Next generation high-availability director provides improved scalability for large enterprise SANs

IBM TotalStorage SAN Switch M14

High port density packaging helps save space

Highlights

- ***High-availability director with built-in redundancy designed to avoid single points of failure***
- ***Highly scalable director with 32 to 128 ports in a single domain***
- ***FICON® Director switching with Fibre Channel/FICON intermix, FICON CUP (Control Unit Port) and FICON cascading***
- ***Interoperable with IBM® TotalStorage® SAN b-type switches***
- ***Offers advanced security with comprehensive, policy-based security capabilities***
- ***Offers advanced fabric services such as end-to-end performance monitoring and fabric-wide health monitoring***

IBM TotalStorage SAN Switch M14

The IBM TotalStorage SAN Switch M14 (IBM M14 SAN Director), with next-generation director technology, is designed to provide improved performance, enhanced scalability and a design ready for future higher performance and expanded capability features. The IBM M14 Director is well-suited to address enterprise SAN customer requirements for infrastructure simplification and improved business continuity.

The M14 SAN Director is designed to be interoperable with other members of the IBM TotalStorage SAN b-type switch family. You can configure a wide range of highly scalable solutions that address demands for integrated, heterogeneous mainframe and open server enterprise SANs.

High-availability design

The M14 Director is designed to provide director-class high availability with redundant, hot-pluggable components and to avoid single points of failure. Redundant control processors, power supplies, power inputs and cooling provide a design for concurrent hardware and firmware maintenance and upgrade

without disruption to network operation. Enterprise Fabric OS firmware enables nondisruptive control processor failover and concurrent firmware activation. Advanced Security features can enforce fabric-wide change control policies that can reduce the potential SAN downtime due to operator errors. Fabric Manager V4 provides Call Home capabilities.

Enhanced performance

The M14 director is built upon next-generation technology that provides link speeds of 1, 2 and 4 Gbps. (requires storage system hardware that supports 4 Gbps throughput). Depending on which switch blade is used, each port can support 100 MBps, 200 MBps and 400 MBps, full-duplex, non-blocking performance. Auto-sensing ports are capable of automatically negotiating to the highest speed supported by the attached server, storage or switch.

M14 Directors can be used to expand an existing core-to-edge SAN fabric infrastructure. As M14 Directors are added to the core, installed IBM SAN Switches can be migrated to the edge. This approach helps support scalable network growth in a modular, cost-effective and nondisruptive manner while customers continue to derive benefit from installed switches.

Enhanced scalability

The IBM M14 SAN director is scalable from 32 to 128 ports in a single domain. This provides twice the scalability of the prior generation IBM M12 SAN Director. The ***M14 Switch Blade and the M14/M48 Switch Blade*** features expand connectivity in 16-port increments. A mixture of shortwave and longwave ports can be configured by adding ***SFP optical transceiver*** features.

Inter-Switch Link (ISL) Trunking, a standard capability, enables as many as four Fibre Channel links between IBM M14 and M12 directors, IBM TotalStorage SAN256B directors and IBM SAN switches, to be combined to form a single logical ISL with an aggregate speed of up to 16 Gbps. ISL Trunking provides additional scalability by enabling M14, M12 and SAN256B directors to be networked in an expandable core, in a core-to-edge SAN fabric.

These high-speed trunks help optimize bandwidth utilization and enhance availability. Load balancing can help balance the load across all of the ISLs through trunking. This enables administrators to focus on overall network performance rather than individual link congestion from multiple higher performance devices sharing a single link. Administrators need only to monitor the trunk performance rather than specific devices being routed across it. Increased network reliability and performance are supported because failed links do not require rerouting of traffic.

End-to-end performance monitoring

Next-generation switching technology enables ***Frame Filtering***, which is based upon additional information in several fields in both the packet header and payload. Frame Filtering enables new intelligent fabric services such as end-to-end performance analysis. M14 Directors, with Frame Filtering, provide detailed information at the switch, port and frame levels. This information can be used to monitor performance end-to-end across the entire core-to-edge SAN fabric—from a specific server to a specific storage device port.

Performance Monitoring, a standard capability, provides support for Frame Filtering-based Performance Monitoring tools for enhanced end-to-end performance monitoring. As core-to-edge SAN fabrics scale up to thousands of devices, ISL Trunking and Frame Filtering can help simplify storage management and reduce the overall cost of the storage infrastructure.

FICON Director operation

FICON director switching includes FICON servers, intermixed FICON and Open servers and FICON cascading between two directors. **FICON CUP Activation** provides Control Unit Port (CUP) in-band management function designed to allow mainframe applications to perform configuration, monitoring, management and statistics collection. These applications include System Automation for OS/390® (SA/390), Dynamic Channel Management Facility (DCM) and Resource Measurement Facility (RMF). Enhanced Call Home and RAS capabilities can help simplify management. Hardware enforced FICON and FCP port zoning enhances separation with intermix operation. ISL Trunking, with self-optimizing traffic management, can enhance the performance and availability of FICON cascading. Advanced Security Activation is required for FICON cascading. **FICON CUP and Security Activation Bundle** provide an affordable bundle of these features.

