

Highest performance and scalability for the most demanding enterprise SAN environments



## IBM System Storage SAN768B



Premier platform for data center connectivity

The IBM System Storage™ SAN768B fabric backbone is designed to be the premier platform for consolidation of your data center connectivity, providing high-performance and highly available data networking. Providing new levels of performance with industry-leading 8 Gbps Fibre Channel (FC) technology, it is also the first member of the IBM System Storage b-type family designed to exploit Brocade®'s new Data Center Fabric architecture.

The SAN768B interoperates with other members of the IBM System Storage b-type and m-type families as well as other fabrics.

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### Highlights

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- **Drive new levels of performance with 8 Gbps Fibre Channel (FC) technology**
- **Reduce total cost of ownership (TCO) through consolidation of network resources**
- **Protect existing infrastructure investment while positioning for future technologies**
- **Manage your infrastructure with greater flexibility and scalability**
- **Unify management framework for consolidated and virtualized resources**
- **Improve energy efficiency by combining higher bandwidth with reduced power consumption**

- *It can be configured with a wide range of connectivity options, including 10, 8, 4, 2 and 1 gigabits per second (Gbps) Fibre Channel, up to 4 Gbps Fibre Connections (FICON®), and Fibre Channel over Internet Protocol (FCIP) over 1 gigabit per second Ethernet (GbE).*
- *It is also designed to enable support for emerging high-performance and high-function network protocols, including Fibre Channel over Converged Enhanced Ethernet (FCoCEE).*
- *The SAN768B is designed to serve as the basis for transforming existing networks into a unified, high-performance data center fabric, connecting applications with their data and virtual servers with virtual storage.*

As a member of the IBM System Storage family of b-type products, the SAN768B is designed to participate in fabrics containing other b-type and m-type devices manufactured by Brocade. This versatile hardware can serve as a new top tier (or backbone) in a complex fabric and provide connections to other b-type and m-type directors, switches and routers.

#### **Adaptive Network Services**

The IBM System Storage SAN768B can be an expandable platform for intelligent, policy-driven services that can

help manage and protect your enterprise data in virtualized environments. These services are part of Brocade's Adaptive Networking strategy, which includes Quality of Services (QoS), traffic management and resource recovery applications.

QoS and traffic management applications help ensure that application workloads meet service levels if congestion occurs anywhere in the data path. Resource recovery applications can detect stranded resources or inefficiently used resources and reclaim or reallocate them to optimize data flow according to pre-defined policies.

#### **Investment protection and efficiency**

To help enterprises protect their technology investments, the SAN768B features backward compatibility with IBM b-type and m-type fabrics, as well interoperability with other fabrics. With the SAN768B as the new, top tier in a fabric infrastructure, it can connect to IBM TotalStorage® SAN256B, IBM TotalStorage SAN140M and IBM TotalStorage SAN256M directors and also to b-type and m-type switches and routers. By adopting an evolutionary strategy rather than a "rip-and-replace" approach, enterprises can save significant time, money and effort as they move forward while minimizing disruption and risk.

The SAN768B is also a highly efficient platform, delivering extremely high performance in terms of watts per gigabit of bandwidth. It requires significantly

less power to deliver much greater bandwidth, which helps make it considerably more cost-effective than previous alternatives.

For a 768-port end user backbone solution, for example, the SAN768B backbone with 8 Gbps SFPs provides up to four times the end user performance per chassis (twice as many ports, each with twice the port performance); up to 60 percent more power efficient than the 4 Gbps SAN256M director; and up to 25 percent more power efficient than the 4 Gbps SAN256B director.

#### **Technical capabilities**

Each SAN768B contains redundant control processor modules (active/standby) and core blades, plus slots for eight other blades. Each system also includes two redundant and hot-swappable power supplies. The entire system can operate on one power supply. The optional **SAN768B Pair of Upgrade Power Supplies** feature provides two additional power supplies. Three redundant and hot-swappable fan units are included with each system. The entire system can operate on two fan units.

Available 16-port, 32-port and 48-port FC blades support link speeds of 8, 4, 2 and 1 Gbps. The 10 Gbps FC blade contains six 10 Gbps FC ports. Each FC port supports full-duplex, non-blocking performance. The FC routing

blade contains sixteen 4 Gbps FC ports and two GbE ports. A base system does not include any port blades; at least one blade is required for host, storage and SAN connectivity. All ports on a blade must be populated with SFP optical transceivers.

Each Fibre Channel port uses an optical transceiver to convert electrical signals to optical pulses and optical pulses back to electrical signals. Each 10 Gbps port requires an XFP optical transceiver, while each 8 Gbps port requires either an 8/4/2 Gbps SFP optical transceiver or a 4/2/1 Gbps SFP optical transceiver. All 8 Gbps ports are capable of automatically negotiating to the highest speed supported by the attached server, storage system, director, switch or router. All Fibre Channel (FC) ports can support Inter-Switch Link (ISL) connectivity between other SAN devices. IP ports can use either an SFP optical transceiver or a copper transceiver that supports 1 Gbps Ethernet (GbE). A variety of SFP and XFP optical transceivers are supported, including 1 Gbps Ethernet, 4 Gbps and 8 Gbps shortwave, 4 Gbps 4 Km and 10 Km, and 8 Gbps 10 Km longwave, 4 Gbps 30 Km extended distance longwave, 10 Gbps shortwave and 10 Gbps longwave. A copper SFP is also supported for use on the Ethernet ports.

