Overview

HP SN6010C 16Gb Fibre Channel Switch (MDS9148S)

The SN6010C 16Gb Fabric Switch (MDS 9148S) is a high-performance, flexible, cost-effective platform providing high-density, line-rate16-Gbps ports for storage networking deployments in small, medium-sized, and large enterprise environments. The SN6010C switch offers outstanding value by providing high-availability, flexibility, and ease of use at a cost-effective price in a compact one-rack-unit (1RU) form factor. With the ability to expand from 12 to 48 ports in 12-port increments, the SN6010C offers the densities required to scale from an entry-level departmental switch to top-of-rack switch to edge connectivity in enterprise SANs. The SN6010C delivers a non-blocking architecture, with all 48 16-Gbps ports operating at line rate concurrently.

The SN6010C supports the C-series Device Manager quick configuration wizard, which allows it to be deployed quickly and easily in networks of any size. Powered by C-series MDS 9000 NX-OS Software, it includes storage networking features and functions and is compatible with C-series SN8000C (MDS 9500) and SN8500C (MDS 9700) Series Multilayer Directors and C-series MDS 9100 and 9200 Series Multilayer Fabric Switches, providing transparent, end-to-end service delivery in core-edge deployments.

HP StoreFabric SN6010C FC Switch

Key Features and Benefits

- **High Performance with exceptional flexibility** at a low cost
  - Up to 768 Gbps of aggregate bandwidth in a 1 rack unit (RU)
  - Up to 48 autosensing Fibre channel ports capable of speeds of 4/8/16 Gbps
  - Pay as you grow flexibility with on-demand port activation licenses
- **Intelligent storage networking services at a cost effective price**
  - N-Port ID Virtualization (NPIV) technology to provide independent management for each virtual machine
  - N-Port Virtualization (NPV) and fabric-port (F-port) channeling features to enable scaling of SANs without reaching Fibre Channel domain ID limits
- **High Availability Platform**
  - Designed for environments in which downtime is unacceptable
  - Non-disruptive software upgrades, dual hot swappable power supplies, and hot swappable fans
  - VSANs for fault isolation and PortChannels for Inter-Switch Link (ISL) resiliency
- **Simplified Management**
  - Supports SAN plug and play capability
  - Built in storage network management
  - Reduced total cost of ownership

Product Highlights

Industry leading 16-Gb Performance Capability	The switch offers full non-blocking 16-Gbps Fibre Channel performance on 48 line-rate ports and an aggregate bandwidth of 768 Gbps in each direction in a 1 Rack unit form factor.
Scalability	The SN6010C switch comes in two preconfigured models of 12 or 48 ports. The 12-port SN6010C model may be upgraded onsite to enable additional ports in 12-port increments by adding the SN6010C 12-port FC Upgrade License for total scalability of 48 ports.
Cost Effective Intelligent Storage networking	The SN6010C switch comes standard in a compact, extremely cost-effective design that simplifies deployment and administration of small and medium-scale storage-area networks (SANs) and as an edge switch in a larger enterprise. Please note that some services listed require the optional MDS 9100 Enterprise Package License. **N-Port ID Virtualization NPIV):** N-Port ID Virtualization (NPIV), a standard Fibre Channel protocol feature, individual virtual machines assume a full identity on the SAN so that Fibre Channel services such as zoning, Quality of Service (QoS), performance monitoring, and security can be provided to each virtual machine. **VSANs:** VSAN, an industry standard for fabric virtualization capabilities, enables more efficient storage network use by creating hardware-based isolated environments within a single physical SAN fabric or switch. Up to 32 VSANs are supported per switch. Each VSAN can be zoned as a typical SAN and maintains its own fabric services and management domains for added scalability and resilience. VSANs allow the cost of SAN infrastructure to be shared among more users, while helping ensure segregation of traffic and retaining independent control of configuration on a VSAN-by-VSAN basis. **PortChannels**: PortChannels allow users to aggregate up to 16 physical ISLs into a single logical bundle, providing optimized bandwidth use across all links. The bundle can consist of any port from the switch, helping ensure that the bundle remains active even in the event of a port failure. **FlexAttach**: The FlexAttach feature gives SN6010C switch customers the flexibility to add, move, or replace servers easily without the need to reconfigure SAN switches or storage arrays. It provides this flexibility by virtualizing the SAN identity of a server, which enables a server to retain its SAN identity even if the server is moved or replaced. **Quality of Service (QoS):** The Quality of Service (QoS) feature allows traffic to be classified into four distinct levels for service differentiation. QoS can be applied to help ensure that Fibre Channel data traffic for latency-sensitive applications receives higher priority over throughput-intensive applications such as data warehousing. **F-port trunking and channeling**: The F-port trunking feature enables multiple VSANs to be transported on the uplink from a SN6010C switch operating in NPV mode to the core switch. This feature will allow the consolidation of uplinks ports necessary for extending VSAN connectivity to the NP device.

