IBM Storage

IBM® Storage Networking SAN512B-7 and SAN256B-7 Directors

Modern storage infrastructure for flash, NVMe and FICON

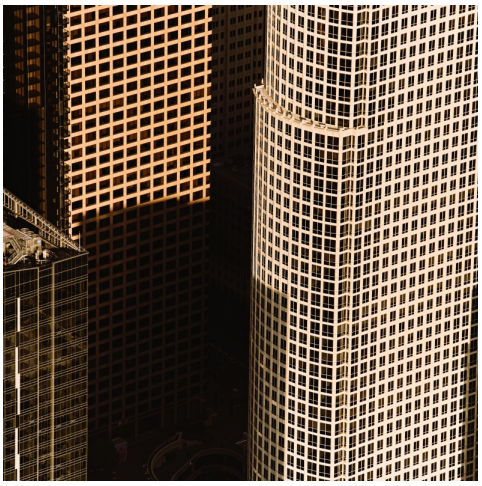
Highlights

- Scale more devices, applications, and workloads
- Maximize NVMe, FICON, high-transaction workloads with lower latency
- Transform telemetry data into actionable insights to optimize performance
- Automate actions to simplify management
- Increase visibility and simplify operations
- Integrate next-gen NVMe into the storage fabric
- Flexible, multihop FICON architectures for increased agility
- Extend replication over distance with a highly scalable extension solution

Technology is evolving at an incredible pace, and businesses are demanding more from their IT resources and infrastructure. Rapid adoption of flash storage and the ramp- up of NVMe-based storage unleash advancements in application design that drive new levels of performance and capacity requirements, such as advanced analytics, business intelligence, and data-intensive workloads.

With the integration of new technologies that are accelerating the delivery of data and services, the network will need to evolve to keep pace with innovations in storage and demands of modern applications to maximize the full value of investments in next-generation data center infrastructure. To meet ever-increasing demands for faster, more reliable data access, it is essential for organizations to deploy a modernized infrastructure that reduces latency, increases bandwidth, and ensures continuous availability. Unprecedented performance is not enough on its own. Powerful analytics and advanced automation capabilities are required to transform current storage networks into an autonomous SAN.

This requires a network that is capable of delivering these capabilities to maximize performance, simplify management, and reduce operational costs. Legacy infrastructure was not designed to support the performance requirements of evolving workloads and NVMe-based storage. In fact, an aging network will impede the performance of the on-demand data center. By modernizing the storage network with IBM® Gen 7 Fibre Channel technology, organizations will enable a faster, more intelligent, and more resilient network. This will maximize the performance, productivity, and efficiency of their storage investments and resources, even as they rapidly scale their environments



The IBM® Storage Networking SAN512B-7 and SAN256B-7 Directors provide a modular building block, purpose-built for scalability to accommodate growth and power large-scale storage environments. With a 50% latency reduction compared to the previous generation, SAN512B-7 and SAN256B-7 directors maximize the performance of NVMe storage, FICON connectivity and high-transaction workloads, eliminating I/O bottlenecks and unleashing the full performance of next-generation storage.
In addition, the SAN512B-7 and SAN256B-7 directors lay the foundation for the autonomous SAN. With autonomous SAN technology, the directo harnesses the power of analytics and the simplicity of automation to optimize performance, ensure reliability, and simplify management. Leveraging these capabilities enables organizations to realize a self-learning, self-optimizing, and self-healing SAN.

The IBM b-type Gen 7 Directors provide up to 512 64Gb/s line rate ports enabling organizations to scale more devices, applications, and workloads. With diverse deployment options, multiprotocol flexibility, and mixed blade capability, organizations can adapt and optimize their businesses to meet next-generation storage and server requirements. SAN512B-7 and SAN256B-7 Directors support the concurrent use of traditional Fibre Channel, FICON and NVMe storage traffic , allowing organizations to seamlessly integrate IBM® Gen 7 Fibre Channel networks with next-generation NVMe-based and FICON storage, without a disruptive rip and-replace.

