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Cisco MDS 9132T 32G Fabric Switch for IBM Storage Networking Product Guide

Product Overview

The next-generation Cisco MDS 9132T 32G Fibre Switch for IBM Storage Networking (Figure 1) provides high-speed Fibre Channel (FC) connectivity from the server rack to the SAN core. It empowers small, midsize, and large enterprises to rapidly deploying cloud-scale applications using highly dense virtualized servers by providing dual benefit of higher bandwidth and consolidation.

Small scale SAN architectures can be built by using a low cost, non-blocking, line rate, and low latency fixed stand-alone SAN switch that connects both storage and host ports. Medium to large-scale SAN architectures that are built with SAN core directors can expand 32-Gbps connectivity to the server rack by using these switches either in switch mode or Network Port Virtualization mode. Additionally, investing in this switch in the server rack provides a first day option of upgrading to 32-Gbps server connectivity using the 32-Gbps HBAs that are already available in the market.

Figure 1. Cisco MDS 9132T 32G Fibre Switch for IBM Storage Networking

The MDS 9132T switch also provides outstanding flexibility through a unique port expansion module (Figure 2) that provides a robust cost-effective, field swappable, port upgrade option.
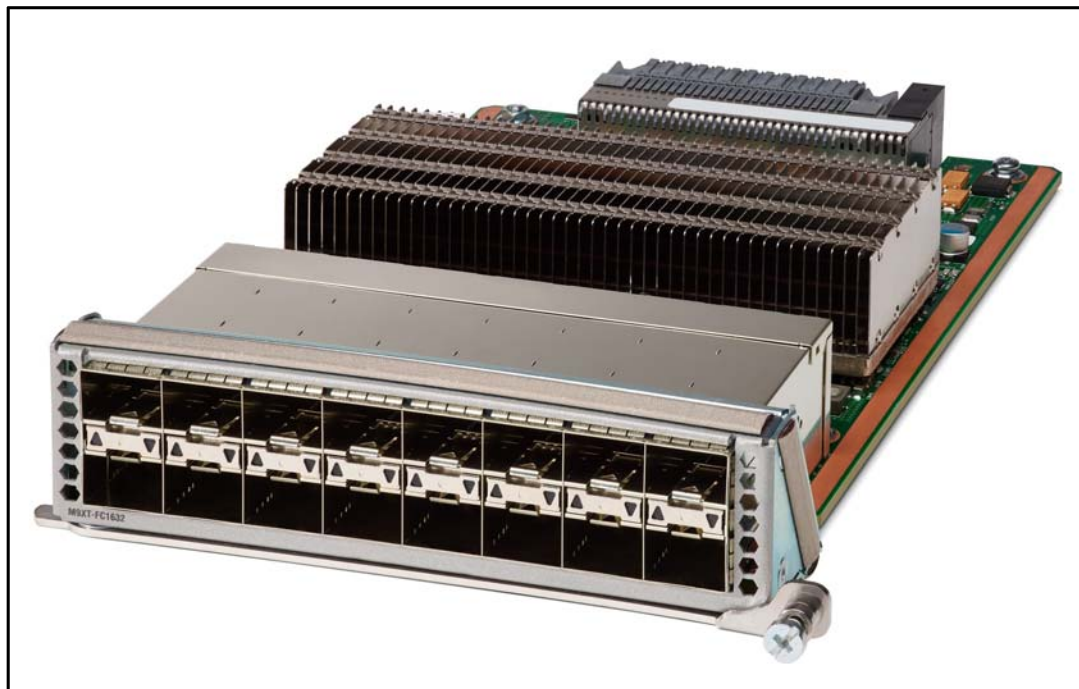

Figure 2. Cisco MDS 9132T 16-Port Expansion Module

Main Features

The following are the main features of the MDS 9132T:

● **High performance:** MDS 9132T architecture with chip-integrated nonblocking arbitration provides consistent 32-Gbps low latency performance across all traffic conditions for every FC port in the switch.