Product Highlights

The F-port channeling feature enables up to 16 physical uplinks between a SN6010C switch operating in NPV mode and the core switch to be bundled into a PortChannel.

Advanced traffic management features, such as fabricwide quality of service (QoS) and Inter-VSAN Routing (IVR), among others, are included with the optional HP MDS 9100 Enterprise Package License.

IVR (MDS 9000 NX-OS Software Release 6.2.9)

VSANs and Inter-VSAN routing (IVR) enable deployment of large-scale multisite and heterogeneous SAN topologies. Integrated VSANs in port-level hardware allow any port in a system or in a fabric to be partitioned into any VSAN. Integrated IVR provides line-rate routing between any of the ports in a system or in a fabric without the need for external routing appliances.

High Availability

The SN6010C switch is designed for environments in which downtime is unacceptable. It offers:

- Non-disruptive software upgrades
- Process monitoring and stateful process restart
- Per-VSAN fabric services
- Redundant, hot-swappable power supply and redundant, hot-swappable power supply and fan trays
- Hot-swappable C-series SFP and SFP+ optics
- PortChannels for Inter-Switch Link (ISL) resiliency
- F-port Channeling for resiliency on uplinks from a SN6010C switch operating in NPV mode
- Online diagnostics

Simplified Storage Management

The SN6010C comes standard with three principal modes of management: the C-series MDS 9000 Family CLI, the Quick Configuration Wizard, and the Cisco Data Center Network Manager (DCNM).

Command Line Interface (CLI):

The C-series MDS 9000 Family CLI is easy to learn and delivers broad management capabilities. The C-series MDS 9000 Family CLI is an extremely efficient and direct interface designed to provide optimal capabilities to administrators in enterprise environments.

Quick Configuration Wizard:

The Quick Configuration Wizard helps eliminate management complexity and creates a readily available SAN environment for small- and midsized-business (SMB) applications. The wizard allows server access to storage to be set up quickly and easily in a single step using an intuitive GUI.

Interoperability

Offers compatibility with a broad range of Hewlett Packard Enterprise servers and operating systems, as well as disk and tape storage devices; see current compatibility matrix.

Diagnostics

- Embedded diagnostics
- Network analysis

Software Components, Included

NX-OS

SN6010C includes the Cisco MDS 9000 NX-OS Software operating system version 6.2(9) or higher, Cisco Data Center Network Manager, and a set of configuration, maintenance and diagnostics tools. It also includes VSAN support, PortChannels, extended fabrics, and hardware-enforced zoning.

Product Highlights

Cisco Data Center Network Manager

Cisco Data Center Network Manager is a responsive, easy-to-use Java application that simplifies management across multiple switches and fabrics. Cisco Data Center Network Manager enables administrators to perform vital tasks such as topology discovery, fabric configuration and verification, LUN security, monitoring, and fault resolution. All functions are available through a secure interface, which enables remote management from any location. Cisco Data Center Network Manager may be used independently or in conjunction with third-party management applications. Cisco provides an extensive API for integration with third-party and user developed management tools.

Software Components, Optional

HP StoreFabric SN6010C 12-Port Upgrade License

The flexibility of the SN6010C switch is provided by the C-series SN6010C 12-port 16Gb FC Upgrade license, which allows the addition of twelve 16-Gbps ports.

HP StoreFabric Data Center Network Manager Package

The "Standard" Cisco Data Center Network Manager software that is included at no charge with the SN6010C Switch provides basic switch configuration and troubleshooting capabilities. HP's C-series StoreFabric Data Center Network Manager (DCNM) Package (for the SN6000C Fabric Switches) extends Cisco Data Center Network Manager by providing historical performance data collection for network traffic hot-spot analysis, centralized management services and advanced application integration.

