IBM

IBM Storage Networking SAN18B-6

Highlights

- Moves more data securely and faster over distance
- Replicates data using less-expensive WAN connections
- Drives more throughput with advanced compression
- Consolidates replication workloads from FC and IP storage
- Encrypts storage data flows over distance
- Provides load balancing and network resilience
- Pre-validates the WAN infrastructure
- Extends proactive monitoring to automatically detect WAN anomalies

Fast, Reliable, and Secure Data Protection Over Distance

With the world's embrace of digital business, data has become more valuable than ever. Expectations for that data to be accessible from anywhere, at any time, on any device are pushing infrastructures to the limit. IT organizations are under pressure to keep pace with the growing avalanche of data and ensure their valuable information is protected from a disaster. The loss of any crucial data could lead directly to lost revenue or damage to the company's brand reputation. To safeguard data from a disaster, storage administrators need a way to achieve sufficient replication performance over distance, keep data flowing over unreliable WAN connections, and secure data-in-flight while containing costs for equipment and long-distance connections.

IBM Storage Networking SAN18B-6

The IBM Storage Networking SAN18B-6 extension switch addresses these challenges by providing a modern replication connectivity solution that cost-effectively and quickly replicates data across sites for fast, continuous data protection. With powerful performance and reliability, and strong security, the SAN18B-6 can handle the unrelenting transfer of data between data centers, minimize the impact of

disruptions to maintain service-level agreements (SLAs), and secure data-in-flight between data centers. The switch has built-in technology that overcomes the inherent challenges of latency and packet loss over long distance. It dramatically speeds up replication performance and enables organizations to substantially reduce costs by deploying less-expensive WAN connections.

A Purpose-Built Extension Platform for Midrange Storage
The SAN18B-6 is a robust platform for medium-scale, multisite data center environments implementing block, file, and tape data protection solutions. It is an ideal platform for building a high-performance data center-to-data center infrastructure for multisite asynchronous and synchronous storage replication and centralized tape backup, recovery, and archiving solutions. The IBM Storage Networking Extension maximizes replication and backup throughput over distance, using WAN-optimized TCP, disk and tape protocol acceleration, and data compression. Without the use of extension, the long distance required for disaster recovery often makes it impossible or impractical for organizations to meet their Recovery Point Objective (RPO) and Recovery Time Objective (RTO). In addition, the platform offers both Fibre Channel over IP (FCIP) and IP extension technology, and is designed to handle simultaneous replication from Fibre Channel and IP storage arrays to consolidate replication workloads over WAN connections.

Whether supporting point-to-point connections, a multisite SAN, or remote offices, the SAN18B-6 offers enterprise-class capabilities to meet demanding disaster recovery requirements. With twelve 32 Gbps capable Fibre Channel ports and six 1/10-Gigabit Ethernet (GbE) ports, this switch provides the bandwidth and throughput required for maximum application performance over WAN connections.

Designed to be affordable, the SAN18B-6 offers flexible configurations. To meet current and future requirements, organizations can purchase a full configuration with 2.5 Gbps WAN capacity or pay as they grow with an on- demand upgrade license to quickly and cost-effectively scale their WAN rate from 1 Gbps to 2.5 Gbps. With a compression ratio of 4 to 1, organizations can scale up to 10 Gbps replication throughput, depending on the type of data and the characteristics of the WAN connection. (Note: 4:1 is typical, but the compression ratio is data dependent and will vary significantly depending on whether the data is easily compressible or already compressed.)

Move More Data Faster over Distance with Powerful Performance
The advanced performance and network optimization features of the SAN18B-6 enable replication and backup applications to send more data over metro and WAN links in less time, and optimize available WAN bandwidth. Supporting up to 250 ms Round-Trip Time (RTT) latency, the SAN18B-6 enables cost-effective extension solutions over distances up to 25,500 kilometers (15,845 miles).

The SAN18B-6 maximizes replication and backup throughput over distance using data compression, disk and tape protocol acceleration, WAN-optimized TCP, and other extension networking technologies. Advanced features and technologies include:

- Extension Trunking: Combines multiple WAN connections into a single, logical, high-bandwidth trunk, providing active load balancing and network resilience to protect against WAN link failures.

- Lossless Link Loss (LLL): Part of Extension Trunking, providing recovery of data lost in-flight when a link goes offline. From the perspective of the storage applications, nothing ever occurs because all data is delivered—and delivered in order.

