IBM System Storage
SAN768B-2 and
SAN384B-2

Designed to become the foundation for private or hybrid cloud storage area networks

IBM® System Storage SAN768B-2 and SAN384B-2 fabric backbones are among the industry's most powerful Fibre Channel (FC) switching infrastructure offerings. They provide reliable, scalable, high performance foundations for mission-critical storage. These fabric backbones also deliver enterprise connectivity options to add support for IBM FICON connectivity, offering a high-performing and reliable Fibre Connection (FICON) infrastructure with fast and scalable IBM System z servers.

Designed to increase business agility while providing nonstop access to information and reducing infrastructure and administrative costs, SAN768B-2 and SAN384B-2 Gen 5 FC fabric backbones deliver a new level of scalability and advanced capabilities to this robust, reliable, high-performance technology.

The IBM System Storage SAN b-type family switch, designed to support FC connectivity for servers and storage, introduces the next generation of fabric backbones with Gen 5 FC technology to bring a long-term solution for mission-critical applications that require secure, high performance, low-latency storage networks. This enables organisations to continue leveraging their existing IT investments as they grow their businesses and solve their most difficult business challenges.

Highlights

- Unleash the full potential of private or hybrid cloud storage with outstanding scalability, performance and reliability
- Enable simpler, flatter, low-latency chassis connectivity to reduce network complexity, management and costs
- Simplify and centralise end-to-end storage area network (SAN) management with comprehensive diagnostics, monitoring and automation
- Protect investments in existing SAN fabrics and automation tools while reducing operational costs and minimising business disruption
- Maximise performance for input/output (I/O) and bandwidth-intensive applications.
These Gen 5 FC director models offer maximum investment protection by:

- Interfacing with existing 2, 4, 8 or 16 gigabits per second (Gbps) FC ports
- Offering configurable 10 Gbps ports for metro optical connectivity
- Offering 1/10 Fibre Channel over IP (FCIP) for global storage area network (SAN) extension infrastructure
- Offering fabric-based encryption for data-at-rest to protect valuable digital assets
- Integrating with IBM Network Advisor unified network management solution to bridge operational gaps across server, network and storage administrators.

Built upon years of innovation and using the core technology of systems designed to perform at up to 99.999 percent uptime, the new generation of SAN b-type networking backbones helps minimise downtime and disruption for some of the world’s most demanding data centres (DCs).

**Improves flexibility and reliability**

SAN768B-2 and SAN384B-2 are designed to address key customer requirements while consolidating the SAN infrastructure. These fabric backbones with Gen 5 FC technology are available in two modular form factors.

Built for large enterprise (LE) networks and measuring 14U, SAN768B-2 has eight vertical blade slots to provide up to 384×16 Gbps universal (E, F, D, M, and EX) FC ports using 48-port FC blades or up to 512×8 gigabits per second (Gbps) universal (E, F, M, and EX) FC ports using 64-port 8 Gbps FC blades.

Designed for midsize networks and measuring 8U, SAN384B-2 has four horizontal blade slots to provide up to 192×16 Gbps universal (E, F, D, M, and EX) FC ports using 48-port FC blades or up to 256×8 Gbps universal (E, F, M, and EX) FC ports using 64-port 8 Gbps FC blades.

Both of these models can:

- Support 2, 4, 8 and 16 Gbps FC or FICON connections; 10 Gbps FC Inter-Switch Link (ISL) connections in metro optical connectivity or with 10 Gbps dense wavelength division multiplexing (DWDM) devices, in-flight encryption and compression; 64 (4×16) Gbps Inter-Chassis Link (ICL) connections and 1/10 Gbps FCIP
- Leverage fabric-based encryption for data-at-rest
- Integrate with advanced fabric services and management tools
- Deliver backward compatibility with the 8 and 4 Gbps IBM System Storage b-type SAN director, switch and router models.

**Offers leading-edge performance**

Emerging and evolving critical workloads and higher density virtualisation are continuing to push the limits of SAN infrastructures. SAN768B-2 and SAN384B-2 directors feature leading-edge Gen 5 FC technology delivering 16 Gbps line-speed performance and 8.2 Tera bits per second (Tbps) chassis bandwidth to address next generation I/O requirements. In addition, local switching capabilities have been designed to
ensure that data traffic within the same port group does not consume slot bandwidth, maximising the number of line-rate ports.