Modern Modular Building Block Designed for Enterprise Deployments

Designed to meet continuous data growth and critical application demands, the Gen 7 Fibre Channel technology directors are purpose-built to power large-scale storage environments that require increased capacity, greater throughput, and higher levels of resiliency and operational efficiency. This modular building block enables organizations to build the highest performing data center SAN fabric that is required for all-flash and NVMe storage environments. SAN512B-7 and SAN256B 7 Directors' modular design provides flexibility with two customizable chassis that can scale on-demand for more devices, applications, and workloads. Both chassis utilize UltraScale ICL technology to scale out modular SANs while preserving blade ports for device connectivity and allowing flexible SAN design that supports core edge or mesh topologies.
The 14U SAN256B-7 Director is built for large enterprise networks and has eight vertical blade slots to provide up to 512 64Gb/s line rate ports for device connectivity. An additional 32 UltraScale Inter-Chassis Link (ICL) connections provide 128 ports for chassis-to-chassis interconnect.
The 8U SAN256B-7 Director is built for midsize networks and has four horizontal blade slots to provide up to 256 64Gb/s line rate ports for device connectivity. An additional 16 UltraScale ICL connections provide 64 ports for chassis-to-chassis interconnect.

Each blade slot within the IBM® Gen 7 chassis can be populated with optional port or extension blades. For device connectivity, the following blades are available:

- The IBM 64Gb/s 64-port Fibre Channel port blade with 32 SFP-DD ports provides 64 x 64Gb/s Fibre Channel ports with backward-compatibility support for 16, 32, and 64G Fibre Channel connectivity.
- IBM® 64Gb/s 48-port Fibre Channel blade provides 48 x 64Gb/s Fibre Channel ports with backward-compatibility support for 8, 10, 16, and 32Gb/s Fibre Channel connectivity.
- IBM® Enhanced 32Gb/s 48-port Fibre Channel Fibre blade provides 48 x 32Gb/s Fibre Channel ports with backward-compatibility support for 4, 8, 10, and 16Gb/s Fibre Channel connectivity.
- IBM® 32Gb/s 64-port Fibre Channel blade provides 64 x 32Gb/s Fibre Channel ports with backward-compatibility support for 4, 8, and 16Gb/s Fibre Channel connectivity as well as support for 10, 25, and 40GbE FCoE connectivity.

To support disaster recovery and data protection storage solutions over long distances, the IBM 32Gb/s Extension Blade provides flexible Fibre Channel and IP storage replication deployment options with 16 32Gb/s Fibre Channel ports, 16 1/10-GbE ports, and 2 40GbE ports. This blade allows organizations to seamlessly integrate extension capabilities within the IBM Gen 7 Director to provide replication services for large-scale, multisite data center environments that implement block, file, and tape data protection solutions. The 32Gb/s Extension Blade can be deployed with the SAN42B-R and SAN18B-6 Extension Switches in a data-center-to-edge architecture as a cost-effective option for connecting primary data centers with remote data centers and offices.

IBM® Gen 7 Directors build upon years of innovation in storage networking to consistently deliver five-nines in the world’s most demanding data centers. Delivering non-disruptive software upgrades, hot-pluggable components, and a no-single-point-of-failure design, Gen 7 Directors offer a highly resilient solution for today’s enterprise-class storage environments.

Autonomous SAN Innovation

The Gen 7 Directors include Fabric Vision technology that provides a robust analytics architecture that delivers autonomous SAN technology through self-learning, self-optimizing, and self-healing capabilities. Fabric Vision technology is a collection of features that leverage comprehensive data collection capabilities with powerful analytics to quickly understand the health and performance of the environment and identify any potential impacts or trending problems.

Analyze the SAN to Optimize Performance and Reliability

IT organizations are responsible for delivering non-stop performance and reliability to ensure that service-level agreements (SLAs) are met. They need analytics to help extract actionable intelligence from their environment and simplified management tools to quickly and easily understand the state of their environment. This requires an infrastructure that can automatically learn its performance and health characteristics, identify potential risks, and provide recommended actions to resolve issues.