Full Fabric and Universal Port operation are supported on all 8 Gbps and 4 Gbps FC ports (F\_Port and E\_Port). FL\_Port and Fibre Channel are supported on 16-port and 32-port blades.

**SAN768B FICON w/CUP** (Control Unit Port) is available as an optional feature. The **FICON Accelerator** feature employs emulation techniques to reduce or eliminate performance degradation over extended distances for applications such as IBM z/OS® Global Mirror and remote tape.

All 8 Gbps FC switch blades support ISL trunking. Up to eight 8 Gbps ports can be combined into a single ISL trunk yielding a 64 Gbps logical connection. ISL trunking is not supported on the 10 Gbps FC switch blade.

Each SAN768B provides up to 384 FC ports in one domain and four Inter-Chassis Link (ICL) connections. The optional **SAN768B Inter-Chassis Cable Kit** and **SAN768B Inter-Chassis License** features enable connection to another SAN768B (both systems must have the Inter-Chassis Cable Kit and Inter-Chassis License optional features). Each ICL provides 32 trunked ISL connections, yielding a total of 128 connections between two SAN768B chassis. Since each chassis can support up to 384 FC ports, connection of two SAN768B chassis together in a dual core configuration yields up to 768 FC ports in two domains in the same fabric. The two SAN768Bs connected via ICLs must be mounted in the same cabinet or in adjacent cabinets.

The optional **SAN768B FCIP/FC High Performance Extension** feature enables the two GbE ports on the FC Routing Blade. The feature includes the following capabilities:

- *FCIP trunking with exchange-based load balancing across all links with the same “path cost to destination.”*
- *Multi-tunnel support for up to eight virtual tunnels per GbE port.*
- *Compression over IP uses hardware-based compression to increase the bandwidth capability of each IP link.*
- *Fast Write over FCIP pre-acknowledges SCSI Write commands to enhance performance for writing to disk storage over long distance IP links.*
- *FC Write over FC link pre-acknowledges SCSI Write commands.*
- *Tape Write Pipelining over FCIP pre-acknowledges portions of SCSI Tape Write commands to enhance performance for writing to tape storage over long distance IP links.*

The optional **Integrated Routing** feature allows any FC port to be configured as an EX\_Port to support Fibre Channel (FC) routing.

The SAN768B is only supported in an IBM TotalStorage SAN Cabinet (2109-C36). One or two SAN768Bs can be installed in one cabinet.

## Fabric Operating System

Brocade® Fabric OS® (FOS) is included with each SAN768B and contains all functions necessary to operate a base system. The SAN768B requires FOS level 6.1.0 or higher. FOS offers the following advanced functions (either included in the base switch or as optional features):

- **ADAPTIVE NETWORKING SERVICES** is a set of features providing users with tools and capabilities to incorporate network policies to ensure optimal behavior of a large SAN. It uses network intelligence to anticipate congestion and to dynamically make adjustments in the fabric so that application traffic continues to flow.
- **ADVANCED PERFORMANCE MONITOR** helps identify end-to-end bandwidth usage by host/target pairs and is designed to provide for capacity planning.
- **ADVANCED WEB TOOLS** enables administration, configuration and maintenance of fabric switches and SANs.
- **ADVANCED ZONING** segments a SAN into virtual private SANs.
- **ENHANCED GROUP MANAGEMENT (EGM)** enables additional device-level management functionality for IBM b-type products when added to the element management and also allows large consolidated operations to groups of devices (i.e. firmware downloads, configuration uploads and downloads).
- **EXTENDED FABRIC** extends SAN fabrics beyond the Fibre Channel standard of 10 km by optimizing internal switch buffers to maintain performance on ISLs at distances up to 500 kilometers.
- **FABRIC WATCH** monitors mission-critical switch operations.
- **FCIP/FC EXTENSION** enables GbE ports on the FC Routing Blades and includes exchanged-based routing across all FCIP links, multi-tunnel support for up to eight virtual tunnels per GbE port, hardware-based compression to increase bandwidth capability on IP ports, FastWrite to enhance performance for writing to disk storage over long IP links, Tape Write Pipelining to enhance performance for writing to tape storage over long IP links, and Fast Write over a FC link (also requires Extended Fabric).
- **FICON ACCELERATOR** employs emulation techniques to reduce or eliminate performance degradation over extended distances for applications such as IBM z/OS Global Mirror and remote tape. Benefits include improved FICON read and write performance, which allows faster data backup and recovery operations.
- **FICON WITH CUP ACTIVATION** is designed to provide in-band management of the SAN768B by System Automation for z/OS from IBM System z9™ EC and zSeries® 990 and 900 servers. This support is designed to provide a single point of control for managing connectivity in active FICON I/O configurations.
- **INTEGRATED ROUTING** allows any FC port in a SAN768B to be configured as an EX\_Port to support Fibre Channel (FC) Routing. An FC Routing Blade is no longer needed in a SAN768B to provide this capability.
- **TRUNKING** enables FC packets to be efficiently distributed across multiple ISLs between two IBM SAN b-type fabric switches and directors while preserving in-order delivery. Both SAN b-type devices must have trunking activated.