Performance capabilities include:

- **SAN768B-2**
  - Up to 384 ports (equivalent to 512 with ICLs) at 16 Gbps in a single chassis
  - 8.2 Tbps chassis bandwidth
    - 6.1 Tbps FC/FICON ports
    - 2.1 Tbps inter chassis link (ICL) bandwidth
  - 512 Gbps bandwidth per slot.

- **SAN384B-2**
  - Up to 192 ports (equivalent to 256 with ICLs) at 16 Gbps in a single chassis
  - 4.1 Tbps chassis bandwidth
    - 3.1 Tbps FC/FICON ports
    - 1 Tbps ICL bandwidth
  - 512 Gbps bandwidth per slot.

Each SAN768B-2 and SAN384B-2 contains redundant control processor modules (active/passive) and core blades (active/active), plus slots for FC port blades and advanced functionality blades. All FC ports on the blades support full-duplex, non-blocking performance. These backbones are available with a number of selectable options. The base systems do not include any blades, but at least one blade is required for host and storage connectivity.

Available blades for SAN768B-2 and SAN384B-2 include:

- **16 Gbps 32-port and 48-port FC blades**: These port blades provide 2, 4, 8, 10 or 16 Gbps on each port, which can be configured as E, F, M, EX or D_ports. These 16 Gbps blades are designed to deliver enhanced fabric resiliency and application uptime through advanced features enabled by the Condor3 application-specific integrated circuit, including support for native 10 Gbps FC, in-flight encryption and compression, ClearLink diagnostic technology (D_Ports), increased buffers or Forward Error Correction (FEC).

- **8 Gbps 32-port and 48-port FC blades**: These two port blades provide 2, 4 or 8 Gbps on each port, which can be configured as E, F, M or EX_ports. These 8 Gbps blades are designed to deliver enhanced fabric resiliency and application uptime through advanced features enabled by the Condor3 application-specific integrated circuit, including increased buffers and no oversubscription for traffic across the backplane. These blades do not support native 10 Gbps FC, in-flight encryption and compression, ClearLink diagnostic technology (D_Ports) or FEC.

- **8 Gbps 64-port FC blade**: This blade is designed to allow midsize-to-LE customers to deploy high-density, chassis-based solutions to minimise physical footprint without compromising performance. The 64-port blade does not support FICON but may be used in the same chassis-switching FICON traffic.

- **8 Gbps Extension blade**: This blade combines FC switching and routing capabilities with hardware-assisted FCIP traffic forwarding over IP wide area network (WAN). Supporting 12×8 Gbps FC ports, 10×1 Gbps Gigabit Ethernet (GbE) ports, and two optional 10 Gbps GbE ports, it is designed to provide global remote storage and SAN connectivity. It integrates a variety of capabilities to help deliver a high performance, reliable and security-rich distance-connectivity solution, such as data compression, FICON Acceleration for disaster recovery (DR) solutions and other features designed to maximise the IP network.
8 Gbps Enhanced Extension blade: This new blade is a scalable and flexible platform combining FC and advanced FCIP technology, designed for building or expanding a high performance SAN extension infrastructure for DR, data protection and data mobility storage solutions to move more data faster and further. It proves Internet Protocol Security (IPSec) over both 10 GbE ports versus the previous blade’s support on one port. It is ideal for open systems and mainframe disk and tape extension; multi-site synchronous and asynchronous disk replication; centralised SAN backup, recovery and archiving; and global data and storage resource migration, distribution, and sharing.

8 Gbps 16-port FC Encryption blade: This blade provides fabric-based encryption for data-at-rest and compression, providing from 48 Gbps up to 96 Gbps of encryption processing power to help meet the needs of the most demanding environments with flexible, on-demand performance. It also provides compression services at speeds up to 48 Gbps for tape storage systems. The encryption blade is supported with IBM Tivoli® Key Lifecycle Manager for both disk and tape encryption applications. This open systems network-based solution secures data-at-rest for disk array logical unit numbers, heterogeneous tape drives and virtual tape libraries. This encryption blade is not supported for FICON.

