

Designed for high-performance, scalable and simple-to-use medium to enterprise SAN environments



IBM TotalStorage SAN32M-2 fabric switch



High-density design with 32 ports in an efficient 1RU height helps save rack space

Highlights

- **Simple-to-use SAN switch with ease-of-installation and ease-of-use features designed specifically for the needs of medium-sized and enterprise environments**
- **High-performance 1, 2 and 4 Gigabit per second links with pay-as-you-grow FlexPort scalability enables growth from 16 to 24 to 32 ports**
- **Designed for high availability with hot-swappable, dual power supplies and HotCAT online code activation**
- **Foundation for new infrastructure simplification and business continuity solutions for servers running Microsoft® Windows®, UNIX®, Linux®, NetWare® and OS/400®, AIX® and z/OS® operating systems**

IBM TotalStorage SMB solutions

The IBM TotalStorage® SAN32M-2 fabric switch is designed specifically to address the needs of medium-sized and enterprise SAN environments. It can be used to create a wide range of high-performance SAN solutions, from simple single-switch configurations to larger multi-switch configurations which support fabric connectivity and advanced business continuity capabilities. Infrastructure simplification solutions for IBM @server® xSeries®, IBM System i™, IBM System p™ and IBM System z™ servers include storage consolidation and high-availability server clustering with IBM TotalStorage disk storage arrays. Business continuity solutions include data protection with IBM TotalStorage tape libraries and devices, and IBM Tivoli® Storage Manager data protection software.

A single SAN32M-2 switch can serve as the cornerstone of a Storage Area Network for those who want the benefits of storage consolidation and are just beginning to implement Fibre Channel storage systems. Such an entry-level

configuration can consist of one or two Fibre Channel links to a disk storage array or to an LTO tape drive. An entry-level, 16-port storage consolidation solution can support up to 15 servers with a single path to either disk or tape. The FlexPort feature is designed to enable a base switch to grow to 16 ports, in eight port increments, to support more servers and more storage devices without taking the switch offline.

A high-availability solution can be created with redundant switches. This capability is ideal for server clustering environments. Such a configuration can support from 14 to 30 servers, each with dual Fibre Channel adapters cross-connected to redundant SAN32M-2 switches which are cross-connected to a dual-controller storage system.

While the SAN32M-2 can be the foundation of medium-sized SANs, it can be configured to participate as a full member in a tier enterprise SAN with other members of the IBM TotalStorage SAN m-type family. This capability helps provide investment protection as SAN requirements evolve and grow over time.

Simple SAN configuration

The introduction of large capacity, high-availability storage systems offers new opportunities for cost reduction through storage consolidation and infrastructure, and management simplification. In older environments each server accessed its own dedicated storage

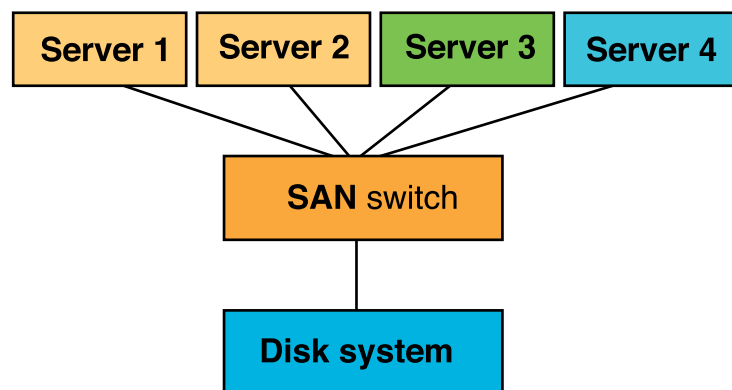
capacity using either internal disks that were contained within the server, or disks which were part of an external system attached exclusively to that server. It has become difficult to sustain that approach as both the requirement for storage capacity and the number of servers has increased. Storage consolidation is a fundamental objective of infrastructure simplification and is based on the philosophy that it is easiest to share and manage capacity contained in a large capacity, high-performance and high-availability external storage system such as provided by the IBM TotalStorage DS4000 and DS6000 series. Fibre Channel Storage Area Networks (SANs) were developed to provide efficient, high-performance access from many servers to many storage devices.

While it is possible in small environments to direct-connect servers to external storage systems using fibre channel links, it is more common to configure a SAN switch between the servers and the storage system to enable multiple servers to share the same storage capacity. This simple SAN is depicted in the following diagram.