- Failover/failback with failover groups: Circuits are assigned metrics and put in a failover group. If all circuits of the lower metric within the failover group go offline, the higher metric circuits take over. This uses LLL, and all data is delivered and delivered in order. The storage application will not know that a failover/failback has occurred.

- Adaptive Rate Limiting (ARL): Dynamically adjusts bandwidth sharing between minimum and maximum rate limits to optimize bandwidth utilization and maintain maximum WAN performance during disruptions.

- IPsec: Ensures secure transport of data over WAN links without a performance penalty or excessive added latency by encrypting data-in-flight with a hardware-implemented, standard 256-bit AES algorithm.

- Unparalleled, extremely efficient architecture: Uniquely permits the high-speed, low-latency processing of IP datagrams and Fibre Channel, making extension of synchronous applications possible.

- WAN-optimized TCP: An aggressive TCP stack, optimizing TCP window size and flow control, and accelerating TCP transport for high-throughput storage applications.

- Streams: Is a feature of WAN-optimized TCP and used with IP extension to prevent Head-of-Line Blocking (HoLB) across the WAN.

- PerPriority TCP Quality of Service (PTQ): Provides high-, medium-, and low-priority handling of Fibre Channel and IBM IP extension flows within the same tunnel for transmission over the WAN using autonomous individual TCP sessions per QoS priority.

- Advanced compression architecture: Provides multiple modes to optimize compression ratios for various throughput requirements.

- FCIP FastWrite (FCIP-FW): Accelerates SCSI write processing, maximizing performance of synchronous and asynchronous replication applications across high-latency WAN connections over any distance.

- Open Systems Tape Pipelining (OSTP): Accelerates read and write tape processing over distance, significantly reducing backup and recovery times over distance anywhere in the world.

Midrange and IP storage arrays with native replication applications generally do not handle latency and packet loss well. The SAN18B-6 provides a robust extension solution that delivers local performance at long distance—along with strong encryption—for comprehensive disaster recovery. It leverages TCP Acceleration to help achieve the fastest replication speeds possible from storage devices, and WAN-optimized TCP to ensure in-order, lossless transmission of extension data.

Extension solutions help to significantly increase the performance of IP storage applications across the WAN—even with encryption turned on. The more latency and packet loss between the data centers, the greater the performance gain using these solutions. The SAN18B-6 can move more data than native TCP/IP stacks to meet rigorous recovery objectives. These performance gains enable use cases that were previously unattainable.

Extension also offers other, more far-reaching benefits. The SAN18B-6 supports and manages Fibre Channel and IP-based data flows, enabling storage administrators to consolidate I/O flows from heterogeneous storage devices and multiple protocols. The consolidation of these applications into a single, managed tunnel between data centers across the WAN has significant operational, availability, security, and performance value.

Consolidating IP storage flows, or both Fibre Channel and IP storage flows, into a single tunnel contributes significantly to operational excellence. Operational advantages are gained with Fabric Vision, Monitoring Alerting Policy Suite (MAPS), WAN Test Tool (Wtool), and IBM SAN management software. Using custom, browser-accessible dashboards for IP storage, or combined Fibre Channel and IP storage, storage administrators have a centralized management tool to monitor the health and performance of their networks.

Extension supports a range of common storage applications, including array native IP Remote Data Replication (RDR), IP-based centralized backup, virtual machine (VM) replication, host-based and database replication over IP, NAS head replication between data centers, and data migration between data centers.

Protect Data from Network Disruptions and Outages
Today's organizations depend on fast, reliable access to data, regardless of location. The ramifications and potential business impact of an unreliable disaster recovery and data protection infrastructure are greater than ever.

The SAN18B-6 provides a suite of features—from pre-deployment validation to advanced network failure recovery technologies—to ensure a continuously available storage extension infrastructure.

The SAN18B-6 has built-in tools to validate the condition of WAN links and network paths, as well as to validate the proper setup of configurations prior to deployment. Administrators can validate and troubleshoot the physical infrastructure with the built-in Flow Generator and WAN Test Tool (Wtool), thereby easing deployment and avoiding potential issues.