HPE MDS 9100 Enterprise Package License

HP's C-series MDS switches have a set of advanced traffic engineering and advanced security features that are recommended for all Enterprise SANs. These features are bundled together in a management application called the HPE MDS 9100 Enterprise Package. Please refer to Cisco's MDS Enterprise Package Data Sheet for more information: **http://www.cisco.com/c/en/us/products/collateral/storage-networking/mds-9000-software-licensing/product_data_sheet09186a00801ca6ac.html**.

HPE Support Services and Warranty Information

Warranty

(1-1-1) Hardware Warranty; 1-year parts; 1-year on-site (8x5, next business day response) and 1-year labor.

NOTE: The hardware warranty covers firmware and embedded non-saleable software. For extended hardware installation information, click the link below:
http://h20564.www2.hpe.com/hpsc/wc/public/home
NOTE: Certain restrictions and exclusions apply. Consult the Customer Support Center for details.

Hardware or Software product installation is not included in the warranty, but is available and highly recommended.

Protect your business beyond warranty with HPE Support Services
HPE Technology Services delivers confidence, reduces risk and helps customers realize agility and stability. Our integrated portfolio of Services for storage help customers reduce costs, optimize data, streamline storage management, and improve backup and recovery. HPE Support Services enable you to choose the right service level, length of coverage and response time as you purchase your new storage solution, giving you full entitlement for the support for need for your IT and business.

Connect your devices
Unlock all of the benefits of your technology investment by connecting your products to HP Enterprise. Achieve up to 77%1 reduction in down time, near 100%2 diagnostic accuracy and a single consolidated view of your environment. By connecting, you will receive 24x7monitoring, pre-failure alerts, automatic call logging, and automatic parts dispatch. HPE Proactive Care Service and HPE Datacenter Care Service customers will also benefit from proactive activities to help prevent issues and increase optimization. All of these benefits are already available to you with your server storage and networking products, securely connected to HPE support.

Optimized Care

HPE Proactive Care* with 6 hour call-to-repair commitment, three year Support Service

HPE Proactive Care gives customers an enhanced call experience plus helps prevent problems and maintains IT stability by utilizing tailored, proactive reports with recommendations and advice when your products are connected to HPE. This Service combines three years' proactive reporting and advice with our highest level of hardware support - HPE's 24x7, six hour hardware call-to-repair. HPE is the only leading manufacturer who makes this level of coverage available as a standard service offering for your most valuable storage systems.**https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA3-8855ENW.pdf**

Standard Care

HPE Proactive Care* with 24x7 coverage, three year Support Service
HPE Proactive Care gives customers an enhanced call experience plus helps preventing problems and maintains IT stability by utilizing personalized proactive reports with recommendations and advice when your products are connected to HPE. This Service combines three years' proactive reporting and advice with our 24x7 coverage, four hour hardware response time when there is a problem.
https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA3-8855ENW.pdf

*HPE Proactive Care and HPE Proactive Care Advanced require that the customer connect their devices to make the most of these services and receive all the deliverables.

Basic Care

HPE Foundation Care 24x7, three-year Support Service
HPE Foundation Care 24x7 gives you access to HPE 24 hours a day, seven days a week for assistance on resolving issues. This service includes need based Hardware onsite response within four hours. Simplify your support experience and make HPE your first call to help resolve hardware or software

HPE Support Services and Warranty Information

problems.
https://www.hpe.com/h20195/V2/GetDocument.aspx?docname=4AA4-8876ENW&cc=us&lc=en

Related Services

HPE Installation Service
Provides for the basic hardware installation of HPE branded servers, storage devices and networking options to assist you in bringing your new hardware into operation in a timely and professional manner.
https://www.hpe.com/h20195/V2/GetPDF.aspx/5981-9356EN.pdf

HPE SAN Deployment Service
Hewlett Packard Enterprise delivers complete design and implementation services for Fibre Channel, FCoE, FCIP, SAS, and iSCSI SAN connectivity components.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/5981-8527EN.pdf

For more information

https://www.hpe.com/us/en/services/operational.html
To learn more on HPE Storage Services, please contact your Hewlett Packard Enterprise sales representative or Hewlett Packard Enterprise Authorized Channel Partner