The SAN32M-2 was designed specifically for use as the SAN switch in this type of configuration. It is easy to install and easy to manage. The tan, green and blue servers represent heterogeneous server types which are members of the same SAN and share capacity of the large disk system. The SAN32M-2 can be upgraded to 32 ports and is future-ready to support 4 Gbps servers and storage devices as they are introduced. Its flexible design allows participation with other SAN m-type switches in fabrics that evolve as requirements change. And it supports advanced functions to help enable participation in complex fabrics including cascaded switches and ISL trunks.

High-availability SAN configuration

Many applications require continuous operation. A common design approach to achieve that objective is to run multiple instances of the application across a cluster of servers. When a server fails or must be taken offline for maintenance, a backup server is available to help continue operation with a minimum of impact. Redundant paths to data are usually configured in a clustered server



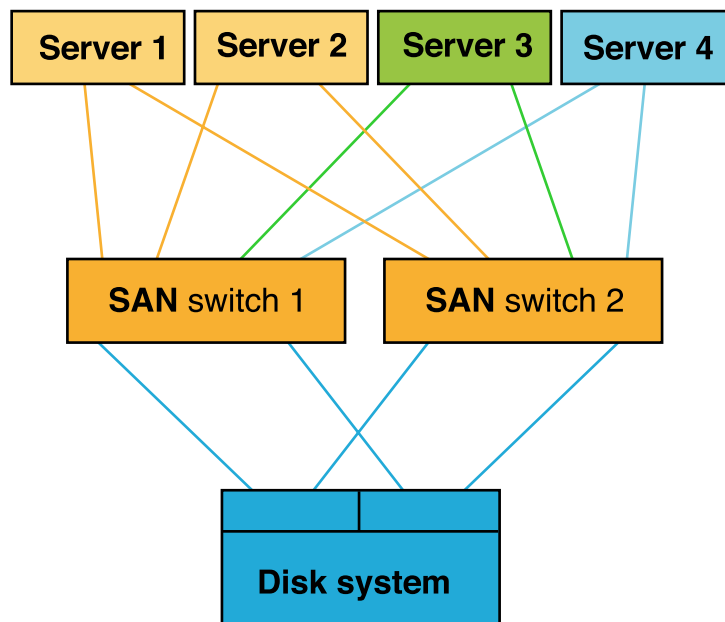
environment for the same reasons in an effort to help maintain access to data. Each server is configured with redundant Host Bus Adapters. Each Host Bus Adapter is connected to a different SAN switch, and each switch is connected to a different controller in a disk system. Every effort is made to maintain application access to data.

The SAN32M-2 is an excellent switch to use in a clustered server environment. Separate SAN switches enable two separate SAN fabrics, which are desirable as a means to help minimize or eliminate single points of failure. The yellow and green clusters shown above provide redundant components at every level and are designed to help minimize application outages.

Business continuity solution

Many small- and medium-sized companies want to implement a business continuity or remote backup capability to help address strict new regulatory requirements. The SAN32M-2 fabric switch can help provide the SAN connectivity required for these environments. The diagram on the following page is intended to represent two different sites. The blue side represents the production site and the green side represents the remote or backup site.

Many disk subsystems, including the IBM TotalStorage DS6000 and DS4000 series, are capable of copying data to a remote location. The data path for the remote copy operation is represented by the red links in the diagram.



Two SAN32M-2 fabric switches can be connected over metro distances (up to 10 km) using longwave SFP optical transceivers. Longer distances can be supported with SAN routers, such as the IBM TotalStorage SAN04M-R and SAN16M-R, which transport Fibre Channel Protocol (FCP) over Internet Protocol (IP) networks without merging the local and remote fabrics.

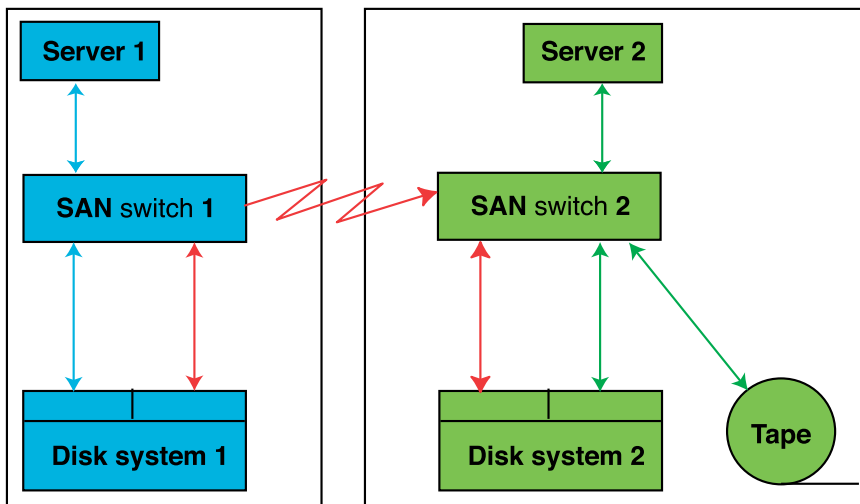
SAN32M-2 fabric switches can also be used to connect two locations to enable remote data backup. An Information Lifecycle Management (ILM) application such as IBM Tivoli Storage Manager (TSM), which runs on a server in the production site, can write data to a tape system at a remote location. The same distance capabilities are available for the business continuity solution described above.