● **Capital Expenditure (CapEx) savings:** The 32-Gbps ports allow users to deploy them on existing 16/8/4-Gbps transceivers, reducing initial CapEx with an option to upgrade to 32 Gbps transceivers and adapters in the future.

● **High availability:** MDS 9132T switches continue to deliver the same outstanding availability and reliability as previous generation Cisco MDS 9000 family switches by providing optional redundancy on all major components such as power supplies and fans. Dual power supplies allow power grid redundancy.

● **Pay-as-you-grow:** The MDS 9132T switch provides an option to deploy as few as eight 32-Gbps FC ports in the entry level variant, which can grow by eight ports to 16 ports, and thereafter with a port expansion module with sixteen 32-Gbps ports, for a maximum of 32 ports. This approach results in lower initial investment and power consumption for entry level configurations of up to 16 ports when compared to a fully loaded switch. Upgrading through the use of an expansion module also reduces the overhead of managing multiple instances of port activation licenses on the switch.

● **Intelligent network services:** Slow drain detection and isolation, VSAN technology, Access Control Lists (ACLs) for hardware-based intelligent frame processing, smartzoning, and fabric-wide Quality of Service (QoS) enable migration from SAN islands to enterprise-wide storage networks. Traffic encyption is optionally available to meet stringent security requirements.

- **Sophisticated diagnostics:** The MDS 9132T provides protocol decoding, network analysis tools, and integrated Cisco Call Home capability for greater reliability, faster problem resolution, and reduced service costs.

- **Virtual machine awareness:** The MDS 9132T provides visibility to all virtual machines (VMs) that are logged into the fabric. This feature is available through HBAs capable of priority tagging the Virtual Machine Identifier (VMID) on every FC frame.

- **Programmable fabric:** The MDS 9132T provides powerful Representational State Transfer (REST) and Cisco NX-API capabilities to enable flexible and rapid programming of utilities for the SAN.

- **Single-pane management:** The MDS 9132T can be provisioned, managed, monitored, and troubleshot using Cisco Data Center Network Manager (DCNM), which currently manages the entire suite of Cisco data center products.

- **Self-contained advanced anticounterfeiting technology:** The MDS 9132T uses on-board hardware that protects the entire system from malicious attacks by securing access to critical components such as the bootloader, system image loader, and Joint Test Action Group (JTAG) interface.

Main benefits

The new 32-Gbps fabric switches address the requirement for highly scalable, virtualized, intelligent storage area networking (SAN) infrastructure in current generation data center environments. The industry is already poised to transition to 32-Gbps fixed switches with the availability of 32-Gbs HBAs and storage arrays from vendors. Additionally, as low-latency flash arrays and highly dense virtualization deployments become more pervasive, fixed switches will be expected to provide 32-Gbps connectivity to the SAN core.

This solution offers several important benefits:

- **Server Port consolidation:** The demand for 32-Gbps fabric switches is driven by hyper-scale virtualizations that will significantly increase the virtual machine (VM) density per rack, and this growth will push the need for higher bandwidth HBA ports per rack of blade or stand-alone servers. One way to meet this demand is for 32-Gbps HBA ports to consolidate the current 16-Gbps HBA installed base to meet future needs to grow the number of ports. As a result, the MDS 9132T, with its lower port density, can be a preferred solution and its flexibility to grow can be an added advantage.