Includes fabric operating system (FOS) and management software

The FOS included with each SAN768B-2 and SAN384B-2 contains all functions necessary to operate a base system. These Gen 5 FC base systems require FOS v7.1 or later to take advantage of the advanced functions delivered through Fabric Vision technology. The enterprise software bundle is a bundle of FOS features on top of base FOS functionality, and it includes the following features:

- Adaptive Networking service is a set of features that provide users with tools and capabilities for incorporating network policies to ensure optimal behaviour of a large SAN. The FOS v7.0 release (or later) supports two types of quality of service (QoS) features with the 16 Gbps fabric backbones: Ingress Rate Limiting and SID/DID-based prioritisation
- Advanced Performance Monitoring helps identify end-to-end bandwidth usage by host/target pairs and is designed to provide for capacity planning
- Extended Fabrics extend SAN fabrics beyond the FC standard of 10 kilometers (km) by optimising internal switch buffers to maintain performance on ISLs connected at extended distances
- Fabric Watch is designed to constantly monitor mission-critical switch operations for potential faults and automatically alert administrators to problems before they become costly failures. Fabric Watch includes Port Fencing capability
- ISL Trunking enables FC frames to be distributed efficiently across multiple ISLs between two IBM b-type SAN fabric switches and directors while preserving in-order delivery. Both b-type SAN devices must have trunking activated. SAN768B-2 and SAN384B-2 add enhanced ISL Trunking support using 16 Gbps ports and enable FC packets to be distributed across up to eight 16 Gbps-capable ISLs for a combined bandwidth of up to 128 Gbps
- Server Application Optimisation license optimises overall application performance for physical servers and virtual machines (VMs) by extending virtual channels to the server infrastructure. Application-specific traffic flows can be configured, prioritised and optimised throughout the entire DC infrastructure.

Delivers simplified scale-out network design

Networks are evolving in order to adapt to rapid growth and change in the server and storage infrastructure. UltraScale chassis connectivity leverages optical ICLs to connect up to 10 SAN768B-2 and SAN384B-2 backbones up to 100 meters apart, enabling flatter, faster and simpler fabrics that increase consolidation while reducing network complexity and costs.

ICLs enable scalable core-edge and active-active mesh chassis topologies. These high-density chassis topologies reduce inter-switch cabling and free up ports for servers and storage, thus maximising overall port density in a lower amount of rack space.
Web Tools, Zoning, Full Fabric, Virtual Fabrics and Enhanced Group Management (EGM) (listed below) are part of the base FOS and do not require a license.

- **Web Tools** enable graphical user interface (GUI)-based administration, configuration and maintenance of fabric switches and SANs
- **Zoning** segments a fabric into virtual private SANs to restrict device communication and apply certain policies only to members within the same zone
- **Full Fabric** enables E_Ports and allows SAN768B-2 and SAN384B-2 to connect to other switches
- **Virtual Fabrics** allow a physical switch to be partitioned into independently managed logical switches, each with its own data, control and management paths
- **EGM** enables additional device-level management functionality for SAN b-type products when added to the element management and also allows large consolidated operations to groups of devices (such as firmware downloads and configuration uploads and downloads).

These optional licenses are also available:

- **FICON with control unit port (CUP) activation** is designed to provide in-band management of the supported SAN b-type switch and director products by system automation for IBM z/OS, performance data for Resource Measurement Facility (RMF), and to provide unsolicited status to IBM MVS. This support is designed to provide a single point of control for managing connectivity in active FICON I/O configurations. To enable in-band management on multiple switches and directors, each chassis must be configured with the appropriate FICON CUP feature. Up to four CUPs per chassis can be enabled.
- **Integrated Routing** allows any 8 or 16 Gbps FC port in SAN768B-2 and SAN384B-2 to be configured as an EX_Port supporting Fibre Channel Routing (FCR).
- **Inter-chassis license** with 16×64 Gbps quad small form-factor pluggable (QSFP) activates ICL ports on the core blades of the 16 Gbps platforms. One ICL Ports on Demand (POD) license only enables half of the ICL ports on core blades of a SAN768B-2 platform or all of the ICL ports on the core blades of a SAN384B-2 platform. Each kit features sixteen 4×16 Gbps ICL QSFP transceivers.
- **Inter-chassis license** with 16× (4×16 Gbps) QSFP provides connectivity up to 100 meters from the switching backplane of one half of an eight-slot chassis to the other half, or to a 4-slot chassis.
- **Enterprise ICL license** supports up to 3,840×16 Gbps universal FC ports (using 16 Gbps 48-port blades); up to 5,120×8 Gbps universal FC ports (using 8 Gbps 64-port blades); ICL ports (32 or 16 per chassis, optical QSFP) connected up to nine chassis in a full-mesh topology or up to 10 chassis in a core-edge topology. Connecting five or more chassis via ICLs requires an Enterprise ICL license.

These optional advanced SAN Extension functionality licenses are available as well:

- **Advanced Extension activation license** enables two advanced extension features, FCIP trunking and adaptive rate limiting (ARL) on the SAN768B-2 or SAN384B-2 systems. The FCIP trunking feature allows multiple IP source and destination address pairs (defined as FCIP circuits) via multiple 1 GbE interfaces to provide a high-bandwidth FCIP tunnel and failover resiliency. The ARL feature is designed to provide a minimum bandwidth guarantee for each tunnel with full utilisation of the available network bandwidth without impacting throughput performance under high traffic load.
- **Extension blade 10 GbE activation license** enables up to two 10 GbE ports on the 8 Gbps extension blades or 8 ×10 Gbps FC ports on the first eight ports of a 16 Gbps port blade. With this license, two additional operating modes, in addition to 1 GbE port mode, can be selected. Either two 10 GbE ports, or ten 1 GbE and one 10 GbE ports, can be configured on an 8 Gbps extension blade when this license is activated.
• **FICON Accelerator activation license** is designed to use advanced networking technologies, data management techniques and protocol intelligence to accelerate FICON disk and tape read-and-write operations over geographically extended distances, while also maintaining the integrity of command and acknowledgment sequences. Ideal for data migration, DR and business continuity solutions beyond 300 km, it supports emulation for IBM z/OS Global Mirror (formerly eXtended Remote Copy or XRC) as well as tape pipelining for FICON tape and virtual tape.

This optional advanced SAN Encryption functionality license is available:

• **Encryption 96 Gbps disk performance upgrade activation license** enables scalability of performance on the encryption blade features. The upgrade is designed to provide increased throughput for disk encryption applications up to 96 Gbps, effectively doubling encrypted throughput performance for disk-based storage with no disruption to operations.

Management software to support Gen 5 FC technology:

• **The IBM Network Advisor** is the base management software required by SAN768B-2 and SAN384B-2. It enables end-to-end management of DC fabrics from storage ports on networked storage systems to host bus adapters (HBAs) attached to physical or virtualised servers. IBM Network Advisor v12.0 or later is required for supporting transitions to cloud environments.

**Optimises DC connectivity over distance**
SAN768B-2 and SAN384B-2 are designed to connect distributed DC for data mobility and advanced data protection. These fabric backbones include integrated metro and global SAN extension capabilities, which can provide application agility and support flexible business continuity and DR solutions.

The b-type director family with Gen 5 FC technology is designed to provide high-speed replication and backup solutions over metro or WAN links with native FC (10/16 Gbps) and optional FCIP (1/10 GbE) extension support. The integrated metro connectivity includes in-flight compression and encryption to optimise bandwidth and help reduce the risk of unauthorised access. SAN768B-2 and SAN384B-2 are designed to support port-based encryption and compression on ISL between two 16 Gbps E_Ports. The encryption and compression feature on an E_Port can be enabled by users on a per-port basis. The same port that has been configured for compression can also be configured for encryption.

**Benefits:**

- Optimises DC connectivity over distance with integrated high performance metro and global connectivity.
- Simplifies and centralises end-to-end SAN management with comprehensive diagnostics, monitoring and automation.
- Enhances data security and efficient use of bandwidth between DC.
• Maximises performance for I/O- and bandwidth-intensive applications with extraordinary performance improvement when compared to competitive offerings.
• Protects investments in existing SAN fabrics and automation tools while reducing operational costs and minimising business disruption.