With Gen 7 Storage Networking, IBM® enables a self-learning SAN that gathers and transforms millions of data points into actionable intelligence to make fast, informed decisions to optimize performance and ensure reliability. These products proactively monitor I/O performance and behavior data points through integrated network sensors to gain deep insight into the environment. The information captured is displayed in IBM® SANnavTM Management Portal to quickly identify and isolate problems before they impact application availability. With built-in best practice recommendations, organizations can simplify troubleshooting by identifying and isolating issues to resolve them as fast as possible. Combining these tools with automation, IBM® b-type Storage Networking solutions can detect abnormal traffic behaviors and degraded performance to automatically take corrective action, eliminating the potential impact of the issue. These new autonomous SAN technologies greatly simplify SAN management and enable unparalleled network performance and reliability.

Automate the SAN to Simplify Management Complexity

IT organizations spend nearly half of their time performing repetitive daily management tasks, such as zoning, inventory reporting, and operational validation checks. By automating these repetitive tasks, IT organizations can significantly improve their efficiency and dramatically decrease the risk of operational mistakes. Automation in large-scale IT environments integrates diverse infrastructure components with consistency and predictability to deliver greater operational efficiency and agility.

With enhanced automation, the Gen 7 Directors can automate actions to simplify management and resolve issues without intervention to avoid network disruptions and outages. Through open DevOps automation technology, organizations can reliably perform resource-intensive tasks, such as infrastructure deployment and provisioning, in a fraction of the time to expedite IT services, while eliminating human error. In addition, automation proactively monitors the network to self-optimize performance and automatically mitigate fabric-related issues with self-healing capabilities.

With self-optimizing capability, IBM® b-type Storage Networking solutions utilize actionable utilizes actionable intelligence to maximize performance. Real-time monitoring of heath and performance characteristics enables the network to make smarter decisions on traffic prioritization, congestion management, and notification to ensure optimal network performance for applications and storage. Gen 7 delivers a traffic optimizer that guarantees critical application performance by automatically prioritizing traffic. This advanced capability classifies and separates traffic with similar characteristics.

64Gb/s

The IBM® Gen 7 Directors feature industry-leading Gen 7 Fibre Channel that increases performance across 64Gb/s line-speed links and up to 39.6Tb/s of chassis bandwith

50%

With a 50% latency reduction compared to the previous generation, SAN512B-7 and SAN256B-7 directors maximize the performance of NVMe storage, FICON connectivity and high-transaction workloads

IBM® Gen 7 SAN solutions raise the bar for network availability through automatic avoidance and recovery features, delivering a self-healing SAN. When detection of potential disruptions occurs, the network will automatically mitigate or resolve issues without intervention. The IBM® b-type Fabric OS software identifies abnormal or unexpected behavior and automatically takes action to avoid a degradation in performance. If congestion occurs, it will instantly notify end devices of the congestion problem through an alerting and signaling process. Once they are alerted, the software ensures data delivery with automatic failover or adjustment of traffic to mitigate the impact of the problem. IBM® SANnav management tools can identify various latency severity levels, pinpointing exactly which devices are causing the issues or are impacted by a bottleneck, and quarantine misbehaving devices automatically.

Instant Visibility and Simplified Processes

IBM® SANnav Management Portal and SANnav Global View empower IT administrators with comprehensive visibility across the entire SAN, from a global view down to local environments. By contextualizing data into visual dashboards and topology views, administrators can quickly detect and isolate points of interest to increase operational efficiencies. In addition, IBM® SANnav streamlines management workflows to accelerate the deployment of new applications, switches, servers, and storage.

Maximum Performance for the On-Demand Data Center

Evolving critical workloads and higher density virtualization are continuing to demand greater, more predictable performance. The IBM® Gen 7 Directors feature industry-leading Gen 7 Fibre Channel that increases performance for demanding workloads across 64Gb/s line-speed links and up to 39.6Tb/s of chassis bandwidth to address next-generation I/O-intensive and bandwidth-intensive applications. This breakthrough performance speeds up data-intensive application response times and allows more transactions in less time, ultimately improving SLAs. In addition, these Directors increase scalability with double the throughput for high-density VM deployments and larger fabrics. This allows organizations to support more storage devices and meet bandwidth requirements.