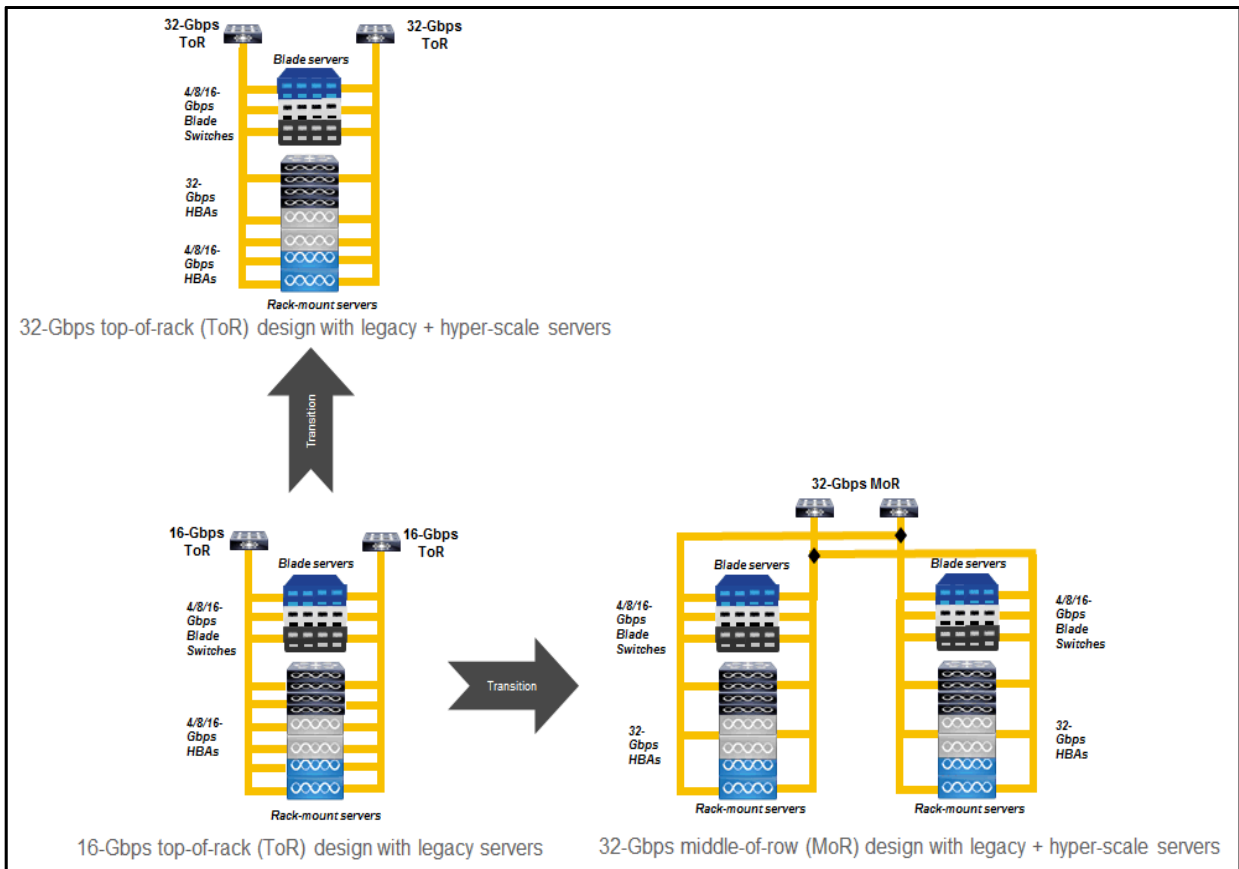Figure 3 shows an example of server port consolidation.

Figure 3. Cisco MDS 9132T in Hyper-scale server environments

- **Simplification:** Through consolidation, a SAN administrator can reduce complexity and simplify management.

- **Multiprotocol convergence :** 32-Gbps links benefit from lower latency compared to lower-bandwidth links, bringing better-performing storage workloads to your storage array. Higher bandwidth also helps ensure less ISL congestion for newer storage protocols that are expected to be available on externally attached storage arrays. For instance, Fibre Channel Non-Volatile Memory Express (NVMe) can coexist on the same link as existing SCSI workloads..

- **Scale and performance :** This small form factor switch supports the performance and scale required to deploy a dedicated and stand-alone Fibre Channel SAN connecting both initiators and targets, without requiring any other switching infrastructure.

Platform Compatibility

For detailed information about hardware and software compatibility as well as product interoperability, please visit the IBM System Storage Interoperation Center (SSIC) website: http://www.ibm.com/systems/support/storage/ssic/interoperability.wss

Licensing

Table 1 describes optional licenses that can be purchased to enable additional features and capabilities on the Cisco MDS 9132T.

