enhancements. The *M48 iSCSI Blade* provides cost-effective connectivity to servers over IP interfaces, and the *M48 10 Gbps Fibre Channel Blade* provides local and extended distance ISL connectivity. A mixture of shortwave and longwave SFP optical transceiver features can be installed on a port-by-port basis.

Advanced Inter-Switch Link (ISL) Trunking

ISL Trunking enables as many as eight 4 Gbps Fibre Channel links to be combined to form a single logical ISL between IBM SAN256B directors and IBM System Storage™ SAN32B-3 or IBM System Storage SAN64B-2 switches or IBM System Storage SAN18B-R routers for an aggregate bandwidth of up to 32 Gbps. Up to four 4 Gbps links can be combined to form a single ISL between SAN256B directors and IBM TotalStorage SAN16B-2 or SAN16B-2 Express Model switches for an aggregate bandwidth of up to 16 Gbps. The SAN256B is also backward compatible with previous generation directors and switches

that operate at 2 Gbps. Connection to IBM M14 and M12 SAN directors and other IBM SAN switches enables up to four links to form a single logical ISL with an aggregate speed of up to 8 Gbps. Advanced ISL Trunking provides additional scalability by enabling SAN256B, M14 and M12 directors to be networked in an expandable core as part of a core-to-edge SAN fabric.

High-speed ISL trunks are designed to automatically optimize bandwidth utilization and help enhance availability. ISL trunks can help simplify administration and provide more flexibility when connecting multiple high-performance devices to the SAN fabric because they eliminate the need to manage traffic over a single link between interconnected switches.

Administrators only need to monitor performance of the ISL trunk rather than performance of specific devices routed across the trunk. Failures of individual links do not require rerouting of traffic, which can help increase network reliability and performance.

Advanced multiprotocol routing
Since the introduction of Storage Area Networks, customers have built multiple SAN networks (or islands) for different applications, often with fabric switch components from different manufacturers. Some islands were built by different departments within a company, while other islands resulted from mergers, acquisitions or reorganizations. Dissimilar SAN equipment with different capabilities or a desire to isolate important applications has constrained opportunities for enhanced infrastructure simplification and vital business continuity solutions.

The *M48 FC Routing Blade* provides Fibre Channel FC-FC Routing Service, which allows the interconnection of multiple SAN islands without requiring that the separate fabrics be merged into a single large SAN. This capability can help create a tiered or extended enterprise SAN infrastructure without having to redesign or reconfigure the entire environment.

FC-FC Routing Service is designed to allow devices located on separate SAN fabrics to communicate without merging the fabrics into a single large SAN environment. This routed network consists of multiple individual SAN fabrics for one large storage network, known as a "MetaSAN."

Local site infrastructure simplification solutions may be extended to one or many remote sites for enhanced data protection and disaster tolerance. The *M48 FC Routing Blade* provides Fibre Channel over IP and FCIP Tunneling Service for distance extension, which can enable cost effective and manageable metro and global business continuity solutions. The ability to encrypt data transmitted over an IP link is designed to provide additional security and data protection. This extended distance connectivity can help create consolidated remote tape vaulting data protection plus metro mirror and global mirror disk-based disaster tolerant solutions.

FCIP Tunneling Service is designed to allow organizations to extend Fibre Channel SANs over longer distances using an IP-based Metropolitan Area Network (MAN) or Wide Area Network (WAN) infrastructure. This service can be integrated with the FC-FC Routing Service. Such integration helps prevent faults on MAN/WAN links from propagating between sites and can help enable a more secure distance-connectivity infrastructure for disaster recovery applications.

iSCSI connection
Many enterprises have a large number of lower-cost servers that are not connected to a consolidated SAN infrastructure primarily because of cost constraints. The *M48 iSCSI Blade*

can provide a means to enable these servers to gain access to efficient, large-capacity fibre channel storage resources via a robust, high-performance, highly scalable SAN infrastructure.

High-speed ISL connectivity

The M48 10 Gbps Fibre Channel Blade is designed to provide ISL connectivity between local or remote directors. Full data-rate connection to 10 Gbps Dense Wave Division Multiplexor (DWDM) links are supported across extended distances.

End-to-end performance monitoring

Advanced switching technology across all IBM TotalStorage SAN b-type directors and switches features Frame Filtering, which is based on additional information contained in several fields in both a network packet header and payload. Frame Filtering enables intelligent fabric services such as end-to-end performance analysis. SAN256B directors with Frame Filtering can provide detailed information at the director, port and frame levels. This information can be used to monitor performance from a specific server to a specific storage device port across an entire core-to-edge SAN fabric.