Extension Trunking protects against WAN link failures with tunnel redundancy for lossless path failover and guaranteed in-order data delivery using Lossless Link Loss (LLL). The advanced Extension Trunking feature allows multiple network paths to be used simultaneously, and when there is a failure for a network path, Extension Trunking will retransmit the lost packets to maintain overall data integrity. The storage application will be protected with no disruption.

With Adaptive Rate Limiting (ARL), organizations can optimize bandwidth utilization and maintain full WAN performance of the link during periods when a path is offline due to an extension platform, IP network device, or array controller outage. ARL uses dynamic bandwidth sharing between minimum (floor) and maximum (ceiling) rate limits to achieve maximum available performance during failure situations.

The SAN18B-6 leverages the core technology of Gen 6 Fibre Channel platforms, consistently delivering 99.9999% uptime in the world's most demanding data centers. These capabilities enable a high-performance and highly reliable network infrastructure for disaster recovery and data protection.

Secure Data from Network Breaches
Growing concerns about potential damage to brand reputation, class-action lawsuits, and costly downtime are causing executives to pay greater attention to the security practices of their organizations. Leaving data exposed in-flight over distance while replicating to a remote location can result in data breaches and unwanted publicity. With security-related outages on the rise, organizations do not want to leave themselves exposed and need to ensure that all data leaving the confines of their data center is secure.

The SAN18B-6 Extension Switch uses unbreakable network encryption to ensure that data-in-flight is protected from threats over the WAN. This switch features robust, hardware-based IPsec with AES 256-bit encryption to keep data secure and meet security compliance requirements. In addition, hardware-based IPsec encrypts data flows over distance without a performance penalty. The SAN18B-6 Extension Switch includes IPsec; no additional licenses or fees are required.

Extending Fabric Vision Technology between Data Centers
Fabric Vision technology, an extension of Gen 6 Fibre Channel, is supported on IBM extension products to provide unprecedented insight and visibility across the storage network. With its powerful integrated monitoring, management, and diagnostic tools, Fabric Vision technology enables organizations to:

Simplify monitoring:

- Deploy more than 20 years of storage networking best practices with a single click to simplify the deployment of monitoring with predefined, threshold-based rules, actions, and policies

- Simplify troubleshooting of end-to-end I/O flows over distance with Fabric Vision monitoring and alerting

- Gain comprehensive visibility into disaster recovery and business continuity network health and performance using browser-accessible dashboards with drill-down capabilities

Increase availability:

- Extend proactive monitoring between data centers to automatically detect WAN anomalies and address problems before they impact operations

- Facilitate planning to improve storage extension network capability, health, and stability through intuitive reporting and trend analysis

- Minimize downtime and accelerate troubleshooting with live monitoring, integrated diagnostics, and point-in-time playback

Dramatically reduce costs:

- Eliminate the majority of maintenance costs through automated testing and diagnostic tools that validate the health, reliability, and performance of the network prior to deployment

- Save up to millions of dollars on CapEx by eliminating the need for expensive third-party tools through built-in monitoring and diagnostics

- Leverage specialized tools for pretesting and validating IT infrastructure to accelerate deployment, simplify support, and reduce operational costs

Simplified Management and Robust Network Analytics

Fabric Vision technology provides a breakthrough hardware and software solution that helps simplify monitoring, maximize network availability, and dramatically reduce costs. Featuring innovative monitoring, management, and diagnostic capabilities, Fabric Vision technology enables administrators to avoid problems before they impact operations, helping their organizations meet SLAs. The SAN18B-6 Extension Switch supports the following Fabric Vision technology features for storage extension management:

- Monitoring and Alerting Policy Suite (MAPS)

- Fabric Performance Impact (FPI) Monitoring

- Integrated dashboards

- Configuration and Operational Monitoring Policy Automation Services Suite (COMPASS)

- ClearLink Diagnostics

- Flow Vision

- Forward Error Correction (FEC)

- Credit Loss Recovery

For disaster recovery, it is important to have visibility and insight for greater control of WAN traffic to guarantee that the RPO and RTO are met. Flow Vision enables administrators to quickly identify, monitor, and analyze specific application flows to simplify troubleshooting, maximize performance, avoid congestion, and optimize resources. Flow Vision includes Flow Learning, Flow Monitor, and Flow Generator.

Flow Learning enables administrators to discover all flows that go to or come from a specific host port or storage port, or traverse Inter-Switch Links (ISLs), Inter-Fabric Links (IFLs), or Fibre Channel over Internet Protocol (FCIP) tunnels to monitor fabric-wide application performance. In addition, Flow Learning enables discovery of top and bottom bandwidth-consuming devices to help manage capacity planning.