The SAN512B-7 and SAN256B-7 Directors provide unmatched chassis, slot-to-slot, and port performance, delivering the lowest port-to-port latency for any director. For the lowest possible latency, local switching enables data traffic in the same port group to switch within a single ASIC, instead of going through the chassis backplane.

When the Gen 7 Directors are used with the IBM Gen 7 blades, they offer IO Insight for non-intrusive, real-time monitoring of NVMe workloads, helping to ensure optimal performance. Insight monitors I/O performance and behavior through integrated network sensors, providing deep insight into problems and helping to ensure service levels. This capability non-disruptively and non-intrusively gathers I/O statistics from any device port and then feeds them to a policy that sets thresholds and generates alerts. VM Insight applies the IO Insight visibility for each virtual machine (VM). Integrated VM, application, and device-level I/O latency and IOPS monitoring enable administrators to set baseline application performance and identify the VM or physical layer responsible for the degraded performance. Integrated network sensors provide I/O performance management to avoid dependence on invasive and disruptive physical taps.

For investment protection, SAN512B-7 and SAN256B-7 directors offer three generations of backward-compatibility support for connectivity to 8, 16, and 32Gb/s Fibre Channel products. Furthermore, Gen 7 supports mix-and-match blades, allowing for Gen 6 and Gen 7 blades to be installed within the chassis.

Simplified Scale-Out Network Design

Organizations need to adapt to continuous data growth and seamlessly scale out their storage environments. UltraScale chassis connectivity leverages optical Inter-Chassis Links (ICLs). These links can connect up to 12 b-type Gen 6, or Gen 7 Directors, enabling flatter, faster, and simpler fabrics that increase consolidation while reducing network complexity and costs.

UltraScale ICLs enable scalable core-edge and active-active mesh chassis topologies. These high-density chassis topologies reduce inter-switch cabling by 75%. With the UltraScale ICL connections residing on the core routing blades instead of consuming ports on the port blades, up to 33% more device ports are available for server and storage connectivity. This maximizes overall port density within the smallest amount of rack space while freeing up front-facing device ports for storage connectivity.

Enhanced Extension for Cyber Resilient Solutions

Connecting distributed data centers enables data mobility for advanced data protection with IBM Cyber Resiliency and Business Continuity solutions..

Enterprise data centers need a disaster recovery infrastructure to ensure fast, continuous, and easy replication of mission- critical data to anywhere in the world. Storage administrators need to replicate large amounts of data quickly, securely, reliably, and simply while minimizing operational and capital expenses.

With the IBM 32Gb/s Extension Blade, the SAN512B-7 and SA256B-7 Directors provide integrated metro and global connectivity with a purpose-built data center extension solution for Fibre Channel and IP storage environments. This solution delivers unprecedented performance, strong security, continuous availability, and simplified management to handle the unrelenting transfer of data between data centers and to maintain SLAs.

SAN512B-7 and SAN256B-7 directors support up to four Extension Blades per chassis. Each Extension Blade provides 16 32Gb/s Fibre Channel/FICON ports, 16 1GbE/10GbE ports, and 2 40GbE ports to deliver the high bandwidth, port density, and throughput required for maximum application performance over WAN connections and to address the most demanding disaster recovery requirements.

IBM® Fabric Vision technology with SANnav Management Portal provides insight and visibility for connections between data centers, as well as the fabrics within each data center. With its powerful, integrated monitoring, management, and diagnostic tools, Fabric Vision technology enables organizations to minimize the impact of disruptions and outages for non-stop business operations. Fabric Vision monitors replication traffic for both Fibre Channel and IP storage. IBM® SANnav Management Portal visualizes the traffic for Fibre Channel and IP storage through in-context topology views to simplify managing complex multi-fabric environments.

Adapting to Next-Gen Storage Requirements with Flexible Deployment Options

To realize the full benefits of flash, organizations will need to transition their high-performance, latency-sensitive workloads to flash-based storage with NVMe over Fibre Channel. The simplicity and efficiency of NVMe enable significant performance gains for flash storage.

SAN512B-7 and SAN256B-7 directors enable flexibility with multi-protocol connectivity, allowing administrators to seamlessly adapt to next-gen requirements and design architectures with concurrent Fibre Channel, NVMe, FICON or FCoE connectivity options. Organizations can seamlessly integrate Gen 7 Fibre Channel networks with NVMe without a disruptive rip-and- replace.