N_Port ID Virtualization

N_Port ID Virtualization (NPIV) 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.

Industry-standard Fibre Channel

The M14 director is designed to provide Fibre Channel connectivity to:

- *IBM @server® iSeries™*
- *IBM @server zSeries® servers and selected S/390® servers*
- *IBM @server pSeries® and selected RS/6000® servers*
- *IBM @server xSeries® and selected Netfinity® servers*
- *Other Intel® processor-based servers with Microsoft® Windows NT® and Windows 2000®, NetWare and Linux®*
- *Selected Sun and HP Servers*
- *IBM TotalStorage Enterprise Storage Server® (ESS), IBM TotalStorage DS6000 series and IBM TotalStorage DS8000 series*
- *IBM TotalStorage DS4000 series (formerly FAStT Storage Servers)*
- *IBM TotalStorage 3590 and 3592 Tape Drives and IBM TotalStorage 3494 Tape Library*
- *IBM TotalStorage 3582, 3583 and 3584 Tape Libraries*
- *IBM TotalStorage SAN Switches*

The M14 director supports the interconnection of multiple IBM SAN Switches. The interconnection of IBM TotalStorage SAN b-type switches (IBM 2005, 2109, 3534) and compatible (Brocade® SilkWorm® 200E, 2400, 2800, 3200, 3800, 3900, 4100, 4300, 12000, 24000 and 48000) switches can support the creation of scalable, dual redundant core-to-edge SAN fabrics that can support high performance, scalability, and fault tolerance required infrastructure simplification and business continuity—such as storage consolidation, data protection, disaster tolerance and data sharing solutions.

Director investment protection

The IBM M14 SAN director is designed to be upgradeable with future technologies. This includes higher switching speeds, expanded protocols and enhanced intelligence capabilities. IBM M12 SAN directors may be upgraded to M14 capabilities by replacing the control processor and switch blades.

Common IBM SAN Switch capabilities

IBM TotalStorage SAN b-type switches include universal ports that can automatically determine the port type when connected to a fabric port (F_port), fabric loop port (FL_port) or expansion port (E_port). Fabric services include automatic self-discovery of new devices and dynamic path selection based upon Fabric Shortest Path First (FSPF) which is designed to select the most efficient routing in a SAN fabric.

Common IBM SAN Switch firmware

Common IBM SAN switch firmware simplifies SAN fabric expansion. Standards-based Management Server and Simple Name Server support in-band discovery of SAN fabric changes. Management access of SNMP information is provided via an external Ethernet interface or in-band over a Fibre Channel link through a single fabric connection.

Device-level zoning of the SAN fabric enables an administrator to create separate segments or zones within the SAN fabric to separate different application servers and devices in heterogeneous SAN environments. Zones may be dynamically created and changed from any switch in the fabric. Basic security functions such as hardware-enforced zoning are standard.

Extended Fabric Activation extends SAN fabrics beyond the Fibre Channel standard 10 km. This enables high performance over extended distances for data protection and business continuity solutions. Extended distance longwave SFP transceivers are available for 35 km and 80 km distances. Extended Fabrics Activation helps optimize switch buffering to support high gateway switch ISL performance.

Remote Switch Activation extends the distance of SAN fabrics by enabling two Fibre Channel switches to interconnect over a Wide Area Network (WAN). With this feature, one can stage and manage data transfers across a pair of Fibre Channel switches connected to a pair of CNT Storage Routers.

QuickLoop enables servers with Fibre Channel Arbitrated Loop (FC-AL) private loop Host Bus Adapters (HBAs) to communicate with FC-AL storage devices through IBM SAN switches. The M14 director does not provide QuickLoop capability. However, IBM SAN switches with QuickLoop enabled may be used to attach private loop devices to M14 director fabrics.

Advanced security

As entry level and departmental SAN islands evolve into large enterprise SANs, which may be interconnected over Wide Area Networks (WANs), advanced security is required to control and manage fabric access. External threats and internal operational events can compromise valuable enterprise data assets and create data integrity exposures.

Advanced Security Activation feature can help create a secure storage networking infrastructure required for multiple protocol operation and SAN island consolidation. Advanced Security extends basic fabric security provided by Advanced Zoning hardware-enforced WWN zoning. It provides a policy-based security system for IBM SAN Switch fabrics with Fabric OS versions 3 and 4. Prior generation switch investment protection is provided with support for Fabric OS version 2.6.2. All switches in an Advanced Security fabric must be upgraded before Advanced Security can be deployed.

Open fabric management

IBM SAN switch management framework is designed to support the widest range of solutions—from the very small workgroup SANs up to very large enterprise SAN fabrics with thousands of devices. Small SANs require rapid deployment and plug-and-play simplicity. Very large SAN fabrics require centralized management and automated administration. IBM SAN switch management options include browser-based WEBTOOLS, Fabric Manager and open standards-based interfaces to enterprise SAN managers.

WEBTOOLS is designed to provide a comprehensive set of management tools that support a Web browser interface for flexible, easy-to-use integration into existing enterprise storage management structures. The WEBTOOLS supports security and data integrity by limiting (zoning) host system attachment to specific storage systems and devices.

