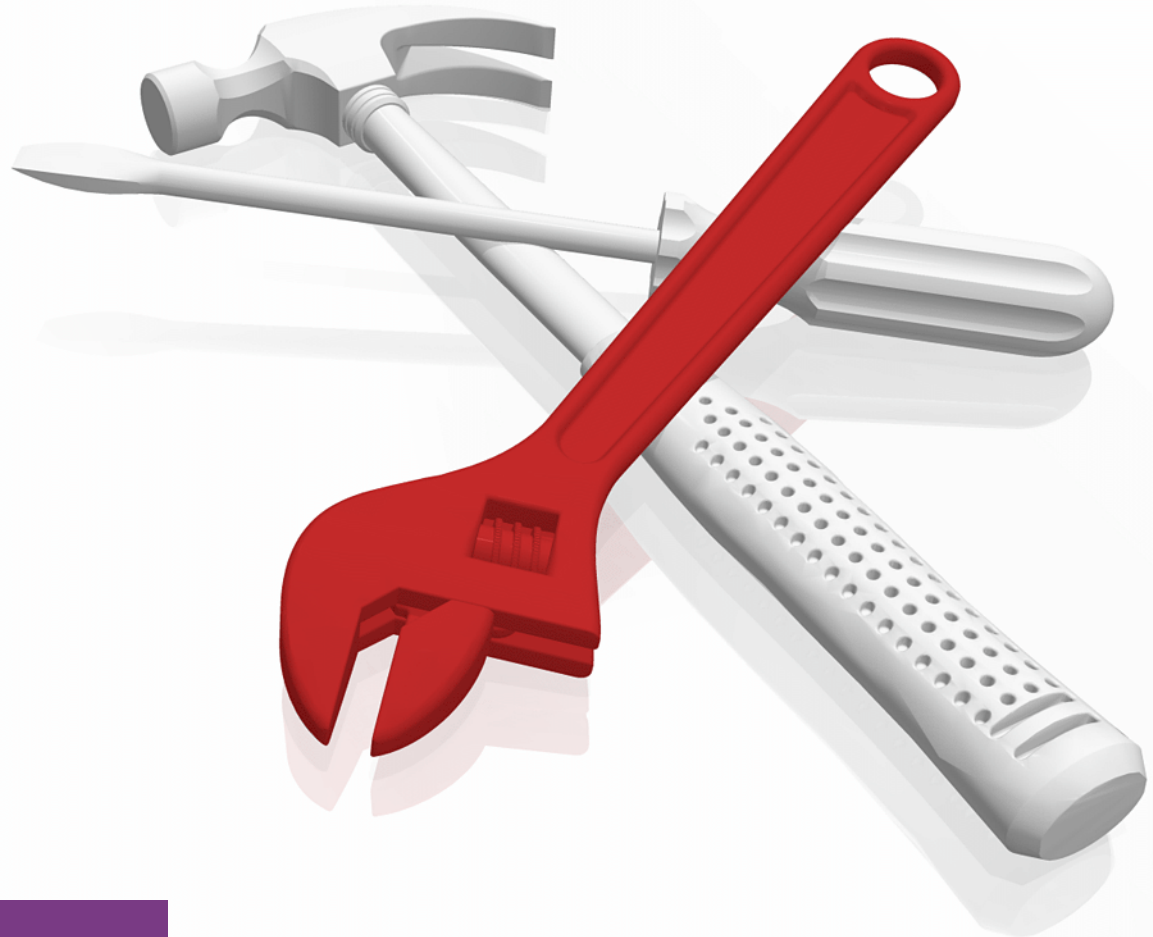# IBM Storage Networking SAN24B-6 Switch

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Product Guide

IBM Storage Networking SAN24B-6 Switch

This IBM® Redbooks® product guide describes the IBM Storage Networking SAN24B-6 switch.