Leveraging the efficiency of NVMe, combined with the high performance and low latency of Gen 7 Fibre Channel, organizations can accelerate IOPS to deliver the performance, application response time, and scalability needed for next-generation data centers.

SAN512B-7 and SAN256B-7 Directors Specifications

Chassis	• Single Chassis: IBM® SAN512B-7 Director: Non-blocking architecture • Director with 64 64Gb/s port blades: 39.6Tb/s of aggregate chassis bandwidth (512 device ports with a 64Gb/s data rate plus 32 4xGen7 ICLs) • IBM® SAN256B-7 Director: Non-blocking architecture • Director with 64 64Gb/s port blades: 19.8Tb/s of aggregate chassis bandwidth (256 device ports with a 64Gb/s data rate plus 16 4xGen7 ICLs) Each provides support for (E, F, D, M, SIM, and EX) Fibre Channel ports. Both Directors are certified for FICON connectivity.
Control processor	Redundant (active/standby) control processor modules.
Scalability	Full-fabric architecture of 239 switches.
Certified maximum	6000 active devices per switch; 56 switches, 19 hops in IBM Fabric OS® (FOS) fabrics; larger fabrics certified as required.
Fibre Channel blades	IBM FC64-48 port blade provides 48 ports of 64G Fibre Channel. IBM FC64-64 port blade provides 64 ports of 64G Fibre Channel. IBM FC32-X7-48 port blade provides 48 ports of 32G Fibre Channel. IBM FC32-48 port blade provides 48 ports of 32G Fibre Channel.
Extension blades	IBM® 32Gb/s Extension Blade provides Fibre Channel extension (16×32Gb/s Fibre Channel ports) and IP extension over IP networks (16×1GbE/10GbE and 2×40GbE ports).
Load Balancing	Frame-based ISL Trunking load balances up to eight SFP+ ports per ISL trunk; up to 512Gb/s per ISL trunk when using 64Gb/s optics. Dynamic Path Selection (DPS) provides exchange-based load balancing across all available ISLs.
UltraScale ICL trunking	• Chassis-to-chassis linkage through connectors on the Core Routing (CR) blade. Can configure the following maximum number of QSFPs per trunk depending on blade type, connecting: • Up to four QSFP ports in a trunk group between two CR64-4 blades. For trunks that contain four or fewer QSFP ports, ports in a trunk must be located in the same port group on each blade. • Up to four QSFP ports in a trunk group between a CR64-4 blade and a CR64-8 blade. For trunks that contain four or fewer QSFP ports, ports in a trunk must be located in the same port group on each blade. A minimum of two QSFP connections are required for a trunk, and up to four QSFP trunks between pairs of CR64-8 (CR64-4) and CR32-8 (CR32-4).
Multichassis with UltraScale ICL ports	Up to 4608 Fibre Channel ports; UltraScale ICL ports (32 for 8-slot or 16 per 4-slot chassis, optical QSFP) connect up to 9 chassis in a full-mesh topology or up to 12 chassis in a core-edge topology.
Chassis bandwidth	IBM® SAN512B-7 Director: 39.6Tb/s per chassis with 512 device ports + 32 UltraScale ICL connections supporting 128 ports. IBM® SAN256B-7 Director: 19.8Tb/s per chassis with 256 device ports + 16 UltraScale ICL connections supporting 64 ports.
Slot bandwidth	4096Gb/s (line rate) providing line-rate performance for the 64Gb/s 64-port blade.
Switch latency	IBM® Gen 7 port blades at 64Gb/s speeds: 460 ns (including FEC); any-port-to-any-port local switching and 1.4µs blade to blade at 64Gb/s, cut-through routing. IBM® Enhanced 32Gb/s 48-port blade: 560 ns (including FEC); any-port-to-any-port local switching and 1.9 µs blade to blade at 32Gb/s, cut-through routing. IBM® 32Gb/s Extension blade and 64-port blade: <780 ns (including FEC) and 2.6µs any-port-to-any-port at 32Gb/s, cut-through routing.
Maximum frame size	2112-byte payload.
Frame buffers	24,000 per switching ASIC.
Classes of service	Class 2, Class 3, Class F (inter-switch frames).
Fibre Channel port types	CR64-8 and CR64-4 CR blades: E_Port, EX_Port, and D_Port. 32Gb/s 48-port, 64Gb/s 48-port, 64Gb/s 64-port blades: F_Port, E_Port, EX_Port, M_Port, SIM, and D_Port. 32Gb/s Extension Blade: F_Port, FL_Port, E_Port, SIM, and EX_Port on FC and VE_Port on GbE. Self-discovery is based on switch type (U_Port) with an optional port type control.
Data traffic types	Fabric switches supporting unicast, multicast (255 groups), and broadcast.