**Simplifies deployment and centralised management**

Automating and simplifying SAN management enables DC to quickly adapt to change and overcome disruptions in a private or hybrid cloud infrastructure. SAN768B-2 and SAN384B-2 advanced diagnostics, monitoring and management help reduce end-to-end SAN management complexities and operating costs through simpler server provisioning and change management, advanced cable and optics diagnostics, and comprehensive management. Several technologies support these capabilities, including:

• ClearLink diagnostic technology (D_Ports) helps identify and isolate optics and cable problems, reducing fabric deployment and diagnostic times
• Dynamic Fabric Provisioning combines b-type backbone and Brocade adapter technology to reduce or eliminate the need to reconfigure zoning and Logical Unit Number (LUN) masking when adding or replacing servers
• IBM Network Advisor provides comprehensive management of DC fabrics, including configuration, monitoring and management of b-type backbones, switches and Brocade adapters.

**Helps ensure enterprise-class reliability, availability and serviceability**

SAN768B-2 and SAN384B-2 FC backbones utilise Fabric Vision technology, which leverages hardware, FOS and IBM Network Advisor integration to provide advanced functions. It features advanced monitoring, diagnostics, reliability, availability and serviceability capabilities to minimise downtime, optimise performance and simplify administration. These enterprise-class features include:

• Critical diagnostic and monitoring capabilities to help ensure early problem detection and recovery
• Non-intrusive and nondisruptive monitoring on every port to provide a comprehensive, end-to-end view of the entire fabric
• FEC capabilities to recover from bit errors on links, enhancing transmission reliability and performance
• Additional buffers to overcome performance degradation and congestion due to buffer credit loss
• Monitoring of real-time bandwidth consumption by hosts/applications on ISLs to easily identify hot spots and potential network congestion.

SAN768B-2 and SAN384B-2 b-type directors are highly efficient at helping reduce power consumption, cooling requirements and the carbon footprint in DC. While providing greater performance and scalability, they require significantly less power to deliver much greater bandwidth, making them more efficient than other offerings.
## IBM System Storage SAN768B-2 and IBM System Storage SAN384B-2 at a glance

### Product Characteristics

<table>
<thead>
<tr>
<th>Product number</th>
<th>SAN768B-2 (2499-816)</th>
<th>SAN384B-2 (2499-416)</th>
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<tbody>
<tr>
<td><strong>Base machine</strong></td>
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<tr>
<td></td>
<td>Single chassis: up to 384 (SAN768B-2) or 192 (SAN384B-2) 16 Gbps universal (E, F, D, M and EX) FC ports using 48-port FC blades. Up to 512 (SAN768B-2) or 256 (SAN384B-2) 8 Gbps universal (E, F, M and EX) FC ports using 64-port 8 Gbps FC blades.</td>
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<td></td>
<td>Multi-chassis with ICL ports: Up to 3840×16 Gbps universal FC ports (using 16 Gbps 48-port blades); up to 5120×8 Gbps universal FC ports (using 8 Gbps 64-port blades); ICL ports (32 or 16 per chassis, optical QSFP) connected up to nine b-type SAN768B-2/SAN384B-2 chassis in a full-mesh topology or up to 10 chassis in a core-edge topology. Deploying five or more chassis with ICL connections within a fabric requires an Enterprise ICL license.</td>
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<td>The base chassis includes the following components:</td>
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<td></td>
<td>One director chassis with door, two vertical cable management combs, redundant (active/standby) control processor blades, redundant active/active core-switching blades, redundant power supplies, fans, and a ship group that includes an installation guide, (optically read) compact disk - read only memory (CD-ROM) (with manuals), two rack-power distribution unit (PDU) power cords, service tools and wrap tools, a RJ-45 serial cable, wrist strap, cable retainer kit and small form factor pluggable (SFP) extraction tool.</td>
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<td></td>
<td>In addition to the above components, the base chassis of SAN768B-2 includes three blower fans and the option for two additional power supplies. The ship group also includes a 14U rack-mounting kit (BR120).</td>
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<td></td>
<td>As for SAN384B-2, the base chassis includes two blower fans and a 1U exhaust duct kit.</td>
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<td>The base FOS (v7.0 or later) software includes:</td>
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<td>Note: No port or advanced functionality blades are included in the base. Customers will need to order the 48- or 32-port 16 Gbps or 8 Gbps FC port blades, the 64-port 8 Gbps FC port blade and/or the supported specialty blades and populate them with transceivers.</td>
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</tbody>
</table>
### IBM System Storage SAN768B-2 and IBM System Storage SAN384B-2 at a glance