Table 1. Optional licenses

License type	Feature Code	Description
Cisco MDS 9100 Enterprise Package - eDelivery	7210	This feature includes advanced traffic-engineering and network security features such as IVR, QoS and zone-based QoS, Fibre Channel Security Protocol (FC-SP), port security, traffic encryption, VSAN-based access control, and fabric binding for open systems. Licensed per switch for all the ports on the switch.
Cisco MDS 9100 DCNM Advanced Edition - eDelivery	7211	This feature includes advanced management capabilities such as VMware vCenter integration, performance trending, advanced provisioning, backup, reports, and dashboards. Licensed per switch for all the ports on the switch. License is either hosted on the server or on each switch.
Cisco MDS 9132T 8-port On-Demand Activation - eDelivery	7215	Enables eight additional Fibre Channel ports, to up to 16 total ports on the base switch (and up to 32 total ports on the base switch with the 16-port Fibre Channel port expansion module).

Product Specifications

Table 2 lists the specifications for the MDS 9132T 32G Fibre Switch for IBM Storage Networking.

Table 2. Product specifications (part 1 of 5)

Protocols	- Fibre Channel standards - FC-PH, Revision 4.3 (ANSI INCITS 230-1994) - FC-PH, Amendment 1 (ANSI INCITS 230-1994/AM1-1996) - FC-PH, Amendment 2 (ANSI INCITS 230-1994/AM2-1999) - FC-PH-2, Revision 7.4 (ANSI INCITS 297-1997) - FC-PH-3, Revision 9.4 (ANSI INCITS 303-1998) - FC-PI, Revision 13 (ANSI INCITS 352-2002) - FC-PI-2, Revision 10 (ANSI INCITS 404-2006) - FC-PI-3, Revision 4 (ANSI INCITS 460-2011) - FC-PI-4, Revision 8 (ANSI INCITS 450-2008) - FC-PI-5, Revision 6 (ANSI INCITS 479-2011) - FC-FS, Revision 1.9 (ANSI INCITS 373-2003) - FC-FS-2, Revision 1.01 (ANSI INCITS 424-2007) - FC-FS-2, Amendment 1 (ANSI INCITS 424-2007/AM1-2007) - FC-FS-3, Revision 1.11 (ANSI INCITS 470-2011) - FC-LS, Revision 1.62 (ANSI INCITS 433-2007) - FC-LS-2, Revision 2.21 (ANSI INCITS 477-2011) - FC-SW-2, Revision 5.3 (ANSI INCITS 355-2001) - FC-SW-3, Revision 6.6 (ANSI INCITS 384-2004) - FC-SW-4, Revision 7.5 (ANSI INCITS 418-2006)

Table 2. Product specifications (part 2 of 5)