Performance Monitoring

Performance Monitoring is a standard capability of SAN256B directors that leverages Frame Filtering capabilities for end-to-end performance monitoring. As core-to-edge SAN fabrics scale to thousands of devices, Advanced ISL Trunking and Frame Filtering can help simplify storage management and reduce the overall cost of the storage infrastructure.

FICON Director operation

IBM FICON Director switching supports FICON servers, intermixed FICON and Open servers and FICON cascading between two directors. *M48 FICON CUP Activation* feature provides Control Unit Port (CUP) in-band management function designed to allow mainframe applications to perform configuration, monitoring, management and statistics collection. These applications include System Automation for IBM OS/390® (SA/390), Dynamic Channel Management Facility (DCM) and Resource Management Facility (RMF). Enhanced Call Home and RAS capabilities can help simplify management. Hardware-enforced FICON and FCP port zoning enhances separation with intermix operation. Advanced ISL Trunking with self-optimizing traffic management can help enhance the performance and availability of FICON

cascading. *M48 Advanced Security Activation* feature is required for FICON cascading. *M48 FICON with CUP, Advanced Security Bundle* feature provides both capabilities in a robust package. (FICON and M48 FICON CUP Activation are not supported on the M48 48-port 4 Gbps Switch Blade.)

Industry-standard Fibre Channel

SAN256B directors support the inter-connection of multiple IBM SAN switches and directors. The interconnection of IBM TotalStorage SAN b-type family members (2005, 2109, 3534) and compatible switches, directors and routers (Brocade® Silkworm® 200E, 2400, 2800, 3200, 3800, 3900, 4100, 4900, 7500, 12000, 24000, 48000 and Multiprotocol Routers) can support the creation of scalable, dual redundant core-to-edge SAN fabrics that can support high-performance, scalable and fault tolerant infrastructure simplification and business continuity solutions such as storage consolidation, data protection, disaster tolerance and data sharing.

Common IBM SAN capabilities

IBM TotalStorage SAN b-type switches and directors 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.

Common IBM SAN switch firmware

Common switch firmware helps simplify 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 administrators 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 a fabric. Basic security functions such as hardware-enforced zoning are standard.

Open fabric management

The IBM TotalStorage SAN b-type management framework is designed to support the widest range of solutions, from 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 b-type switch management options include browser-based Web Tools, Fabric Watch, Fabric Manager and open standards-based interfaces to enterprise SAN managers.

Advanced Web Tools is a standard function designed to provide a Web browser interface for flexible, easy-to-use integration into existing enterprise storage management structures. Web Tools is designed to support security and data integrity by limiting host system attachment to specific storage systems and devices through zoning.

Fabric Watch is either a standard function or an optional feature on IBM TotalStorage SAN b-type family members. Fabric Watch threshold monitoring tracks the health of switches and SAN fabrics. It is designed to monitor fabric resources, port traffic, switch environmental values and operational values for Small Form-factor Pluggable

(SFP) optical transceivers. This information is accessible from Web Tools and Fabric Manager. When used with IBM TotalStorage b-type family members, Web Tools provides an easy-to-use interface to intelligent fabric features such as end-to-end performance monitoring and ISL Trunking.

Optional features
M48 Remote Switch Activation

Remote Switch Activation feature extends the distance of SAN fabrics by enabling two Fibre Channel switches to interconnect across a 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 CNT Storage Routers.

M48 Extended Fabric Activation

Extended Fabric Activation feature extends SAN fabrics beyond the Fibre Channel standard 10 km. This helps enable high performance over extended distances for data protection and business continuity solutions. Extended distance longwave SFP transceivers are available for 35 km and 80 km distances. Extended Fabric Activation helps optimize switch buffering to support high gateway switch ISL performance.

M48 Advanced Security Activation

As entry level and departmental SAN islands evolve into large enterprise SANs within the datacenter and across 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 SAN island consolidation. Advanced Security Activation extends basic fabric security provided by Advanced Zoning hardware-enforced World Wide Name (WWN) zoning. It provides a policy-based security system for IBM SAN switch fabrics with Fabric OS versions 3, 4 and 5. Prior generation switch investment protection is provided with support for Fabric OS version 2.6.2. All switches in an Advanced Security fabric must be upgraded before Advanced Security can be deployed.

M48 FICON with CUP Activation

FICON with CUP Activation feature provides support for FICON on IBM System z servers. (FICON and M48 FICON CUP Activation are not supported on the M48 48-port 4 Gbps Switch Blade.)

M48 FICON with CUP, Advanced Security Bundle

FICON with CUP Activation and Advanced Security Bundle provides support for both FICON on IBM eServer™ zSeries® servers and Advanced Security in one package.

M14/M48 N_Port ID Virtualization

N_Port ID Virtualization (NPIV) provides support for selected attached IBM System z Fibre Channel Protocol (FCP) channels and is designed to allow the sharing of a single physical FCP channel among operating system images, whether in LPARs or as IBM z/VM® guests in virtual machines.