Explosive data growth, coupled with user expectations of unlimited access from anywhere, at any time, is pushing storage environments to the limit. To meet these dynamic business demands, the network must evolve to improve speed, increase efficiency, and reduce costs. Legacy infrastructures were not designed to support the performance requirements of flash-based storage technology. A new approach to storage networking is required to unlock the full capabilities of all-flash arrays. By treating the network as a strategic part of a storage environment, organizations can maximize their productivity and efficiency, even as they rapidly grow their environments.

The IBM Storage Networking SAN24B-6 switch provides exceptional value in an entry-level switch, combining high-performance capabilities of 4, 8, 16, and 32 Gbps, point-and-click simplicity, and enterprise-class functionality. The port speed capability is dependent on the transceiver installed.

SAN24B-6 provides small to midsized data centers with low-cost access to industry-leading Gen 5 and Gen 6 Fibre Channel technology, and the ability to start small and grow on demand from 8 to 24 ports to support an evolving storage environment. In addition, SAN24B-6 is easy to use and install, with a point-and-click user interface that simplifies deployment and saves time.

Figure 1 shows the SAN24B-6 switch.

Figure 1   SAN24B-6 switch

Did you know?

The IBM SAN24B-6 switch provides the following benefits:

► Proactively monitors and optimizes the health and the performance of individual virtual machines (VMs), and identifies anomalies with IBM VM Insight®

► Leverages Fabric Vision technology to help simplify administration, quickly resolve problems, increase uptime, and reduce costs

► Scale on demand, from 8 to 24 ports, to connect additional devices as needed

Product highlights

The IBM SAN24B-6 switch has the following highlights:

► Meet the high-throughput, low-latency demands of critical applications with flash-ready performance

► Scale on demand, from 8 to 24 ports, to connect additional devices as needed

► Deliver 4, 8, 16, or 32 Gbps port bandwidth for increased performance on demand

► Simplify deployment and reduce install time with a point-and-click user interface

► Automatically discover and recover from common networking problems

► Proactively monitor and optimize the health and performance of individual virtual machines (VMs)

► Simplify administration, resolve problems, increase uptime, and reduce costs by using Fabric Vision technology

Product overview

The IBM Storage Networking SAN24B-6 switch offers low cost of entry, high performance, power efficiency, and TCO-friendly flexibility in licensing and capacity, with a flash-ready solution for the always-on business.

Gen 6 Fibre Channel

IBM b-type Gen 6 Fibre Channel is the purpose-built network infrastructure for mission-critical storage, delivering breakthrough performance to accelerate data retrieval, adapt to evolving requirements, and drive always-on data access. The SAN24B-6 switch with Gen 6 Fibre Channel storage technology simplifies setup, management and monitoring while delivering the performance required by flash storage, and can grow with your business at a low cost of entry.

Fabric Vision technology

Fabric Vision technology with VM Insight is an optional feature that provides unprecedented insight and visibility across the storage network. Its powerful, integrated monitoring, management, and diagnostic tools enable organizations to achieve these goals:

► Simplify monitoring:

- Deploy more than 20 years of storage networking best practices with a single click
- Leverage integrated network sensors to gain visibility into VM storage
- Gain comprehensive visibility into the fabric using browser-accessible dashboards with drill-down capabilities

► Increase operational stability:

- Avoid up to 50 percent of common network problems with proactive monitoring
- Identify hot spots and automatically mitigate network problems before they affect performance
- Monitor performance for each VM and spot anomalies

► Dramatically reduce costs:

- Eliminate nearly 50 percent of maintenance costs through automated testing and diagnostic tools
- Help reduce capital expenditure costs by eliminating the need for expensive third-party tools
- Simplify network planning and provisioning based on VM workload requirements

Gain maximum flexibility

The SAN24B-6 switch is configurable with Ports on Demand (PoD) for 8, 16, or 24 ports, and supports 4, 8, 16, or 32 Gbps port speeds with the proper transceivers installed, all in an efficient 1U package. The switch has an integrated power supply and four built-in fans. The power supply offers real-time, active power monitoring. SAN24B-6 helps to lower costs, too, with low energy consumption (at 0.10 watts per Gbps and 3.2 watts per port).

