

Highest performance for the most demanding enterprise SAN environments



## IBM System Storage SAN384B



Compact platform for enhanced data center connectivity

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### Highlights

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- **Drive new levels of performance with 8 Gbps Fibre Channel (FC) technology in a compact design**
- **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**

The IBM® System Storage™ SAN384B 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 one of the first members of the IBM System Storage b-type SAN family designed to exploit Brocade®'s new Data Center Fabric architecture.

The SAN384B interoperates with other members of the IBM System Storage b-type SAN family as well as other fabrics.

- *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 Connectivity (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 SAN384B 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 SAN products, the SAN384B is designed to participate in fabrics containing other b-type SAN 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 SAN directors, switches and routers.

#### **Adaptive Network Services**

The IBM System Storage SAN384B 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.

#### **Virtual Fabrics**

The IBM System Storage SAN384B supports the ANSI standard-based implementation of Virtual Fabrics (VF). Virtual Fabrics adds the capability for physical switches to be partitioned into independently managed Logical Switches, each with its own data, control, and management paths. Logical Switches can be used to allocate fabric resources on a per-port basis rather than on a per-switch basis. Additionally, Logical Switches can simplify resource allocation by customer, department, application, or storage tier, and consolidate resources across multiple fabrics.

Each Logical Switch belongs to one Logical Fabric. A Logical Fabric can include both logical and physical switches. Physical switches joining a Logical Fabric are not required to support the Virtual Fabric feature, making it compatible with existing fabrics. All fabric services, such as Zoning, Quality of

Service (QoS), and Access Control List (ACL) policies are managed separately in each Logical Fabric. With Virtual Fabrics, improved ISL bandwidth utilization, per-port resource allocation, and flexible management partitioning can be achieved, resulting in reduced power and cooling costs, more ports for connectivity to end devices, and a simplified management scheme.

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

To help enterprises protect their technology investments, the SAN384B features backward compatibility with IBM b-type SAN fabrics. With the SAN384B as a new element in a fabric infrastructure, it can connect to IBM TotalStorage® SAN256B, IBM System Storage SAN768B backbones and also to b-type SAN 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 SAN384B 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 384-port end user backbone solution, for example, the SAN384B backbone with 8 Gbps SFPs provides up to two times the end user performance per chassis (equivalent number of ports as SAN256B, each port with twice the performance); and up to 25 percent more power efficiency than the 4 Gbps SAN256B director.

### Technical capabilities

Each SAN384B contains redundant control processor modules (active/standby) and core blades, plus slots for four other blades. Each system also includes two redundant and hot-swappable power supplies. The entire system can operate on one power supply. Two redundant and hot-swappable fan units are included with each system. The entire system can operate on one fan unit. Available blades for the SAN384B include:

- *16-port, 32-port and 48-port FC blades supporting link speeds of 8, 4, 2 and 1 Gbps*
- *6-port FC blade supporting link speed of 10 Gbps*
- *FC routing blade containing sixteen 4 Gbps FC ports and two GbE ports*

All Fibre Channel ports on the blades support full-duplex, non-blocking performance. 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 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 ports can support Inter-Switch Link (ISL) connectivity between other SAN devices. Internet Protocol (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 FICON are supported on 16-port and 32-port blades. FICON is supported on 48-port blades as part of a Logical Switch configuration using the new Virtual Fabrics feature. **FICON w/CUP** (Control Unit Port) is available as an optional feature, which provides in-band management of the SAN384B by System Automation for z/OS from IBM System z9® EC and zSeries® 990 and 900 servers. The **FICON Accelerator** optional 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 SAN384B provides up to 192 FC ports in one domain and four Inter-Chassis Link (ICL) connections. The optional **Inter-Chassis Cable Kit** and **SAN384B Inter-Chassis License** features enable connection to another SAN384B or SAN768B (both systems must have the Inter-Chassis Cable Kit and Inter-Chassis License optional features). Each ICL port provides 8 x 8 Gbps trunked ISL connections, yielding a total of 64 logical connections between two SAN384B or SAN768B chassis and preserving 64 physical ports for device connectivity. Since each chassis can support up to 192 FC ports, connection of two SAN384B chassis together in a dual core configuration yields up to 384 FC ports in two domains in the same fabric. The two SAN384Bs connected via ICLs must be mounted in the same cabinet or in adjacent cabinets.

The optional **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 SAN384B is only supported in an IBM TotalStorage SAN Cabinet (2109-C36). One, two or three SAN384Bs can be installed in one cabinet.