SAN512B-7 and SAN256B-7 Directors Specifications

Media types	IBM 64G/bs 48-port blade (64G FC SFP+ LC connector: SWL, LWL, ELWL; 32G FC SFP+ LC connector: SWL, LWL, ELWL; 10G FC SFP+ LC connector: SWL, LWL), IBM 64Gb/s 64-port blade (64G FC SFP-DD SN connector: SWL; 64G FC SFP+ LC connector: SWL, LWL; 32G FC SFP+ LC connector: LWL, ELWL), IBM Enhanced Gen 6 48-port blade (32G FC SFP+ LC connector: SWL, LWL, ELWL; 16G FC SFP+ LC connector: SWL, LWL, ELWL; 10G FC SFP+ LC connector: SWL, LWL), IBM 32Gb/s 48-port blade (32G FC SFP+ LC connector: SWL, LWL, ELWL; 16G FC SFP+ LC connector: SWL, LWL, ELWL; 10G FC SFP+ LC connector: SWL, LWL), IBM 32Gb/s 64-port blade (4x32G FC QSFP+ MPO connector: SWL; 4x32G FC QSFP+ SMF LC connector: 2 km (fixed at 4x32G only); 4x16G FC QSFP+ MPO connector: SWL; FCoE QSFP+ MPO connector: 100GBASE-SR4, 4x25GbE; FCoE QSFP+ MPO connector: 40GBASE-SR4, 4x10GbE, FCoE QSFP+ LC connector: 40GbE BiDi), IBM 32Gb/s Extension Blade (32G FC SFP+ LC connector: SWL, LWL, ELWL; 16G FC SFP+ LC connector: SWL, LWL, ELWL; 10G FC SFP+ LC connector: SWL, LWL; Ethernet QSFP+ MPO connector: 40GBASE-SR4, 40GBASE-LR4, 40GBASE-ER4 Ethernet QSFP+ LC connector: 40GbE BiDi , 10GbE SFP+ LC connector: SR, LR, USR; 1GbE SFP+ LC connector: SR, LR ; 1GbE SFP+ copper connector), Core Routing (CR) blades, IBM CR64-4 and CR64-8 (Gen 7 FC QSFP+ MPO connector: SWL, 2 km*; 4x32G FC QSFP+ SMF LC connector: SWL, 2 km)
USB	One USB port per control processor for firmware download, support save, and configuration upload or download.
Fabric services	Adaptive Networking (QoS); BB Credit Recovery; IBM® Advanced Zoning (Default Zoning, Port/WWN Zoning); Dynamic Path Selection (DPS); Extended Fabrics; Fabric Congestion Notification; Fabric Vision; FDMI; FICON CUP; Flow Vision; FSPF; Integrated Routing; ISL Trunking; Management Server; N_Port Trunking; NPIV; NTP v3; Peer Zoning; Port Fencing; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Simple Name Server (SNS); Syslog; Target-Driven Zoning; Traffic Optimizer; Virtual Fabrics (Logical Switch, Logical Fabric).
Extension	Supports DWDM, CWDM, and FC-SONET Devices; Fibre Channel; In-flight Compression (IBM LZO) and Encryption (AES-GCM-256); BB Credit Recovery; FCIP; IP Extension; Adaptive Rate Limiting (ARL); Data Compression; Fast Write; Read/Write Tape Pipelining; QoS.
FICON	FICON cascading; support for lossless DLS; FICON CUP; Advanced Accelerator for FICON (IBM z/OS Global Mirror and read/write Tape Pipelining).
Fibre Channel ports	IBM® SAN512B-7: Up to 512 64Gb/s ports, universal (E_Port, F_Port, EX_Port, M_Port, D_Port, SIM Port, FICON*). IBM® SAN256B-7: Up to 256 64Gb/s ports, universal (F_Port, E_Port, EX_Port, M_Port, D_Port, SIM Port, FICON*). *NOTE: FICON is supported on 48-port blades only.
Classes of service	Class 2, Class 3, Class F (inter-switch frames).
ANSI Fibre Channel protocol	FC-PH (Fibre Channel Physical and Signaling Interface standard).
Fabric initialization	Complies with FC-SW 5.0.