Industry-leading technology that is flexible, simple, and easy to use

SAN24B-6 features up to 24 Fibre Channel ports in a low-cost, efficiently designed 1U form factor, delivering industry-leading Gen 6 Fibre Channel technology in a flexible, simple, and easy-to-use solution. Designed for maximum flexibility, this entry-level switch offers pay-as-you-grow capability to easily and cost-effectively scale from 8 to 24 ports with PoD. Moreover, each of the 24 SFP+ ports supports 4, 8, 16, and 32 Gbps Fibre Channel speeds. High-speed 32 Gbps and 16 Gbps optics allow organizations to deploy bandwidth on demand to meet growing data center needs.

With its PoD capability, SAN24B-6 provides excellent overall value and the agility needed to enable rapid deployments to meet user demands and support higher growth. In addition, the switch is easy to deploy with the EZSwitchSetup wizard, featuring a simple user interface that dramatically reduces deployment and configuration times to as few as three steps.

Flash-ready performance for evolving storage requirements

Faced with increased competition and the need to deliver differentiated services, organizations rely on leading technology to help them expand their businesses and grow revenue. IBM b-type Gen 6 Fibre Channel delivers advanced 32 Gbps performance to redefine the limits of application performance, and to unleash the full potential of new storage technologies.

SAN24B-6 combines market-leading Gen 6 throughput and low latency with an affordable switch form factor, making it ideal for small to midsized businesses. Using this switch, organizations can build a flash-ready infrastructure that adapts to their expanding business requirements. Administrators can achieve optimal bandwidth utilization, high availability, and load balancing by combining up to eight inter-switch links (ISLs) in a 256 Gbps framed-based trunk. This can be achieved through eight individual 32 Gbps SFP+ ports.

Moreover, exchange-based dynamic path selection (DPS) optimizes fabric-wide performance and load balancing by automatically routing data to the most efficient, available path in the fabric. This feature augments ISL Trunking to provide more effective load balancing in certain configurations.

To realize the full benefits of flash, organizations will need to transition their high-performance, latency-sensitive workloads to flash-based storage with NVMe. SAN24B-6 is NVMe-ready, allowing organizations to seamlessly integrate IBM b-type Gen 6 Fibre Channel networks with next-generation NVMe without a disruptive rip and replace. The simplicity and efficiency of NVMe over Fibre Channel enable significant performance gains for flash storage. In addition, NVMe enables users to achieve faster application response times and harness the performance of solid-state drives for better scalability across virtual data centers with flash. Leveraging the efficiency of NVMe over Fibre Channel, combined with the high performance and low latency of IBM b-type Gen 6 Fibre Channel, organizations can accelerate input/output operations per second (IOPS) to deliver the performance, application response time, and scalability needed for next-generation data centers (Figure 2).
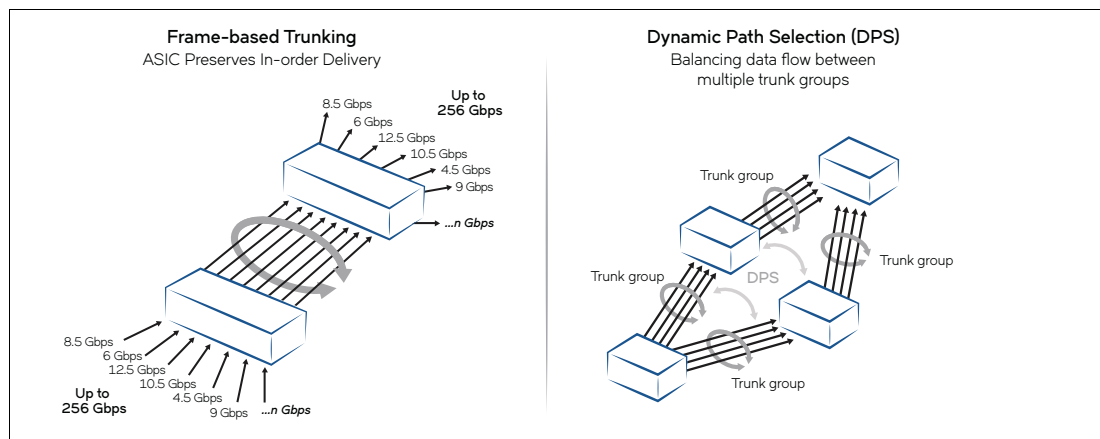