HPE Support Services are sold by HPE and Hewlett Packard Enterprise Authorized Service Partners:

- Services for customers purchasing from HPE or an enterprise reseller are quoted using HPE order configuration tools.
- Customers purchasing from a commercial reseller can find HPE Support Services at **https://ssc.hpe.com/portal/site/ssc/**

Family Information

	HP StoreFabric SN8500C 4-slot 16Gb FC Director	HP StoreFabric SN8500C 8-slot 16Gb FC Director	SN6010C 16Gb Fabric Switch	HP SN6500C 16Gb Multi-service Switch
Switch Type	Multilayer Director	Multilayer Director	Multilayer Fabric Switch	Multi-service Fabric Switch
Maximum ports	192 16 Gbps Fibre Channel ports, 192 FCoE ports	384 16 Gbps Fibre Channel ports, 384 FCoE ports	Up to 48 16 Gbps Fibre Channel ports	Up to 40 16 Gbps FC ports, 2 fixed 10GbE FCIP ports, 8 fixed 10GbE FCoE ports
Number of slots per chassis	Four	Eight	One fixed	Two fixed

NOTE: For additional switch support information, refer to the C-series FC Switch Connectivity Stream on the Single Point of Connectivity Knowledge (SPOCK) website at: **https://h20272.www2.hpe.com/spock/**. You must sign up for a Hewlett Packard Enterprise Passport to enable access. Once logged in, click Switches under Other Hardware in the last navigation panel of the window to access the Fibre Channel Switch Streams. Click on the C-Series FC Switch Connectivity Stream to open the document.

Configuration Information

The HP StoreFabric SN6010C 16Gb Fabric Switch comes preconfigured with 12 or 48 autosensing Fibre Channel ports capable of 16, 8 and 4 Gbps in a compact 1RU form factor chassis. An On-Demand Port Activation license is available for "pay as you grow" expansion in 12-port increments for up to 48 Fibre Channel ports. The port slots are empty and optical transceivers are required to utilize the ports. Short, Medium and Long Range optical transceiver options (SFPs) are available and must be ordered separately.

Step 1 - Base Configuration

Select one:

Model	Model Description	Part Number
HP StoreFabric SN6010C 12-port 16Gb Fibre Channel Switch	Base 48-Port Fabric Switch with 12 16-Gbps active ports, Dual Power Supplies, Power Cords (configurable by ship-to country) and Fans, VSANs, PortChannels, Cisco Data Center Network Manager, firmware, accessory kit and documentation. (no SFPs included)	K2Q16A
HP StoreFabric SN6010C 48-port 16Gb Fibre Channel Switch	Base 48-Port Fabric Switch with 48 16-Gbps active ports, Dual Power Supplies, Power Cords (configurable by ship-to country) and Fans, VSANs, PortChannels, Cisco Data Center Network Manager, firmware, accessory kit and documentation. (no SFPs included)	K2Q17A

Step 2 - Optional Software

On Demand Port Activation License	Description	
HP StoreFabric SN6010C 12-port 16Gb Fibre Channel Upgrade LTU	12 port upgrade license for SN6010C 12 Port 16Gb FC Switch (K2Q16A)	D4U60A
Management Software		
HP StoreFabric SN6000C Data Network Manager LTU		TC364A
HP MDS 9100 Enterprise Package License -1 MDS 9100 Swt LTU		A7515A

Step 3 - Options

Select each required option with quantities specified:

16Gb FC Transceivers	Quantity	
HP StoreFabric C-series 16 Gb Fibre Channel SW SFP+ Transceiver **NOTE:** Optional - Must be ordered separately.	1 min, 48 max	C8S72A
HP StoreFabric C-series 16 Gb Fibre Channel LW SFP+ Transceiver **NOTE:** Optional - Must be ordered separately.	1 min, 48 max	C8S73A
8 Gb FC Transceivers		
HP MDS 9000 8Gb FC SFP+ Short Range XCVR **NOTE:** Optional - Must be ordered separately.	1 min, 48 max	AJ906A
HP MDS 9000 8Gb FC SFP+ Long Range XCVR **NOTE:** Optional - Must be ordered separately.	1 min, 48 max	AJ907A

NOTE: Each port on the SN6010C may be configured to accept Short or Long Wave SFP optical transceivers. However, when ordering the SN6010C, active ports must be populated with above SFP optical transceivers only. (No substitutes allowed) Using other transceivers may void product warranty.

