Highest performance and scalability for the most demanding enterprise SAN environments

IBM System Storage SAN768B

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.

Premier platform for data center connectivity

### Highlights

- **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).
- It is also designed to enable support for emerging high-performance and high-function network protocols, including Fibre Channel over Ethernet (FCoE).
- 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 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 use a SFP optical 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 longwave, 4 Gbps 30 Km extended distance longwave, 10 Gbps shortwave and 10 Gbps longwave.

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.

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 SAN769B 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 SAN768B is only supported in an IBM TotalStorage SAN Cabinet (2109-C36). One or two SAN768Bs can be installed in one cabinet.

Software capabilities

*Fabric OS® (FOS)* is included with each SAN768B and includes the Enterprise Software Bundle, Advanced Web Tools and Zoning, and contains all functions necessary to operate a base system.

The *Enterprise Software Bundle* includes Adaptive Networking Services, Advanced Performance Monitoring, Enhanced Group Management (EGM), Extended Fabrics, Fabric Watch and Trunking. The SAN768B is designed to enable non-disruptive software upgrades.

*Adaptive Networking Services* is a set of features providing users with tools and capabilities to incorporate network policies to ensure optimal behavior of a SAN. FOS 6.0 introduces three new features on the SAN768B fabric backbone:

- **Two types of Quality of Service (QoS) features enable traffic differentiation and prioritization:**
  - Ingress Rate Limiting can restrict throughput on the ingress side of a port by delaying the return of BB credits to the external device.
  - SID/DID Based Prioritization is used to prioritize the FC flow using a Virtual Channel (VC) by which an FC flow is assigned to different behavior aggregates.

- **The Toptalker feature is an addition to the existing performance tools to help identify bandwidth usage on a specific port.**

*Advanced Performance Monitoring* helps identify end-to-end performance usage by host or target pairs and is designed to provide information for capacity planning.

*Enhanced Group Management (EGM)* enables additional device-level management for IBM b-type products and also allows large consolidated operations to groups of devices (for example: groups of SAN devices to receive firmware downloads or configuration uploads or downloads).

*Extended Fabrics* enables extension of SAN fabrics beyond the Fibre Channel standard of 10 Km by optimizing internal switch buffers to maintain performance on ISLs at distances of up to 500 Km.

*Fabric Watch* monitors mission-critical switch operations.

*Trunking* enables FC packets to be efficiently distributed across multiple ISLs while preserving in-order delivery.

The *Advanced Web Tools* utility enables administration, configuration and maintenance of fabric switches and SANs.

*Zoning* can segment a fabric into virtual private SANs.

*Brocade Fabric Manager (FM)* and *Brocade Enterprise Fabric Connectivity Manager (EFCM)* are separate software programs available to provide advanced management functions for large fabrics.
### IBM System Storage SAN768B at a glance

#### Product characteristics

<table>
<thead>
<tr>
<th>Product number</th>
<th>2499-384</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base machine</td>
<td>Base chassis includes the following components:</td>
</tr>
<tr>
<td></td>
<td>- Two control processor modules and two core module</td>
</tr>
<tr>
<td></td>
<td>- Two power supplies</td>
</tr>
<tr>
<td></td>
<td>- Three fan modules</td>
</tr>
<tr>
<td></td>
<td>- Fabric Operating System</td>
</tr>
<tr>
<td></td>
<td>- Enterprise Software Bundle (including Adaptive Networking, Advanced Performance Monitoring, Enhanced Group Management, Extended Fabrics, Fabric Watch and Trunking)</td>
</tr>
<tr>
<td></td>
<td>- Advanced Web Tools and Zoning</td>
</tr>
<tr>
<td></td>
<td>- No switches 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)</td>
</tr>
<tr>
<td></td>
<td>- Rack mounting kit, rack-mount power cords, service tools, serial cable and documentation</td>
</tr>
<tr>
<td>Fibre Channel interfaces</td>
<td>8 Gbps E_Port, F_Port and FL_Port</td>
</tr>
<tr>
<td>FICON interfaces</td>
<td>4 gigabits per second (Gbps)</td>
</tr>
<tr>
<td>IP interfaces</td>
<td>1 Gigabit Ethernet (GbE)</td>
</tr>
<tr>
<td>Transceivers</td>
<td>8 Gbps and 4 Gbps SFP and 10 Gbps XFP shortwave and longwave</td>
</tr>
<tr>
<td>Hot-swap components</td>
<td>Control processor and core modules, power supplies, fan modules, FC and FC routing blades, SFPs and XFPs</td>
</tr>
<tr>
<td>Rack support</td>
<td>IBM TotalStorage SAN Cabinet (2109-C36) only</td>
</tr>
<tr>
<td>Management software</td>
<td>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</td>
</tr>
<tr>
<td>Servers supported</td>
<td>IBM System z9® EC, z9 BC and zSeries® 990 and 900; IBM System p™ and selected RS/6000® servers; IBM System i™ and selected 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)</td>
</tr>
<tr>
<td>Storage products supported</td>
<td>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 Files 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</td>
</tr>
<tr>
<td>Fibre Channel switches supported</td>
<td>IBM System Storage and IBM TotalStorage SAN b-type and m-type directors, switches and routers; other directors, switches and routers manufactured by Brocade</td>
</tr>
<tr>
<td>Fibre optic cable</td>
<td>Fibre optic cables with LC connectors are required and are available in various lengths in single-mode and multi-mode formats</td>
</tr>
<tr>
<td>Warranty</td>
<td>1-year; 24x7; same-day</td>
</tr>
<tr>
<td>Optional features</td>
<td>Maintenance service options are available after warranty expiration</td>
</tr>
<tr>
<td></td>
<td>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 w/CUP activation; FCIP/FC extension</td>
</tr>
</tbody>
</table>
### IBM System Storage SAN768B at a glance

#### Physical characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (rack mount)</td>
<td>61.24 cm/24.11&quot;</td>
</tr>
<tr>
<td>Width</td>
<td>43.74 cm/17.22&quot;</td>
</tr>
<tr>
<td>Depth (with door)</td>
<td>73.20 cm/28.82&quot;</td>
</tr>
<tr>
<td>Depth (without door)</td>
<td>61.19 cm/24.09&quot;</td>
</tr>
<tr>
<td>Weight (384 ports fully populated)</td>
<td>103.50 kg/228.20 lbs</td>
</tr>
</tbody>
</table>

#### 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

---

For more information

Contact your IBM representative or
IBM Business Partner or visit:

ibm.com/storage/san

---

IBM is not responsible for the performance or interoperability of any non-IBM products discussed herein. Performance data for IBM and non-IBM products and services contained in this document was derived under specific operating and environmental conditions. The actual results obtained by any party implementing such products or services will depend on a large number of factors specific to such party’s operating environment and may vary significantly. IBM makes no representation that these results can be expected or obtained in any implementation of any such products or services.