First time SAN users characteristics

Easy to install and maintain

The SAN32M-2 includes capabilities designed to make it easy to install and easy to maintain for system administrators who have minimal experience with SAN components. EFCM Basic provides intuitive graphic switch management capabilities. Installation and backup/restore wizards are included for novice users which are designed to help guide them through switch setup and operation.

EFMC Basic (formerly SANpilot) is designed for first-time SAN users with minimum SAN expertise. EFCM Basic can help simplify monitoring and configuration management. Functions include Web browser access, fabric and switch configuration management, port activity monitoring and reset, firmware updating, event logging, diagnostics and



online help. Whether you have a single switch or a small fabric to manage, EFCM Basic capabilities and functionality can help simplify management of your SAN solution.

Pay-as-you-grow scalability

The **FlexPort Expansion** feature is designed to support scalable switch upgrades. The FlexPort feature provides an activation key and eight shortwave SFPs which upgrade the switch in eight-port increments while helping avoid fabric disruption. The ability to increase switch capacity while maintaining service helps customers implement a pay-as-you-grow strategy while minimizing impact to applications.

High performance

The SAN32M-2 switch provides 4 Gbps performance on all ports when paired with storage system hardware that supports 4 Gbps throughput. Each port

auto-negotiates to 4, 2 Gbps or 1 Gbps, full duplex, depending on the capabilities of the attached device or switch. Up to 256 Gbps aggregate throughput is possible with 32-port configurations.

Network performance can be enhanced with the **Open Trunking** feature which automatically balances performance throughout a network while helping minimize storage administrators' involvement. Open Trunking is designed to optimize the total throughput between two switches automatically by redirecting traffic from high-utilization links to links with available bandwidth. Open Trunking is designed to continuously monitor loads on all links, detect congestion and automatically balance traffic across available ISLs without operator interaction. Based on constant traffic monitoring, Open Trunking acts to help improve throughput and reroute traffic efficiently.

High availability

Medium-sized and enterprise businesses require high-availability switch fabric solutions. The SAN32M-2 fabric switch uses advanced application-specific integrated circuits (ASICs) to help minimize the number of internal components and thus improve reliability.

The SAN32M-2 switch is designed to provide hot-swappable, load-sharing dual power supplies designed to allow the switch to remain online if one power supply fails. Dual power cords allow attachment to separate power sources to help improve availability. Hot-swappable power supplies with integrated cooling components help eliminate downtime for service when replacing a failed component and help reduce or eliminate the risk of erroneously cabling a replacement switch because of a simple component failure. Failed power supplies require IBM service or switch replacement and hot-pluggable optical transceivers can be replaced without taking the switch offline.

FlexPort technology is designed to support switch port upgrades without fabric disruption. In addition, HotCAT online code activation is designed to allow firmware to be downloaded and activated while the fabric switch remains operational. Redundant switches can be deployed for high-availability clustering applications.

Advanced solution management Enterprise Fabric Connectivity Manager

Enterprise Fabric Connectivity Manager (EFCM) software is designed to support interconnection of multiple IBM TotalStorage SAN m-type switches and directors for the creation of tiered enterprise SAN solutions. EFCM software with a 1U rack mount management server (separately orderable products) is designed to centralize the management of multiple, distributed switches and directors in an enterprise-wide Fibre Channel fabric.

The **SAN32M-2 Element Manager** feature is designed to enable tiered enterprise-to-edge EFCM management of SAN32M-2 switches when interconnected with multiple IBM TotalStorage SAN m-type switches and directors in a tiered enterprise SAN solution.