Installation Services

For complete design and implementation of Fibre Channel connectivity components, select **HPE Enhanced Implementation**

Configuration Information

Service for SANs

For basic hardware installation, select the service noted below. **NOTE:** 1 per switch

Product	Description	Installation
K2Q16A	HP SN6010C 16Gb 12-port FC Switch	2/16 FC switch Installation
K2Q17A	HP SN6010C 16Gb 48-port FC Switch	2/16 FC switch Installation

Recommended Cables

HPE OM3 LC-LC Optical Cables

HP LC to LC Multi-mode OM3 2-Fiber 0.5m 1-Pack Fiber Optic Cable	AJ833A
HP LC to LC Multi-mode OM3 2-Fiber 1.0m 1-Pack Fiber Optic Cable	AJ834A
HP LC to LC Multi-mode OM3 2-Fiber 2.0m 1-Pack Fiber Optic Cable	AJ835A
HP LC to LC Multi-mode OM3 2-Fiber 5.0m 1-Pack Fiber Optic Cable	AJ836A
HP LC to LC Multi-mode OM3 2-Fiber 15.0m 1-Pack Fiber Optic Cable	AJ837A
HP LC to LC Multi-mode OM3 2-Fiber 30.0m 1-Pack Fiber Optic Cable	AJ838A
HP LC to LC Multi-mode OM3 2-Fiber 50.0m 1-Pack Fiber Optic Cable	AJ839A

HPE PremierFlex OM4+ Fiber Optic Cables

HP Premier Flex MPO/MPO OM4 8f 10m Cbl	QK729A
HP Premier Flex MPO/MPO OM4 12f 50m Cbl	QK731A
HP Premier Flex LC/LC OM4 2f 1m Cbl	QK732A
HP Premier Flex LC/LC OM4 2f 2m Cbl	QK733A
HP Premier Flex LC/LC OM4 2f 5m Cbl	QK734A
HP Premier Flex LC/LC OM4 2f 15m Cbl	QK735A
HP Premier Flex LC/LC OM4 2f 30m Cbl	QK736A
HP Premier Flex LC/LC OM4 2f 50m Cbl	QK737A

Technical Specifications

Minimum software requirements

MDS 9000 NX-OS Software Release 6.2(9)

Performance and port configuration

- Port speed: 16 and 8 Gbps autosensing with 16 Gbps of dedicated bandwidth per port
- Buffer credits: Up to 256 for a group of 4 ports, with a default of 64 buffer credits per port and a maximum of 253 buffer credits for a single port in the group
- Ports per chassis: Up to 48 16-Gbps ports
- Base configuration with 12 ports; additional configuration for 48 ports available.
- Upgrade ports in 12-port increments from any configuration with the port activation license
- PortChannel: Up to 16 ports in a PortChannel

Security

- VSANs
- Zoning
  - Hardware-enforced zoning
  - Logical-unit-number (LUN) zoning and read-only zones
- FC-SP for host-to-switch and switch-to-switch authentication
- Port security
- Management access
  - SSHv2
  - SNMPv3
  - IP ACLs

Compatibility

Fibre Channel protocols

- 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-1, 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-AL, Revision 4.5 (ANSI/INCITS 272-1996)[#]
- FC-AL-2, Revision 7.0 (ANSI/INCITS 332-1999)[#]
- FC-AL-2, Amendment 1 (ANSI/INCITS 332-1999/AM1-2003)[#]
- FC-AL-2, Amendment 2 (ANSI/INCITS 332-1999/AM2-2006)[#]
- 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)
- 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-BB-6, Revision 2.00 (ANSI INCITS 509-2014)
- FC-BB-2, Revision 6.0 (ANSI INCITS 372-2003)

Technical Specifications

- 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)
- 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, (BSR INCITS PN-1828-D-200x)
- 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-VI, Revision 1.84 (ANSI INCITS 357-2002)
- 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-SP, Revision 1.8 (ANSI INCITS 426-2007)
- FC-SP-2, Revision 2.71 (ANSI INCITS 496-2012)
- 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)
- 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)
- Extensive IETF-standards-based TCP/IP, SNMPv3, and Remote Monitoring (RMON) MIBs
- Fibre Channel classes of service: Class 2, Class 3, and Class F
- Fibre Channel standard port types: E, F, and FL
- Fibre Channel enhanced port types: SD, ST and TE

Supported only at 8G FC speed

Fabric Services

- Name server
- Registered state change notification (RSCN)
- Login services
- Broadcast
- In-order delivery

Advanced Services

Please note that some services require the optional Enterprise Package license to be activated.