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>FC interfaces</strong></td>
<td>16/10/8/4/2 Gbps ClearLink diagnostic technology (D_Port), E_Port, EX_Port, F_Port and M_Port (mirror port)</td>
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<tr>
<td><strong>FICON interfaces</strong></td>
<td>16/8/4/2 Gbps</td>
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<tr>
<td><strong>FCIP interfaces</strong></td>
<td></td>
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<tr>
<td><strong>Transceivers</strong></td>
<td>16 Gbps: 32- and 48-port 16 Gbps blades require hot-pluggable SFP+, LC connectors; 16 Gbps short-wavelength laser (SWL), long-wavelength laser (LWL)</td>
</tr>
<tr>
<td></td>
<td>10 Gbps: 32- and 48-port 16 Gbps blades require hot-pluggable SFP+, LC; 10 Gbps SWL, LWL</td>
</tr>
<tr>
<td></td>
<td>8 Gbps: 32- and 48-port 16 Gbps blades, 32- and 48-port 8 Gbps blades, extension and encryption blades require hot-pluggable SFP+, LC; 8 Gbps SWL, LWL, extended long-wavelength laser (ELWL)</td>
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<td>4 Gbps: 8 Gbps Enhanced Extension blades need copper or SFPs to be used with IP ports, LC; 4 Gbps SWL, LWL</td>
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<td></td>
<td>1 GbE: hot-pluggable optical SFP, SWL and LWL; GbE copper SFP (8 Gbps Extension blade GbE ports only)</td>
</tr>
<tr>
<td><strong>Hot-swap components</strong></td>
<td>Control processors (CPs), core routing modules, power supplies, fan modules, all FC port blades, Extension blades, Encryption blades, SFPs and QSFPs</td>
</tr>
<tr>
<td><strong>Rack support</strong></td>
<td>IBM TotalStorage SAN cabinet (2109-C36)</td>
</tr>
<tr>
<td><strong>Management software</strong></td>
<td>HTTP, simple network management protocol (SNMP) v1/v3 (Fabric Element (FE) Management Information Base (MIB), FC MIB), Secure Shell (SSH); auditing, syslog; web tools, advanced performance monitoring, IBM Network Advisor v11.1 or later; command line interface</td>
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<tr>
<td><strong>Servers supported</strong></td>
<td>IBM Power Systems, IBM System p</td>
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<td>IBM System i</td>
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<td>IBM System x</td>
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<td></td>
<td>IBM System z, IBM zSeries</td>
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<tr>
<td></td>
<td>Other Intel® processor-based servers with Linux®, Microsoft® Windows® 2008 and Windows 2012</td>
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<td></td>
<td>Selected Sun and HP servers</td>
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<tr>
<td><strong>Operating systems supported</strong></td>
<td>Windows 2008, Windows 2012</td>
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<tr>
<td></td>
<td>Red Hat Linux, Red Hat Linux Advanced Server</td>
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<tr>
<td></td>
<td>SUSE Linux, SUSE Linux Enterprise Server (SLES)</td>
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<tr>
<td></td>
<td>IBM AX storage system</td>
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<tr>
<td></td>
<td>Other selected operating systems</td>
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</table>
### IBM System Storage SAN768B-2 and IBM System Storage SAN384B-2 at a glance