Open System Management Server (OSMS), a standard feature, is an ANSI (American National Standards Institute)-based capability that supports SAN management software from vendors such as VERITAS, Tivoli and BMC. OSMS is designed to extend the switch's capability to include in-band management with an open systems, host-based application and to allow the fabric switch and devices attached to it to be "discovered," or seen in a fabric through a framework software application.

SANtegrity™ Enhanced (Security Suite) feature is designed to help enhance business continuity by reducing the impact of human influences on

networked data. The feature includes SANtegrity Binding and SANtegrity Authentication.

SANtegrity Zoning, a standard capability of Enterprise Operating System (E/OS), provides hardware-enforced world wide name (WWN) and port zoning. SANtegrity Secure Management Zone (SMZ) is designed to secure management access to local and remote SAN devices over a secure connection.

SANtegrity Binding is designed to create multiple layers of access control, including port, switch and fabric binding.

Standards-based SANtegrity Authentication is designed to force each device in the SAN to prove who they are in order to avoid unauthorized access and unauthenticated devices.

Preferred Path, a standard feature, is designed to allow a customer to define routes across a fabric. The Preferred Path modifies the behavior of Open Trunking by providing guidance for the balancing function. The Preferred Path configuration helps address user preference regarding exit port assignment but is subject to the standard rules regarding the Fabric Shortest Path First (FSPF) protocol.

Full Volatility feature is designed to support high-security environments, which require no customer data be retained after power-off. Full Volatility is designed to configure a switch or director so that no frame data is stored after a power-off.

SAN32M-2 FICON® Management Server feature supports management of the SAN32M-2 switch using System Automation for z/OS and System Automation for OS/390® and System z9™. IBM 9032 ESCON® director is a type of dynamic in-band management. System Automation—for z/OS or OS/390—is designed to concurrently manage IBM 9032 ESCON directors as well as McDATA® FICON directors.

N_Port ID Virtualization

(NPIV) feature provides support for attached IBM System z9™ Fibre Channel Protocol (FCP) channels and is designed to allow the sharing of a single physical FCP channel among operating system images, whether in LPARs or as z/VM® guests in virtual machines.

NPIV helps to improve I/O performance with increased resource sharing and channel utilization of FCP channels among operating system images in LPARs or virtual machines and helps to facilitate infrastructure simplification with virtual channel administration and management.

High port density, rack space savings

Rapidly growing Fibre Channel SAN infrastructures place a premium on rack space. The IBM TotalStorage SAN32M-2 fabric switch uses SFP LC optical connectors and advanced packaging that requires only one-rack unit (1U) height for 32 ports. The SAN32M-2 switch is also tabletop stackable.

IBM TotalStorage SAN32M-2 at a glance

Product characteristics

Product number	2026-432
Base fabric switch	IBM TotalStorage SAN32M-2 fabric switch with 32 ports: 16 ports activated, 16 shortwave 4 Gbps SFP transceivers, dual power supplies and PDU jumper cords, EFCM Basic, Install Wizards, Open Systems Management Server and Preferred Path software.
Fibre Channel interfaces	E_Port, F_Port, FL-Port
Optical transceivers	4 Gbps shortwave SFPs; 2 Gbps longwave SFPs
Fans and power supplies	Dual IBM CE replaceable power supplies with integrated cooling
Hot-swap components	SFP optical transceivers, power supplies
Rack support	19 inch, 1RU industry standard rack with Rack Mount Kit feature
Non-rack support	Desktop installation is supported; country-specific power cords must be ordered
Management software	EFCM Basic, Install and Backup/Restore Wizards
Servers supported*	IBM @server xSeries servers and other Intel® processor-based servers IBM System p, selected Sun™ and HP servers IBM System i servers IBM System z servers
Operating systems supported*	Microsoft® Windows NT®, Windows® 2000, Windows® 2003 Red Hat® Linux®, Red Hat Linux Advanced Server SUSE LINUX, SUSE LINUX Enterprise Server (SLES) United Linux, Novell® NetWare, OS/400, AIX, z/OS
Storage products supported*	IBM TotalStorage DS8000, DS6000 and Enterprise Storage Server® IBM TotalStorage DS4000 storage servers IBM TotalStorage 3580, 3588, 3590 and 3592 tape drives IBM TotalStorage 3581 Tape Autoloader IBM TotalStorage 3494, 3582, 3583 & 3584 tape libraries & 3588 tape drive IBM TotalStorage SAN Volume Controller (SVC) & SAN File System (SFS)
Fibre optic cable	Fibre optic cables are available in various lengths in single mode and multi-mode formats
Optional features	8-Port FlexPort Expansion Kit with eight shortwave 4 Gbps SFPs 8-Port FlexPort Expansion Kit with eight longwave 2 Gbps SFPs 8-Port FlexPort Expansion Kit with eight longwave 4 Gbps 4 Km SFPs 8-Port FlexPort Expansion Kit with eight longwave 4 Gbps 10 Km SFPs Base Switch Conversion Kit with 16 longwave 2 Gbps SFPs Base Switch Conversion Kit with 16 4 Gbps 4 Km SFPs 2 Gbps longwave SFP transceiver 4 Gbps longwave SFP transceivers SAN32M-2 Element Manager SAN32M-2 SANtegrity Enhanced SAN32M-2 Open Trunking SAN32M-2 Full Volatility SAN32M-2 FICON Management Server SAN32M-2 N_Port ID Virtualization SNS Open Systems Package with Open Trunking and SANtegrity Enhanced SNS Mainframe Package with N_Port ID Virtualization, FICON Management Server and FICON CUP Zoning SNS Mainframe Cascading Package includes SNS Mainframe Package features with Open Trunking and SANtegrity Enhanced