Flow Monitor provides comprehensive visibility into flows across a storage extension network. It automatically learns and non-disruptively monitors all flows from a specific storage device that are writing to or reading from a destination storage device or logical unit numbers (LUNs), or across a storage extension network. Additionally, LUN-level monitoring of specific frame types can be performed to identify resource contention or congestion that is impacting application performance.

Flow Generator provides a built-in traffic generator for pretesting and validating the storage extension infrastructure—including route verification, QoS zone setup, Extension Trunking configuration, WAN access, IPsec policy setting, and integrity of optics, cables, and ports—for robustness before deploying applications.

Improve Efficiency with Fabric Automation
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. By introducing REST APIs directly into its switch and

management products, IBM offers a broad range of choices to enable any SAN management solution. IT organizations that couple IBM robust data collecting capabilities with automation and orchestration tools (such as Ansible) gain the ability to automate configuration tasks and the visibility to monitor and detect any performance or health changes.

IBM automation solutions are based on these pillars:
• Make standard REST APIs available directly from the switch in order to automate repetitive daily tasks, such as fabric inventory, provisioning, and operational state monitoring.
• Quickly integrate systems with open source PyFOS, a Python language, to simplify common SAN management practices.
• Leverage Ansible to easily scale automation and orchestration across the entire infrastructure.

SAN18B-6 Extension Switch Specifications

System Architecture	
Enclosure	1U chassis designed to be mounted in a 19-inch cabinet
Fibre Channel ports	12 ports, 32 Gbps capable, universal (E, F, M, D, and EX ports)
Ethernet ports	6 ports of 1/10 GbE for LAN and WAN connectivity
Scalability	Full fabric architecture with 239 switches maximum
Certified Maximum	• Single fabric: 56 domains, 7 hops• Multiprotocol routing fabric: 19 hops
Fibre Channel performance	• 8.5 Gbps line speed, full duplex• 14.025 Gbps line speed, full duplex• 28.05 Gbps line speed, full duplex• Auto-sensing of 8, 16, and 32 Gb/s port speeds
Ethernet interfaces	1GbE and 10GbE
IBM Trunking	Up to eight 32 Gbps links aggregating to 256 Gbps per trunk. There is no limit to how many trunk groups can be configured per switch.
Fabric Latency	Non-blocking shared memory, 900 ns with no contention, cut-through switching at 32 Gbps
Maximum Fibre Channel frame size	2112-byte payload
Maximum IP MTU size	Jumbo Frames 1280 bytes to 9216 bytes
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Port types	F_Port, E_Port, EX_Port, (FCR E_Port), D_Port (Diagnostic), M_Port (Mirror), and self-discovery based on switch type (U_Port); VE_Port (FCIP and IP extension)
Data traffic types	Fibre Channel, FCIP, and IP extension
USB	One USB port for system log file downloads or firmware upgrades
Media types	Fibre Channel: Hot-pluggable Small Form-Factor Pluggable (SFP) and SFP+, short wavelength (SWL), and long wavelength (LWL) transceivers (available wavelength options vary for 16, and 32 Gbps SFPs) Ethernet: IHot-pluggable SFP and SFP+, short-reach wavelength (SRWL), long-reach wavelength (LRWL), and copper SFP/SFP+ transceivers
Fabric services	Simple Name Server (SNS); Registered State Change Notification (RSCN), NTP, RADIUS, RCS (Reliable Commit Service), Dynamic Path Selection (DPS), Exchange-based routing, device-based routing, port-based routing, lossless, Advanced Zoning, Web Tools, Trunking, Extended Fabrics, Fabric Vision, SDDQ
Extension services	Extension Trunking, Adaptive Rate Limiting (ARL), WAN Test Tool (Wtool), Open Systems Tape Pipelining (OSTP), FastWrite (FCIP-FW), QoS Marking, Bandwidth Enforcement, PerPriority TCP QoS, (PTQ), Advanced Extension, and Integrated Routing (FCR)
Optional upgrade license	The following optional extension features can be enabled on the SAN18B-6 base configuration via the upgrade license: • Enable WAN-side throughput from 1 Gbps to 2.5 Gbps • Enable 10 GbE port speed on the Ethernet ports • Turn on additional 8 Fibre Channel ports, includes 16 Gbps SFPs• Enable advanced software features, including Fabric Vision technology, Extension Trunking, Fibre Channel Trunking, and Integrated Routing