**IBM System Storage Data Center Fabric Manager** (DCFM), **Brocade Fabric Manager** (FM) and **Brocade Enterprise Fabric Connectivity Manager** (EFCM) are separate software programs available to provide advanced management functions for large fabrics. DCFM is recommended as the preferred network management program.

## IBM System Storage SAN768B at a glance

### Product characteristics

Product number	2499-384
Base machine	Base chassis includes the following components: <ul style="list-style-type: none"><li>• Two control processor modules and two core module</li><li>• Two power supplies</li><li>• Three fan modules</li><li>• Fabric Operating System</li><li>• Enterprise Software Bundle (including Adaptive Networking, Advanced Performance Monitoring, Enhanced Group Management, Extended Fabrics, Fabric Watch and Trunking)</li><li>• Advanced Web Tools and Zoning</li><li>• No switches or blades are included in the base (at least one 8 Gbps or 10 Gbps Fibre Channel (FC) switch blade or FC Routing Blade is required for server, storage or SAN connectivity)</li><li>• Rack mounting kit, rack-mount power cords, service tools, serial cable and documentation</li></ul>
Fibre Channel interfaces	8 Gbps E_Port, F_Port and FL_Port
FICON interfaces	4 gigabits per second (Gbps)
IP interfaces	1 Gigabit Ethernet (GbE)
Transceivers	<ul style="list-style-type: none"><li>• 8 Gbps and 4 Gbps SFP and 10 Gbps XFP shortwave and longwave optical transceivers (SFP optical transceivers may be used on any of the FC and GbE ports)</li><li>• A 1 Gigabit per second copper SFP is available for use on Ethernet ports</li><li>• All ports on a blade must be populated with transceivers</li></ul>
Hot-swap components	Control processor and core modules, power supplies, fan modules, FC and FC routing blades, SFPs and XFPs
Rack support	IBM TotalStorage SAN Cabinet (2109-C36) only
Management software	Fabric Operating System, Enterprise Software Bundle (including Adaptive Networking Services, Advanced Performance Monitoring, Enhanced Group Management (EGM), Extended Fabrics, Fabric Watch and Trunking), Advanced Web Tools and Zoning
Servers supported	IBM System z9® EC, z9 BC and zSeries® 990 and 900; IBM Power Systems, IBM System i™, System p™ and selected RS/6000® and AS/400® servers; IBM System x™ and selected Netfinity® servers; other Intel®-based servers with Linux®, Microsoft® Windows® 2000 and Windows 2003; selected Sun™ and HP servers;
Storage products supported	IBM System Storage SAN Volume Controller (SVC)
Fibre Channel switches supported	IBM System Storage and IBM TotalStorage SAN b-type and m-type directors, switches and routers; other directors, switches and routers manufactured by Brocade
Fibre optic cable	Fibre optic cables with LC connectors are required and are available in various lengths in single-mode and multi-mode formats
Warranty	1-year; 24x7; same-day
Optional features	Maintenance service options are available after warranty expiration 16-port, 32-port and 48-port 8 Gbps Fibre Channel switch blades; 10 Gbps Fibre Channel switch blades; 16 FC + 2 IP FC routing blades; SFPs and XFPs; fibre optic cables; Inter-Chassis Cable Kit; inter-chassis license; upgrade power supply; FICON Accelerator, FICON w/CUP activation; FCIP/FC extension, and Integrated Routing



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## IBM System Storage SAN768B at a glance

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### Physical characteristics

Height (rack mount)	61.24 cm/24.11"
Width	43.74 cm/17.22"
Depth (with door)	73.20 cm/28.82"
Depth (without door)	61.19 cm/24.09"
Weight (384 ports fully populated)	103.50 kg/228.20 lbs

### Operating environment

Temperature (operating)	10 to 40 degrees C (50 to 104 degrees F)
Humidity (operating)	20% to 85% relative humidity (RH) non-condensing at 40 degrees C (104 degrees F), with a maximum gradient of 10% per hour
Altitude (operating)	Up to 3 kilometers/10,000 feet
Airflow	.00059 cu m/hr/350 cu ft/min

### Electrical requirement

Nominal input voltage	200 – 240Vac, Universal
Input line frequency	47 – 63 Hz
Heat dissipation	1440 Watts or 4914 British thermal unit (Btu)
Inrush current	Maximum of 20 amps

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### For more information

Contact your IBM representative or IBM Business Partner or visit:

[ibm.com/systems/storage/san](http://ibm.com/systems/storage/san)

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