Figure 2   DPS augments ISL Trunking to route data efficiently between multiple trunk groups

Rely on the network that delivers always-on business operations

IBM b-type Gen 5 and Gen 6 technologies leverage a rich heritage of Fibre Channel innovation to deliver industry-leading reliability for the world's most demanding data centers. IBM b-type Fabric Vision technology provides a breakthrough hardware and software solution that helps organizations simplify monitoring, maximize network availability, and gain insight into issues to speed resolution and meet critical service level agreements (SLAs).

VM Insight is the newest feature in Fabric Vision technology, enabling proactive visibility into the health and performance of individual VMs with integrated sensors. Using this capability, administrators can quickly identify abnormal VM behaviors to facilitate troubleshooting and fault isolation, helping to ensure maximum performance and operational stability.

Forward Error Correction (FEC) capabilities further increase resiliency by automatically detecting and recovering network transmission errors. To ensure predictable performance before deployment, organizations can validate infrastructure with the ClearLink Diagnostics and Flow Generator features.

Simplified management and robust network analytics

Fabric Vision technology provides unprecedented insight and visibility across the storage network, with powerful integrated monitoring, management, and diagnostic capabilities. These innovative features enable administrators to avoid problems before they impact operations, helping organizations meet SLAs. Fabric Vision technology includes these features:

- ► **VM Insight:** Seamlessly monitors VM performance throughout a storage fabric with standards-based, end-to-end VM tagging. Administrators can quickly determine the source of VM/application performance anomalies, as well as provision and fine-tune the infrastructure based on VM/application requirements to meet service-level objectives.

- ► **Monitoring and Alerting Policy Suite (MAPS):** Leverages prebuilt, rule-/policy-based templates within MAPS to simplify fabric-wide threshold configuration, monitoring, and alerting. Administrators can configure the entire fabric (or multiple fabrics) at one time using common rules and policies, or customize policies for specific ports or switch elements. With Flow Vision and VM Insight, administrators set thresholds for VM flow metrics in MAPS policies to be notified of VM performance degradation.

- ► **Fabric Performance Impact (FPI) Monitoring:** Uses predefined MAPS policies to automatically detect and alert administrators to different latency severity levels, and to identify slow-drain devices that could affect network performance. This feature identifies various latency severity levels, pinpointing exactly which devices are causing or are affected by a bottlenecked port, and quarantines automatically slow-drain devices to prevent buffer credit starvation.

- ► **Dashboards:** Provides integrated dashboards that display an overall storage area network (SAN) health view, along with details about out-of-range conditions, to help administrators easily identify trends and quickly pinpoint issues occurring on a switch or in a fabric.

- ► **Configuration and Operational Monitoring Policy Automation Services Suite (COMPASS):** Simplifies deployment, safeguards consistency, and increases operational efficiencies of larger environments with automated switch and fabric configuration services. Administrators can configure a template or adopt an existing configuration to seamlessly deploy a configuration across the fabric. In addition, they can ensure that settings do not drift over time with COMPASS configuration and policy violation monitoring within IBM Network Advisor dashboards.

- ► **ClearLink Diagnostics:** Ensures optical and signal integrity for Fibre Channel optics and cables, simplifying deployment and support of high-performance fabrics. ClearLink Diagnostic Port (D_Port) is an advanced capability of Fibre Channel platforms.