High Availability

Architecture	Non-blocking shared memory; passive backplane; redundant active/passive control processor; redundant active/active core switching blades; redundant WWN cards.
Chassis power	IBM® SAN512B-7 • Four power supplies required for AC low-line (100 VAC to 120 VAC). • Two power supplies required for AC high-line (200 VAC to 240 VAC). • Two power supplies required for high voltage AC (200 VAC to 277 VAC) or high voltage DC (240 VDC to 380 VDC). • Three PSUs are required for 2+1 redundancy. Shipped with power supplies and fans installed. • Two PSUs provide system power, but four PSUs must be installed to provide power efficiency and 2+2 redundancy. IBM® SAN256B-7 • Two power supplies required for AC low-line (100 VAC to 120 VAC). • One power supply required for AC high-line (200 VAC to 240 VAC). • One power supply required for high voltage AC (200 VAC to 277 VAC) or high voltage DC (240 VDC to 380 VDC). • One PSU provides system power, but both PSUs must be installed to provide power efficiency and 1+1 redundancy. Shipped with power supplies and fans installed.
Cooling	IBM® SAN512B-7 • Requires three fan tray assemblies. A failure condition is one failed fan from any fan tray. • Each assembly contains two fans for a total of six fans. The system requires five of six functioning fans for operation in the director. One fan tray assembly can be hot-swapped and should be replaced immediately in the event of a failure. IBM® SAN256B-7 • Requires two fan tray assemblies. A failure condition is one failed fan from any fan tray. • Each assembly contains two fans for a total of four fans. The system requires three of four functioning fans for operation in the director. One fan assembly can be hot-swapped and should be replaced immediately in the event of a failure.
Air Flow	Non-port-side intake (NPI) to port-side exhaust and port-side intake to non-port-side exhaust (NPE) options are available.
Solution Availability	Designed to provide 99.999% uptime capabilities; hot-pluggable redundant power supplies, fans, WWN cards, processors, core switching, port blades, and optics; online diagnostics; non-disruptive firmware download and activation.

Management

Management	HTTP; SNMP v1/v3 (FE MIB, FC Management MIB); SSH; Auditing; Syslog; IBM Advanced Web Tools; IBM® SANnav Management Portal and SANnav Global View; Command Line Interface (CLI); SMI-S compliant; RESTful API; trial licenses for add-on capabilities.
Security	AES-GCM-256 encryption on ISLs; DH-CHAP (between switches and end devices); FCAP switch authentication; FIPS 140-2 compliant; HTTPS; IP filtering; LDAP with IPv6; OpenLDAP; Device Connection Control (DCC); RADIUS; user-defined Role- Based Access Control (RBAC); Secure Copy (SCP); SFTP; SSH v2; TLS v1.2/v1.3; Switch Binding; TACACS+; Fabric Configuration Server (FCS); USGv6 compliant; Secure Boot.
Management Access	10/100/1000Mb/s Ethernet (RJ-45) per control processor; serial console port (RJ-45) and one USB per control processor module; DHCP/DHCPv6; call-home integration enabled through IBM® SANnav Management Portal.
Diagnostics	IO Insight for SCSI and NVMe monitoring (IBM Enhanced 32Gb/s 48-port blade and 32Gb 64-port blade only); ClearLink® optics and cable diagnostics, including electrical/optical loopback, link traffic/latency/distance; built-in flow generator; POST and embedded online/offline diagnostics, including environmental monitoring, FCping, and Pathinfo (FC traceroute); flow mirroring; frame viewer; non-disruptive daemon restart; optics health monitoring; power monitoring; RAStrace logging; and Rolling Reboot Detection (RRD).