NPIV helps to improve I/O performance with increased resource sharing and channel utilization of FCP channels among operating system images in LPARs or virtual machines and helps to facilitate infrastructure simplification with virtual channel administration and management.

M48 FCIP Activation

M48 FCIP Activation enables organizations to extend their Fibre Channel SANs over longer distances that would be impractical or too expensive with native Fibre Channel or in situations where "dark fibre" resources are unavailable but in which IP connectivity already exists. Eight virtual FCIP tunnels per IP port help maximize scalability and utilization of MAN/WAN resources.

Related products
Fabric Manager

Fabric Manager is a powerful tool to help simplify management, reduce cost of administration and accelerate deployment and provisioning.

Fabric Manager provides a Java™ technology-based application that can help simplify management of a complex, multiple switch fabric. Web Tools and Fabric Manager work together on the same management server which can access any switch in a core-to-edge fabric. Fabric Manager requires a Microsoft® Windows NT®, Windows® 2000 or Sun Solaris 7 server with a Netscape or Internet Explorer Web browser. Fabric Manager is available through IBM as a separate software program.

IBM SAN Cabinet C36

The C36 Cabinet is based on a standard 19-inch rack and offers 36U vertical space. It is specifically designed to support up to two SAN256B, M14 or M12 directors with two power distribution units, each with three power outlets. Alternative configurations consisting of a SAN256B director plus other members of the IBM TotalStorage SAN b-type family are possible. Please consult the Web at **ibm.com**/storage/san/b_type for specific configuration options and attachment capabilities.

IBM TotalStorage SAN256B at a glance

Product characteristics

Product number	2109-M48
Base fabric director	Base chassis includes two control processor blades and slots for one to eight blades
Fibre Channel interfaces	E-Port, F_Port, FL-Port
FICON interfaces	4 Gigabits per second (Gbps)
IP interfaces	1 gigabite Ethernet
Optical transceivers	4 Gbps SFP and 10 Gbps XFP short wave and long wave
Fans and power supplies	Dual power supplies and blowers
Hot-swap components	SFP and XFP optical transceivers, control processor blades, switch, routing, iSCSI and 10 Gbps blades, power supplies, blowers
Rack support	IBM TotalStorage SAN Cabinet C36 only
Non-rack support	Non-rack installation is not supported
Management software	Web Tools, Fabric Watch, Performance Monitor
Servers supported	IBM System z and IBM eServer zSeries servers; IBM System x™ and IBM eServer xSeries® servers; IBM System p™ and IBM eServer pSeries® servers; IBM System i™ and IBM eServer iSeries™ servers; Other Intel® processor-based servers; Selected Sun and HP servers; IBM System Storage SAN Volume Controller (SVC)
Operating systems supported	IBM z/OS®, AIX® and OS/400®, Microsoft Windows 2000, Windows 2003; Red Hat Linux®, Red Hat Linux Advanced Server; SUSE Linux, SUSE Linux Enterprise Server (SLES); United Linux; Novell® NetWare®
Storage products supported	IBM System Storage DS8000™ series; IBM System Storage DS6000™ series; IBM System Storage DS4000™ series; IBM TotalStorage Enterprise Storage Server®; IBM TotalStorage 357x, 358x, and 359x Tape Drives and Libraries (not supported with 3590 or LTO®; Generation 1 Tape Drives); IBM TotalStorage 3494 Tape Library when using 3592 Tape Drives; Other selected storage systems
Fibre Channel switches supported	IBM TotalStorage SAN b-type switches, directors and routers Other switches, directors and routers manufactured by Brocade
Fibre optic cable	Fibre optic cables are required and are available in various lengths in single mode and multi-mode formats
Warranty (standard)	1-year; Customer Replaceable Unit (CRU) Service and IBM On-site Repair; warranty service upgrades are available
Optional features	M48 Remote Switch Activation; M48 Extended Fabric Activation; M48 Advanced Security Activation; M48 FICON with CUP Activation; M48 FICON with CUP, Advanced Security Bundle; M14/M48 N_Port ID Virtualization, M48 FCIP Activation, 2 Additional Power Supplies

Physical characteristics

Height (rack mount)	61.24 cm/24.11 in
Width	43.74 cm/17.22 in
Depth (with door)	74.20 cm/29.20 in
Weight (without media)	98 kg/216 lbs

Operating environment

Temperature	0 to 40 degrees C
Relative humidity	20% to 85% at 40 degrees C

Electrical requirement

Power	240 or 208 VAC

For more information

Contact your IBM representative or
IBM Business Partner or visit:

ibm.com/storage/san/b_type