- ► **Flow Vision:** Enables administrators to identify, monitor and analyze specific application flows in order to simplify troubleshooting, maximize performance, avoid congestion, and optimize resources. Flow Vision includes these features:
  - – **Flow Monitor:** Provides comprehensive visibility, automatically learns and nondisruptively monitors flow performance. Administrators can monitor all flows from a specific host to multiple targets or logical unit numbers (LUNs), from multiple hosts to a specific target/LUN, or across a specific ISL. Additionally, they can perform LUN-level monitoring of specific frame types to identify resource contention or congestion that is affecting application performance. With VM Insight, administrators can monitor network throughput statistics for each VM.
  - – **Flow Learning:** Enables administrators to nondisruptively discover all flows that go to or come from a specific host port or a storage port, or traverse ISLs/inter-fabric links (IFLs) or Fibre Channel over IP (FCIP) tunnels, to monitor fabric-wide application performance. In addition, administrators can discover top and bottom bandwidth-consuming devices and manage capacity planning.
  - – **Flow Generator:** Provides a built-in traffic generator for pretesting and validating your infrastructure for robustness, including route verification and integrity of optics, paths and connectors, cables, ports, back-end connections, and ISLs, before deploying applications.
  - – **Flow Mirroring:** Provides the ability to nondisruptively create copies of specific application and data flows or frame types that can be captured for in-depth analysis.
- ► **Forward Error Correction (FEC):** Enables recovery from bit errors in device connections and ISLs, enhancing transmission reliability and performance.
- ► **Credit Loss Recovery:** Helps overcome performance degradation and congestion due to buffer credit loss.

IBM Network Advisor

IBM Network Advisor simplifies Gen 6 Fibre Channel management and helps organizations proactively diagnose and resolve issues to maximize uptime, increase operational efficiency, and reduce costs. The wizard-driven interface dramatically reduces deployment and configuration times by allowing fabrics, switches, and ports to be managed as groups. Customizable dashboards graphically display performance and health indicators out of the box, including all data captured using Fabric Vision technology.

To accelerate troubleshooting, administrators can use dashboard playback to quickly review past events and identify problems in the fabric. Dashboards and reports can be also configured to show only the most relevant data, enabling administrators to more efficiently prioritize their actions and maintain network performance.

For more information, see the IBM Network Advisor data sheet.

Access Gateway mode

SAN24B-6 can be deployed as a full-fabric switch or as an Access Gateway, which simplifies fabric topologies and heterogeneous fabric connectivity (the default mode setting is a switch). Access Gateway mode utilizes N_Port ID Virtualization (NPIV) switch standards to present physical and virtual servers directly to the core of SAN fabrics. This configuration makes a switch in Access Gateway mode transparent to the SAN fabric, greatly reducing management of the overall storage network edge. SAN24B-6 in Access Gateway mode can connect servers to NPIV-enabled SAN fabrics.

Organizations can easily enable Access Gateway mode via IBM Network Advisor or a command-line interface (CLI). Access Gateway mode includes these key benefits:

► Improved scalability for large or rapidly growing server and virtual server environments

► Reduced management of the network edge because Access Gateway does not have a domain identity and appears transparent to the core fabric

► Support for heterogeneous SAN configurations without reduced functionality for server connectivity

Specifications

Table 1 lists the system architecture specifications for the SAN24B-6 switch.