Mechanical Specifications

Enclosure	IBM® SAN512B-7 12-blade slots: 14U rack-mountable chassis; 27 in. to 31 in. and 22 in. rail kits for the four-post rack; mid- mount kit for the two-post rack. IBM® SAN256B-7 8-blade slots: 8U rack-mountable chassis; 27 in. to 31 in. rail, 18 in. to 24 in. rail, and airflow diversion rack-mount kits for the four-post rack; mid-mount kit for the two-post rack.
Mounting	Rack-mountable in a standard 19-inch EIA cabinet.
Size	IBM® SAN512B-7 Height: 61.23 cm (24.11 in., 14U) Width: 43.74 cm (17.23 in.) Depth: 61.04 cm (24.04 in.) IBM® SAN256B-7 Height: 34.45 cm (13.56 in., 8U) Width: 43.74 cm (17.23 in.) Depth: 61.04 cm (24.04 in.) IBM® SAN256B-7 with airflow diversion rack-mount kit Height: 40.00 cm (15.75 in., 9U) Width: 43.74 cm (17.23 in.) Depth: 61.29 cm (24.09 in.)
System weight	IBM® SAN512B-7 35.61 kg (78.5 lb) for chassis 145.8 kg (321.5 lb) maximum fully populated configuration IBM® SAN256B-7 24.5 kg (54 lb) for chassis 68.95 kg (152.0 lb) maximum fully populated configuration

Environment

Temperature	Operating: 0°C to 40°C (32°F to 104°F). Non-operating: –25°C to 70°C (–13°F to 158°F).
Humidity	Operating humidity: 5% to 93% RH non-condensing at 40°C (104°F) with a maximum gradient of 10% per hour. Non-operating humidity: 10% to 93% RH non-condensing at 70°C (158°F).
Altitude	Up to 3000 meters (9842 feet).
Shock	Operating: 10g, 11 ms, half sine wave. Non-operating: 20g, 11 ms, half sine wave.
Vibration	Operating: 5 Hz to 10 Hz at +5 dB/oct; 10 Hz to 200 Hz at 0.0005 grms; 200 Hz to 500 Hz at –5 dB/oct; scale 0.05 grms. Non-operating: 3 Hz to 10 Hz at +5 dB/oct; 10 Hz to 200 Hz at 0.0065 grms; 200 Hz to 500 Hz at –5 dB/oct; scale 1.12 grms.
Heat dissipation	IBM® SAN512B-7 512-port 64Gb/s configuration with ICLs: Typical: 11,766 Btu/hr; Max: 16,942 Btu/hr. Power consumed: Typical: 3,447W; Max: 4,964W. Note: Input power is at 200 VAC with full PSU redundancy. IBM® SAN256B-7 256 64Gb/s configuration with ICLs: Typical: 6,384 Btu/hr; Max: 8,221 Btu/hr. Power consumed: Typical: 1,870W; Max: 2,409W. Note: Input power is at 200 VAC with full PSU redundancy.

Power

Supported power range	Standard AC Power Supplies Input Voltage Standard AC input: Range: 90 VAC to 264 VAC auto-volt Nominal: 100 VAC to 240 VAC Power 85 VAC to 132 VAC: 1450W 180 VAC to 264 VAC: 2870W 80 PLUS Platinum certified
	High Voltage (HV) Power Supplies Input Voltage Range: 90 VAC to 132 VAC Nominal: 100 VAC to 120 VAC Range: 180 VAC to 305 VAC Nominal: 200 VAC to 277 VAC Range: 192 VDC to 400 VDC Nominal: 240 VDC to 380 VDC Power 90 VAC to 132 VAC: 1450W 180 VAC to 305 VAC: 2870W 192 VDC to 400 VDC: 2870W
In-rush current	35A maximum, peak
Frequency	50 Hz to 60 Hz (Nominal: 50 Hz to 60 Hz)

Why IBM?
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