Protocols (continued)	- FC-SW-5, Revision 8.5 (ANSI INCITS 461-2010) - FC-GS-3, Revision 7.01 (ANSI INCITS 348-2001) - FC-GS-4, Revision 7.91 (ANSI INCITS 387-2004) - FC-GS-5, Revision 8.51 (ANSI INCITS 427-2007) - FC-GS-6, Revision 9.4 (ANSI INCITS 463-2010) - FCP, Revision 12 (ANSI INCITS 269-1996) - FCP-2, Revision 8 (ANSI INCITS 350-2003) - FCP-3, Revision 4 (ANSI INCITS 416-2006) - FCP-4, Revision 2b (ANSI INCITS 481-2011) - FC-SB-2, Revision 2.1 (ANSI INCITS 349-2001) - FC-SB-3, Revision 1.6 (ANSI INCITS 374-2003) - FC-SB-3, Amendment 1 (ANSI INCITS 374-2003/AM1-2007) - FC-SB-4, Revision 3.0 (ANSI INCITS 466-2011) - FC-SB-5, Revision 2.00 (ANSI INCITS 485-2014) - FC-BB-6, Revision 2.00 (ANSI INCITS 509-2014) - FC-BB-2, Revision 6.0 (ANSI INCITS 372-2003) - FC-BB-3, Revision 6.8 (ANSI INCITS 414-2006) - FC-BB-4, Revision 2.7 (ANSI INCITS 419-2008) - FC-BB-5, Revision 2.0 (ANSI INCITS 462-2010) - FC-VI, Revision 1.84 (ANSI INCITS 357-2002) - FC-SP, Revision 1.8 (ANSI INCITS 426-2007) - FC-SP-2, Revision 2.71 (ANSI INCITS 496-2012) - FAIS, Revision 1.03 (ANSI INCITS 432-2007) - FAIS-2, Revision 2.23 (ANSI INCITS 449-2008) - FC-IFR, Revision 1.06 (ANSI INCITS 475-2011) - FC-FLA, Revision 2.7 (INCITS TR-20-1998) - FC-PLDA, Revision 2.1 (INCITS TR-19-1998) - FC-Tape, Revision 1.17 (INCITS TR-24-1999) - FC-MI, Revision 1.92 (INCITS TR-30-2002) - FC-MI-2, Revision 2.6 (INCITS TR-39-2005) - FC-MI-3, Revision 1.03 (INCITS TR-48-2012) - FC-DA, Revision 3.1 (INCITS TR-36-2004) - FC-DA-2, Revision 1.06 (INCITS TR-49-2012) - FC-MSQS, Revision 3.2 (INCITS TR-46-2011) - Fibre Channel classes of service: Class 2, Class 3, and Class F - Fibre Channel standard port types: E, F, and B - Fibre Channel enhanced port types: SD, ST, and TE - In-band management using IP over Fibre Channel (RFC 2625) - IPv6, IPv4, and Address Resolution Protocol (ARP) over Fibre Channel (RFC 4338) - Extensive IETF-standards-based TCP/IP, SNMPv3, and remote monitoring (RMON) MIBs
Ports	- Fixed switch form factor with 16 SFP+ ports base and one 16 SFP+ port expansion slot - Entry-level 8-port preactivated base model with flexibility to turn on 8 ports. - Incremental ports: - On the 8-port base model, with the 8-port On-Demand Activation license to activate up to 16 ports on the base switch - On the 8-port base model, with the 16-port expansion module to activate up to 24 ports - On the 16-port configuration, with the 16-port expansion module to activate up to 32 ports - On the 24-port configuration, with the 8-port On-Demand Activation license to activate up to 32 ports

Table 2. Product specifications (part 3 of 5)

Security	● VSAN fabric isolation ● Intelligent packet inspection at the port level ● Hardware zoning by ACLs ● FC-SP switch-to-switch authentication ● FC-SP host-to-switch authentication ● RBAC using RADIUS, TACACS+, or LDAP Authentication, Authorization, and Accounting (AAA) functions ● Secure FTP (SFTP) ● Secure Shell Version 2 (SSHv2) ● Simple Network Management Protocol Version 3 (SNMPv3) implementing Advanced Encryption Standard (AES) ● Control-plane security ● Cisco TrustSec payload encryption
Performance	● Port speed: 4/8/16/32-Gbps autosensing with 32 Gbps of dedicated bandwidth per port ● Aggregate bandwidth of 1024 Gbps end-to-end full duplex ● Buffer credits: Up to 8300 for a group of 16 ports, with a default of 500 buffer credits per port and a maximum of 8191 buffer credits for a single port in the group ● PortChannel: Up to 16 load-balanced physical links grouped in one port channel
Diagnostics	● POST diagnostics ● Online diagnostics ● Internal loopbacks ● SPAN ● Fibre Channel traceroute ● Fibre Channel ping ● Fibre Channel debug ● Cisco Fabric Analyzer ● Syslog ● Port-level statistics
Serviceability	● Configuration file management ● Call Home ● Port beaconing ● System LEDs ● SNMP traps for alerts
Reliability and availability	● Cisco In-Service Software Upgrade (ISSU) ● Hot-swappable, dual redundant power supplies ● Hot-swappable fan tray with integrated temperature and power management ● Hot-swappable SFP+ optics ● Hot-Swappable port expansion module ● Stateful process restart ● Any port configuration for PortChannels ● Fabric-based multipathing ● Per-VSAN fabric services ● Port tracking ● VRRP for management connections