* Refer to ibm.com/storage/san/m_type for the most current and complete details.

IBM TotalStorage SAN32M-2 at a glance

Physical characteristics

Height (rack mount)	4.1 cm / 1.6 in (1RU)
Width	43.7 cm / 17.2 in
Depth	39.4 cm / 15.5 in
Weight	6.8 kg / 15.0 lbs

Operating environment

Temperature	4° C to 40° C/40° F to 104° F
Relative humidity	8% to 80%

Electrical requirement

Power	90-264 VAC, 47-63 Hz
-------	----------------------

For more information

Contact your IBM representative or IBM Business Partner, or visit:

ibm.com/storage/san/m_type

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

MB, GB and TB equal 1,000,000, 1,000,000,000 and 1,000,000,000,000 bytes, respectively, where referring to storage capacity. Actual storage capacity will vary based upon many factors and may be less than stated. Some numbers given for storage capacities give capacity in native mode followed by capacity using data compression technology.

THE INFORMATION IN THIS DOCUMENT IS PROVIDED "AS-IS" WITHOUT ANY WARRANTY, EITHER EXPRESSED OR IMPLIED. IBM EXPRESSLY DISCLAIMS ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT. IBM products are warranted according to the terms and conditions of the agreements (e.g., IBM Customer Agreement, Statement of Limited Warranty, International Program License Agreement, etc.) under which they are provided.

References in this document to IBM products, programs or services do not imply that IBM intends to make such products, programs or services available in all countries in which IBM operates or does business. Any reference to an IBM program or product in this document is not intended to state or imply that only that program may be used. Any functionally equivalent program or product that does not infringe IBM's intellectual property rights may be used instead. It is the user's responsibility to evaluate and verify the operation of any non-IBM product, program or service.

IBM's customer is responsible for ensuring its own compliance with legal requirements. It is the customer's sole responsibility to obtain advice of competent legal counsel as to the identification and interpretation of any relevant laws and regulatory requirements that may affect the customer's business and any actions the customer may need to take to comply with such laws. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the customer is in compliance with any law.



© Copyright IBM Corporation 2006

IBM Systems and Technology Group
5600 Cottle Road
San Jose, CA 95193
U.S.A.

Produced in the United States
April 2006
All Rights Reserved

IBM, the IBM logo, the e-business logo, AIX, Enterprise Storage Server, @server, Netfinity, OS/390, OS/400, System i, System p, System z, System z9, Tivoli, TotalStorage, xSeries, z9, z/OS and z/VM are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries or both.

Intel, Intel Inside (logos), MMX and Pentium are trademarks of Intel Corporation in the United States, other countries, or both.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft, Windows, Windows NT, Windows Server, Windows 2000, Windows 2003 and the Windows logo are trademarks or registered trademarks of Microsoft Corporation in the United States, other countries or both.

Novell and NetWare are registered trademarks of Novell, Inc., in the United States and other countries.

Linear Tape Open, LTO and Ultrium are trademarks of Hewlett Packard, IBM and Certance in the United States, other countries or both.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product and service names may be trademarks or service marks of others.

This document could include technical inaccuracies or typographical errors. IBM may make changes, improvements or alterations to the products, programs and services described in this document, including termination of such products, programs and services, at any time and without notice. Any statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. The information contained in this document is current as of the initial date of publication only and is subject to change without notice. IBM shall have no responsibility to update such information.