Table 1   System architecture

Product number	8960-F24[a]
Fibre Channel ports	Switch mode (default): 8, 16, and 24-port configurations (8-port increment through PoD license); E, F, M, and D ports Access Gateway default port mapping: 16 F_Ports, 8 N_Ports
Scalability	Full-fabric architecture with a maximum of 239 switches
Certified maximum	9,000 active nodes; 56 switches, 19 hops in Fabric OS fabrics; larger fabrics certified as required
Performance	Fibre Channel: 4.25 Gbps line speed, full duplex; 8.5 Gbps line speed, full duplex; 14.025 Gbps line speed, full duplex; auto-sensing of 4, 8, 16, and 32 Gbps port speeds
ISL Trunking	Frame-based trunking with up to eight 32 Gbps ports per ISL trunk; up to 256 Gbps per ISL trunk. Exchange-based load balancing across ISLs with DPS included in Fabric OS.
Aggregate bandwidth	768 Gbps end-to-end full duplex
Maximum fabric latency	Latency for locally switched ports is 900 ns (including FEC)
Maximum frame size	2,112-byte payload
Frame buffers	2,000 dynamically allocated
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Port types	F_Port, E_Port, M_Port, D_Port (ClearLink Diagnostic Port) on 24 SFP+ ports. Access Gateway mode: F_Port and NPIV-enabled N_Port
Data traffic types	Fabric switches supporting unicast
Hot-swap components	Small form-factor pluggables (SFPs)
Warranty	One-year; customer-replaceable unit (CRU) and on-site, 9×5 next-business-day response Warranty service upgrades are available
Media types	32 Gbps: SAN24B-6 requires hot-pluggable SFP+, LC connector; 32 Gbps SWL, LWL 16 Gbps: SAN24B-6 requires hot-pluggable SFP+, LC connector; 16 Gbps SWL, LWL, ELWL Fibre Channel distance subject to fiber-optic cable and port speed

Port speed	4, 8, and 16 Gbps when using 16 Gbps SFP+ transceivers 8, 16, and 32 Gbps when using 32 Gbps SFP+ transceivers
USB	One USB port for system log file downloads or firmware upgrades
Fabric services **Note:** Some fabric services do not apply or are unavailable in Access Gateway mode.	► Monitoring and Alerting Policy Suite (MAPS) ► Flow Vision ► Adaptive Networking (Traffic Isolation, quality of service) ► Fabric Performance Impact (FPI) Monitoring ► Slow Drain Device Quarantine (SDDQ) ► Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning, peer zoning, target-driven zoning) ► Dynamic Fabric Provisioning (DFP) ► Dynamic Path Selection (DPS) ► Extended Fabrics ► Enhanced BB credit recovery ► FDMI ► Frame Redirection ► Frame-based Trunking ► FSPF ► ISL Trunking ► Management Server ► NPIV ► NTP v3 ► Registered State Change Notification (RSCN) ► Reliable Commit Service (RCS) ► Simple Name Server (SNS) ► Read Diagnostics Parameter (RDP) ► VM Insight

a. You will need to choose one of the 2445, 2446, or 2447 optional feature codes.

Table 2 lists the management specifications for the SAN24B-6 switch.

Table 2   Management features

Supported management software	► HTTP, SNMP v1/v3 (FE MIB, FC Management MIB), SSH ► Auditing, Syslog ► Advanced Web Tools ► IBM Network Advisor SAN Enterprise or IBM Network Advisor Professional Plus ► CLI ► SMI-S compliant ► Administrative Domains ► Trial licenses for add-on capabilities

Security	► DH-CHAP (between switches and end devices)
	► FCAP switch authentication
	► HTTPS
	► IPSec
	► IP filtering
	► LDAP with IPv6
	► OpenLDAP
	► Port Binding
	► RADIUS
	► TACACS+
	► User-defined Role-Based Access Control (RBAC)
	► Secure Copy (SCP)
	► Secure RPC
	► Secure Syslog
	► SFTP
	► SSH v2
	► SSL
	► Switch Binding
	► Trusted Switch
Management access	10/100/1000 Mbps Ethernet (RJ-45), in-band over Fibre Channel, serial port (RJ-45), and one USB port
Diagnostics	► ClearLink optics and cable diagnostics, including electrical/optical loopback, link traffic/latency/distance
	► Flow mirroring
	► Built-in flow generator
	► POST and embedded online/offline diagnostics, including environmental monitoring, FCping, and Pathinfo (FC traceroute)
	► Frame viewer
	► Nondisruptive daemon restart
	► Optics health monitoring
	► Power monitoring
	► RAStrace logging
	► Rolling Reboot Detection (RRD)

Table 3 lists the mechanical characteristics of the SAN24B-6 switch.