#### **Fabric Operating System**

Brocade Fabric OS® (FOS) is included with each SAN384B and contains all functions necessary to operate a base system. The SAN384B requires FOS level 6.2.0 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 GUI-based administration, configuration and maintenance of a SAN switch.
- **ADVANCED ZONING** partitions a SAN into logical groups (called zones) to restrict device communication and apply certain policies only to members within the same zone.
- **ENHANCED GROUP MANAGEMENT (EGM)** enables additional device-level management functionality for IBM b-type SAN 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 connected at extended distances.
- **FABRIC WATCH** constantly monitors mission-critical switch operations for potential faults and automatically alerts administrators to problems before they become costly failures.
- **FCIP/FC EXTENSION** enables GbE ports on a FC Routing Blade 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 SAN384B 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 SAN384B to be configured as an EX\_Port to support Fibre Channel (FC) Routing. With this feature, a FC Routing Blade is not needed in a SAN384B to provide routing capability.
- **TRUNKING** enables FC packets to be efficiently distributed across multiple ISLs between two IBM SAN b-type SAN fabric switches and directors while preserving in-order delivery. Both b-type SAN devices must have trunking activated.
- **VIRTUAL FABRICS** allows a physical switch to be partitioned into independently managed Logical Switches, each with its own data, control, and management paths.

**IBM System Storage Data Center Fabric Manager** (DCFM) is a software program that centralizes management of data center fabrics, maximizes productivity by automating tasks, provides an intuitive GUI-based interface with wizard-driver operations, and actively monitors mission critical fabrics in real time. DCFM is recommended as the preferred network management program.

## IBM System Storage SAN384B at a glance

### Product characteristics

Product number	2499-192
Base machine	Base chassis includes the following components: <ul style="list-style-type: none"><li>• Two control processor modules and two core modules</li><li>• Two power supplies</li><li>• Two 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 ISL 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>• Side Exhaust Duct Kit (which also serves as a rack-mount kit), rack-mount power cords, service tools, serial cable and documentation</li></ul>
Fibre Channel interfaces	<ul style="list-style-type: none"><li>• 10 Gbps E_Port</li><li>• 8/4/2/1 Gbps E_Port, F_Port, and FL_Port; EX_Port with optional Integrated Routing feature</li></ul>
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 the FC ports; 4 Gbps shortwave SFPs may be used on any of the 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 Processors (CPs), 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; IBM System Storage SAN Volume Controller (SVC)

## IBM System Storage SAN384B at a glance

Storage products supported	IBM System Storage DS8000®; IBM System Storage DS6000™; IBM System Storage DS4000®; IBM TotalStorage Enterprise Storage Server®; IBM TotalStorage Enterprise NAS Gateway 500; IBM System Storage n Series NAS Filers and Gateways; IBM TotalStorage 3580, 3588, 3590 and 3592 Tape Drives; IBM TotalStorage 3494, 3582, 3583 and 3584 Tape Libraries; IBM TotalStorage 3581 Tape Autoloader; IBM TotalStorage 3584 High Availability Frame Model HA1; Other selected storage systems
Fibre Channel switches supported	IBM System Storage and IBM TotalStorage b-type SAN directors, switches and routers; other directors, switches and routers manufactured by Brocade
Fibre optic cable	Fiber 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 Maintenance service options are available after warranty expiration
Optional features	16-port, 32-port and 48-port 8 Gbps Fibre Channel switch blades; 6-port 10 Gbps Fibre Channel switch blades; 16-port FC + 2-port GbE FC Routing Blades; SFPs and XFPs; fiber optic cables; Inter-Chassis Cable Kit; inter-chassis license; upgrade power supply; FICON Accelerator, FICON w/CUP activation; FCIP/FC extension, and Integrated Routing

### Physical characteristics

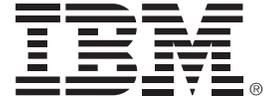
Height (rack mount)	35.0 cm/13.78" (8U) plus 4.37 cm/1.72" exhaust shelf (1U)
Width	43.74 cm/17.22"
Depth (with door)	73.20 cm/28.82"
Depth (without door)	61.19 cm/24.09"
Weight (384 ports fully populated)	68.04 kg/150.0 lbs

### Operating environment

Temperature (operating)	0 to 40 degrees C (32 to 104 degrees F)
Humidity (operating)	10% 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 - 240 V ac, 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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