Fabric Watch is a standard function on IBM M14 and M12 directors and IBM SAN switches. Fabric Watch threshold monitoring tracks the health of switches and SAN fabric. Fabric Watch monitors fabric resources, port traffic, switch environmental values and operational values for GigaBit Interface Converters (GBIC) and SFP optical transceivers. This information is accessible from the WEBTOOLS and Fabric Manager. When used with IBM SAN switches, WEBTOOLS provides an easy-to-use interface to intelligent fabric features such as end-to-end performance monitoring and ISL Trunking.

Fabric Manager

Fabric Manager V4 can help simplify management, reduce cost of administration and accelerate deployment and provisioning. It builds upon Fabric Manager V3 by offering new capabilities:

- *Configuration change management with fabric snapshot and compare*
- *Secure Fabric OS management including security policy control, audit and reporting*
- *SAN topology visualization and at-a-glance views*
- *Call home facility sends e-mail notification to support personnel as events occur.*
- *Flexible security and policy administration and enhanced RAS and Call Home capabilities for simplified FICON operation and management.*

Fabric Manager provides a Java-based application that can simplify management of a complex, multiple switch fabrics. WEBTOOLS and Fabric Manager work together on the same management server which can be attached to any switch in the core/edge fabric. Fabric Manager requires a Windows NT/2000 or Sun Solaris 7 server with a Netscape or Internet Explorer Web browser. ***Fabric Manager V4, ten domains and Fabric Manager V4, upgrade ten to maximum domains*** features are offered.

IBM TotalStorage SAN Cabinet Model C36

The C36 cabinet is based upon a standard 19-inch rack and offers 36U vertical space. It is specifically designed to support up to two M14 and/or M12 and/or SAN256B directors with two power distribution units, each with three power outlets.

A ***Ruggedized Rack*** feature provides enhanced rigidity and stability for locations with earthquake concerns. A power distribution unit, ***PDU pair*** feature enables installation of up to three F16 and two F32 switches with a single M14 or M12 or SAN256B director. For specific availability dates, configuration options, server models, operating system levels and attachment capabilities, please consult the Web at: **ibm.com**/totalstorage/san/b-type.

IBM TotalStorage SAN Switch M14 at a glance

Physical characteristics	**M14 director**	**C36 cabinet**
Height	61.24 cm/24.11 in (14U)	180.4 cm/71.0 in (36U)
Width	43.74 cm/17.22 in	64.4 cm/25.4 in
Depth	74.20 cm/29.20 in (with door)	109.8 cm/43.3 in
Weight (fully populated)	96 kg/212 lb	One M14 340 kg/748 lb Two M14s 816kg/1795 lb
Operating environment		
Temperature	0° to 40° C/32° to 104° F	0° to 40° C/50° to 104° F
Relative humidity	5% to 85% at 40° C/104° F	8% to 80% at 40° C/104° F
Power requirements		
Power range	180 to 264 VAC, 47 to 63 Hz	200 to 240 VAC, 50 to 60 Hz
Product numbers		
Director	**2109 M14—IBM TotalStorage SAN Switch M14** A 32-port director with enclosure includes 2N redundancy power supplies, three fans, two control processors and two 16-port, 2 Gbps M14 switch blades. The base configuration includes Fabric OS Version 4.4, WEBTOOLS, Advanced Zoning, FabricWatch, ISL-Trunking, Performance Monitoring and space for six additional M14 switch blades for one 128-port fabric FC 2310—Shortwave SFP transceiver FC 2314—Shortwave SFP transceiver 4 pack FC 2320—Longwave SFP transceiver FC 2324—Longwave SFP transceiver 4 pack FC 2335—35 Km extended distance longwave SFP transceiver FC 2380—80 Km extended distance longwave SFP transceiver FC 2414—4 Gbps SW SFP transceiver 4 pack FC 3226—M14 16-Port 2 Gbps Switch Blade FC 3416—M14/M48 16-Port 4 Gbps Switch Blade FC 4444—M14 4 Gbps Upgrade Kit (Field) FC 9444—M14 4 Gbps Upgrade Kit (Plant)	
Fiber Optic Cables:	Multimode, 50u and single mode, 9u fiber optical cables and couplers with SC and/or LC connectors are available	
Advanced Fabric Features:	FC 4745—M14/M48 N_Port ID Virtualization FC 7250—Fabric Manager V4, ten domains FC 7252—Fabric Manager V4, upgrade ten to maximum domains FC 7602—Remote Switch Activation FC 7603—Extended Fabric Activation FC 7623—M14 Advanced Security Activation FC 7631—M14 FICON CUP Activation FC 7633—M14 FICON CUP Advanced Security Bundle	
Cabinet	**2109 C36—IBM TotalStorage SAN Cabinet C36** A 19-inch rack with 36U space, designed to support two M14 Directors with two power distribution units, each with three power outlets FC 6080—Ruggedized Rack FC 6081—PDU pair for F32 and F16 Switch installation	

For more information

For more information, contact your IBM representative or IBM Business Partner. Or visit **ibm.com**/totalstorage/san/b-type

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