Table 3   Mechanical characteristics

Enclosure	Back-to-front airflow (non-port-side intake); power from back, 1U
Size	Width: 42.88 cm (16.88 in.) Height: 4.29 cm (1.69 in.) Depth: 30.66 cm (12.07 in.)
System weight	5.76 kg (12.65 lb) with one integrated power supply, without transceivers

Table 4 lists the environmental characteristics of the SAN24B-6 switch.

Table 4   Environmental characteristics

Operating environment	Temperature: 0°C - 40°C (32°F - 104°F) Humidity: 10% - 85% (non-condensing)
Non-operating environment	Temperature: -25°C - 70°C (-13°F - 158°F) Humidity: 10% - 90% (non-condensing)
Operating altitude	Up to 3,000 m (9,842 ft)

Storage altitude	Up to 12 km (39,370 ft)
Shock	Operating: Up to 20 G, 6 ms half-sine Non-operating: Half sine, 33 G 11 ms, 3G axis
Vibration	Operating: 0.5 g sine, 0.4 grms random, 5 Hz to 500 Hz Non-operating: 2.0 g sine, 1.1 grms random, 5 Hz to 500 Hz
Heat dissipation	24 ports at 215 BTU per hour

Table 5 lists the electrical characteristics of the SAN24B-6 switch.

Table 5   Electrical characteristics

Power supply	Base switch includes a single, fixed power supply with four integrated system cooling fans
AC input	90 V - 264 V
Maximum input current	2.2 A
Input line frequency	47 Hz - 63 Hz
Power consumption	76.52 W with all 24 ports populated with 32 Gbps SWL optics 55.83 W for idle configuration (all optics loaded but not initialized)

Table 6 lists the available optional features.

Table 6   Optional features

Feature code	Feature name	Feature description
2445	F24 Zero SFP Bundle	This feature enables FC ports 0 to 7. It does not include SFP transceivers.
2446	F24 8 x 16Gbps SW SFP Bundle	This feature provides a bundle of eight SW 16 Gbps SFPs transceivers with 8 FC ports enabled.
2447	F24 16Gbps SW SFP Enterprise Bundle	This feature provides a bundle of 24 SW 16 Gbps SFP transceivers with 24 FC ports enabled.
7422	SAN24B-6 Enterprise Bundle	This feature enables the following: Trunking Activation, Extended Fabric, and Fabric Vision.
7498	SAN24B-6 8 Port 16Gbps SW Upgrade	This feature enables additional port activation for ports 8 to 15 (first eight port increment) or ports 16 to 23 (second eight port activation). Note that the first port is designated as port zero and the last port is designated as port 23. It includes eight 16 Gbps SW SFP transceivers.
7499	Gen 6 8 Port Activation	This feature enables additional port activation for ports 8 to 15 (first eight port increment) or ports 16 to 23 (second eight port activation). Note that the first port is designated as port zero and the last port is designated as port 23. This feature does not include SFPs.

Related information

To learn more about the IBM Storage Networking SAN24B-6 switch, please contact your IBM representative or IBM Business Partner.

For more information, see the following links:

- ► IBM SAN24B-6 product page

  https://ibm.com/us-en/marketplace/san24b-6

- ► *IBM Network Advisor*, TIPS1124

  https://www.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=TS012443USEN&

- ► *Fabric Vision Technology*, REDP-5400

  https://www.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=TS012932USEN&

- ► IBM Offering Information page (announcement letters and sales manuals)

  http://www.ibm.com/common/ssi/index.wss?request_locale=en

  On this page, enter SAN24B-6, select the information type, and then click **Search**. On the next page, narrow your search results by geography and language.

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