Management

Supported Management	Serial port (9600, 8, 1,no parity, no flow),Command LineInterface (CLI): SSHv2or Telnet, Web Tools:HTTP/HTTPS,SNMPv1/v3 (FE MIB,FC Management MIB),SMI-S, RADIUS, LDAP
Security	AES-GCM-256encryption on FC ISLs(E_Port), DH-CHAP(between switch andend-device), FCAPswitch authentication;FIPS 140-2 L2-compliant, HTTPS, IPfiltering, LDAP withIPv6, OpenLDAP, PortBinding, RADIUS,TACACS+, Role-BasedAccess Control(RBAC), TransportLayer Security (TLS)v1.2+, Secure Copy(SCP), Secure RPC,SFTP, SSHv2, SSL,Switch Binding,Trusted Switch
Extension security	Encryption: AES-GCM-256 IPsec ontunnel (VE_Port),Authentication:ECDSA-P384, Diffie-Hellman: ECDH-P384,PRF: PRF-HMAC-384,Integrity:HMAC-384-192, ESP,Suite B, ConnectedpWWN FCIP checking
Management access	10/100/1000 Ethernet(RJ-45); serial port(RJ-45) and one USBport
Diagnostics	POST and embeddedonline/offlinediagnostics, includingD_Port, WAN TestTool, FCIP ping, FCIPtraceroute, FCping,Pathinfo(FCtraceroute),SupportSave, RASLog, Syslog, MAPS,SDDQ, Flow Vision,and Ftrace

Mechanical

Enclosure	Back-to-front airflow/non-port-side air intake and power, 1RU,19-in., EIA-compliant
Size	Width: 44.0 cm (17.32in.) Height: 4.4 cm (1.73in.) Depth: 45.7 cm (17.74 in.)
System Weight	7.98 kg (17.6 lb.) empty 8.35 kg(18.4 lb.) fully loaded

Environmental

Temperature	Operating: 0°C to 40°C (32°F to 104°F) Non-operating: 25°C to 70°C (13°F to 158°F)
Relative humidity (non-condensing)	Operating: 10% to 85% at 40°C (104°F) Non-operating: 10% to 90%
Altitude (above sea level)	Operating: 0 to 3000m (9842 ft) Storage: 0 to 12 km (39,370 ft)
Shock	Operating: 10G, 10 ms, half-sine wave Non-operating: 33G, 11 ms, half-sine wave, 3G Axis
Vibration	Operating: 0.25g sine, 0.4 grms random, 5 Hz to 500 Hz Non-operating: 5 Hz at 0.5 grms, 10 Hz to 500 Hz at 1.0 grms (sine vibration), 3 Hz to 500 Hz @ 1.12 grms (random vibration)
Airflow	Maximum: 45.0 CFM Nominal: 22.4 CFM

Power

Power supply	Dual, hot-swappable, redundant, AC input power supplies with integrated system cooling fans
Power inlet	C14; requires C13 plug
Input voltage	100 VAC to 240 VAC (nominal), 90 VAC to 264 VAC (range)
Input line frequency	50/60 Hz (nominal), 47 Hz to 63 Hz (range)
Max inrush current	50A peak @ 240 VAC for <10 ms to 150 ms, <15A peak 50A peak @ 240 VAC at cold start for <10 ms 15A peak for cycles 10 ms to 150 ms, <3.5A peak for >150 ms
Power consumption	@100 VAC: 1.29A, 130W, 444 BTU/hr, 135 VA (max config) @200 VAC: 0.65A, 132W, 449 BTU/hr, 146 VA (max config)

Why IBM?

Innovative technology, open standards, excellent performance, and a broad portfolio of proven storage software and hardware solutions offerings—all backed by recognized industry leadership—are just a few of the reasons to consider storage solutions from IBM. In addition, IBM delivers some of the best storage products, technologies, services and solutions in the industry without the complexity of dealing with different hardware and software vendors.

For more information

To learn more about IBM Storage Networking SAN128B-6, please contact your IBM representative or IBM Business Partner, or visit: ibm.com/us-en/marketplace/san18b-6