| Storage products supported* | IBM XIV Storage System  
|                            | IBM System Storage DS8000 storage servers  
|                            | IBM Storwize V7000  
|                            | IBM Storwize V3700  
|                            | IBM System Storage SAN Volume Controller (SVC)  
|                            | IBM System Storage DS5000 and DS3000  
|                            | IBM System Storage TS2240 Tape Drive Express and IBM System Storage TS2340 Tape Drive Express with IBM Linear Tape-Open® (LTO) Ultrium® 4 tape drives  
|                            | IBM System Storage TS2250 Tape Drive Express and IBM System Storage TS2350 with IBM LTO Ultrium 5 tape drives  
|                            | IBM System Storage TS1130 and TS1140 tape drives  
|                            | IBM System Storage TS1100, TS3200, TS3310, and TS3500 tape libraries  
|                            | IBM Tivoli Key Lifecycle Manager (TKLM) v2.0, or later  
|                            | Other selected storage systems  
| FC switches supported      | System Storage and 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 are required and available in various lengths in single-mode and multimode formats  
| Power cords                | Jumper cables are included for installation; country-specific power cords must be ordered for desktop/standalone installation  
| Warranty                   | One year; around-the-clock same-day maintenance service options are available  
| Optional features          | **Blades:** 32- and 48-port 16 Gbps FC switch blades (FC #3632, 3648); 32- and 48-port 8 Gbps FC switch blades (FC #3633, 3649); 64-port 8 Gbps FC switch blade (FC #3864); 22-port 8 Gbps Extension blade (FC #3890); 22-port 8 Gbps + 2-port 10 Gbps Enhanced Extension blade (FC #3891); 8 Gbps Encryption blade (FC #3895).  
|                            | **Licenses:** Inter-chassis, FICON with CUP activation, Advanced Extension activation, Extension blade 10 GbE activation, FICON Accelerator activation, Encryption 96 Gbps disk performance upgrade activation, Integrated Routing and Enterprise ICL.  
|                            | **Other:** SFPs; fiber optic cables; upgrade power supplies  

## IBM System Storage SAN768B-2 and IBM System Storage SAN384B-2 at a glance

### Physical characteristics

<table>
<thead>
<tr>
<th>Size</th>
<th>SAN768B-2:</th>
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<tbody>
<tr>
<td>Width</td>
<td>43.74 cm (17.22 inches)</td>
</tr>
<tr>
<td>Height</td>
<td>61.24 cm (24.11 inches, 14U)</td>
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<tr>
<td>Depth (without door)</td>
<td>61.19 cm (24.09 inches)</td>
</tr>
<tr>
<td>Depth (with door)</td>
<td>73.20 cm (28.82 inches)</td>
</tr>
</tbody>
</table>

SAN384B-2:
- Width: 43.74 cm (17.22 in.)
- Height: 35.00 cm (13.78 in., 8U) plus 4.37 cm exhaust shelf (1.72 in., 1U)
- Depth without door: 61.19 cm (24.09 in.)
- Depth with door: 73.20 cm (28.82 in.)

### Weight (maximum ports fully populated)

| SAN768B-2: |
| 103.50 kilogram (228.20 pounds) for 384-port configuration fully populated |
| 39.55 kg (82.20 lbs) for chassis |

SAN384B-2:
- 68.04 kg (150.00 lbs) for 192-port configuration fully populated
- 25.76 kg (56.80 lbs) for empty chassis

### Operating environment

| Temperature (operating) | 0° to 40°C (32° to 104°F) |
| Humidity (operating) | 20% to 85% relative humidity (RH) noncondensing at 40°C (104°F) |
| Altitude (operating) | Up to 3000 meters (9842 feet) |
| Airflow | Rear panel-to-door airflow |

### Electrical requirement

| Nominal input voltage | 85 to 264 alternating current (ac), universal |
| Input line frequency | 47 to 63 Hertz (Hz) |
For more information
To learn more about IBM System Storage SAN768B-2 and SAN384B-2, please contact your IBM marketing representative or IBM Business Partner (BP), or visit the following website: ibm.com/systems/networking/switches/san

Additionally, IBM Global Financing (IGF) can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. We will partner with credit-qualified clients to customise an IT financing solution to suit your business goals, enable effective cash management and improve your total cost of ownership (TCO). IGF is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit: ibm.com/financing/uk

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