Table 2. Product specifications (part 4 of 5)

Network management	● Access methods
	● 2 Out-of-band 10/100/1000 Ethernet ports:
	● mgmt0: 10/100/1000 optical port
	● mgmt1: 10/100/1000 base-T port
	● RS-232 serial console port
	● USB Power-on-auto-provision
	● Access protocols
	● Command-Line Interface (CLI) using the console and Ethernet ports
	● SNMPv3 using the Ethernet port and in-band IP over Fibre Channel access
	● Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S)
	● NX-API for RESTful access of HTTPS
	● Distributed device alias service
	● Network security
	● Per-VSAN Role-Based Access Control (RBAC) using LDAP, RADIUS, and TACACS+-based Authentication, Authorization, and Accounting (AAA) functions
	● SFTP
	● SSHv2 implementing AES
	● SNMPv3 implementing AES
	● Cisco Data Center Network Manager (DCNM)
Programming interfaces	● Scriptable CLI
	● Cisco DCNM web services API
	● NX-API RESTful interfaces
	● On-board Python interpreter
	● Cisco Embedded Event Manager
	● Cisco NX-OS Software scheduler
Physical dimensions (HxWxD) and weight	● One Rack unit 43.7 cm (1.72 inches) x 43.94 cm (17.3 inches) x 51.08 cm (20.11 inches) excluding PSU and FAN tray handles
	● 9.1 Kg with 16 activated ports
	● 9.82 Kg with all 32 activated ports
Power	● 80-plus platinum certified power supplies
	● Power supply, any one of these types:
	● 650W AC in base model, Port side exhaust variant (up to 2 per switch)
	● 650W AC in base model, Port side intake variant (up to 2 per switch)
	● Power cord:
	● IEC60320 C14 plug on 650W power supply connecting to a notched C15 socket connector
	● AC input: 100 to 240V AC (10% range)
	● Frequency: 50 to 60 Hz (nominal)
	● Typical power consumption: 100 - 240 VC (10 percent range), 50-60 Hz (nominal)
	● Airflow: Back to front (toward ports) using port side exhaust fans
	● 50 Cubic Feet per Minute (CFM) through system fan assembly at 25C
	● 100 CFM maximum
	● Cisco recommends maintaining a minimum air space of 2.5 in. (6.4 cm) between walls and chassis air vents and a minimum horizontal separation of 6 in. (15.2 cm) between two chassis to prevent overheating
Temperature range	● Temperature, ambient operating:
	● 32 to 104°F (0 to 45°C) with port side exhaust airflow variant
	● 32 to 131°F (0 to 55°C) with port side intake airflow variant
	● Temperature, ambient non-operating and storage: -40 to 158°F (-40 to 70°C)
	● Relative humidity, ambient (noncondensing) operating: 10 to 90%
	● Relative humidity, ambient (noncondensing) non-operating and storage: 10 to 95%
	● Altitude, operating: -197 to 6500 ft (-60 to 2000m)

Table 2. Product specifications (part 5 of 5)

Approvals and compliance	• Safety compliance • CE Marking • UL 60950 • CAN/CSA-C22.2 No. 60950 • EN 60950 • IEC 60950 • TS 001 • AS/NZS 3260 • IEC60825 • EN60825 • 21 CFR 1040 • EMC compliance • FCC Part 15 (CFR 47) Class A • ICES-003 Class A • EN 55022 Class A • CISPR 22 Class A • AS/NZS 3548 Class A • VCCI Class A • EN 55024 • EN 50082-1 • EN 61000-6-1 • EN 61000-3-2 • EN 61000-3-3
Fabric services	• Name server • Registered State Change Notification (RSCN) • Login services • Fabric Configuration Server (FCS) • Broadcast • In-order delivery
Advanced functions	• VSAN • IVR • PortChannel with multipath load balancing • Flow-based and zone-based QoS
Supported Cisco optics, media, and transmission distances	For detailed information about all supported transceivers, see the Cisco MDS 9000 Family pluggable transceivers documentation at http://bit.ly/2hDHmgF.

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