- NPIV
- VSAN
- PortChannels
- NPV mode
- FlexAttach
- F-port trunking and channeling
- Flow-based and zone-based QoS
- IVR (in Cisco MDS 9000 NX-OS Software Release 6.2.9 or later)
- SPAN
- POST diagnostics
- Online diagnostics

Technical Specifications

Diagnostic and Troubleshooting

- Internal loopbacks
- Fibre Channel traceroute
- Fibre Channel ping
- Fibre Channel debug
- Cisco Fabric Analyzer
- Syslog
- Port-level statistics

Management

- Access methods
  - Out-of-band 10/100/1000 Ethernet port
  - EIA/TIA-232 serial console port
  - In-band Fibre Channel over IP (FCIP)
- Access protocols
  - CLI
  - SNMP
  - SMI-S
- Security
  - RBAC using RADIUS or TACACS+ authentication, authorization, and accounting (AAA) functions
  - VSAN-based roles
  - SSHv2
  - SNMPv3

Management Applications

- Zero-touch deployment with DHCP (in Cisco MDS 9000 NX-OS Software Release 6.2.9 or later)
- C-series MDS 9000 Family CLI
- Quick Configuration Wizard
- C-series Data Center Network Manager and Device Manager
- C-series StoreFabric Data Center Network Manager (optional; requires C-series StoreFabric Data Center Network Manager license)

Availability

- Non-disruptive software upgrades
- Process monitoring and stateful process restart
- Per-VSAN fabric services
- Redundant, hot-swappable power supply and redundant, hot-swappable power supply and fan trays
- Hot-swappable SFP and SFP+ optics
- PortChannels aggregating up to 16 ports
- F-port Channeling
- Online diagnostics

Serviceability

- Configuration file management
- Call Home
- Port beaconing
- System LEDs
- SNMP traps for alerts

Environmental

- Physical dimensions (H x W x D) of 1RU: 1.72 x 17.16 x 16.34 in. (4.37 x 43.59 x 41.50 cm)
- Weight of fully configured chassis: 19.84 lb (9 kg)
- Ambient operating temperature: 32 to 104°F (0 to 40°C)
- Ambient non-operating temperature: -40 to 158°F (-40 to 70°C)
- Humidity (RH), ambient (noncondensing) operating: 10 to 90%
- Humidity (RH), ambient (noncondensing) non-operating and storage: 10 to 95%

Technical Specifications

- Operating altitude: -197 to 6500 ft (-60 to 2000 m)

Power and Cooling

- Power supplies (300W AC) (maximum of 2 per switch)
- AC Input: 100 to 240 VAC nominal (+/-10% for full range)
- Frequency: 50 to 60 Hz nominal (+/-3 Hz for full range)
- Maximum power consumption:
  - With 4-Gbps optics (48 ports fully populated): 99W with 0.89A at 110 VAC and 0.45A at 220 VAC
  - With 8-Gbps optics (48 ports fully populated): 101W with 0.90A at 110 VAC and 0.46A at 220 VAC
  - 100W (on base model config running 16G 100% traffic load at 25C)
- 125W (on fully populated config running 16G 100% traffic load at 25C)Airflow: Rear to front (toward ports)
- 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

Safety

- CE Marking
- UL 60950 -1
- CAN/CSA-C22.2 No. 60950 -1
- EN 60950 -1
- IEC 60950 -1
- TS 001
- AS/NZS 3260
- IEC 60825
- EN 60825
- 21 CFR 1040

EMC

- FCC Part 15 (CFR 47) Class A
- ICES-003 Class A
- EN55022 Class A
- CISPR22 Class A
- AS/NZS 3548 Class A
- VCCI Class A
- EN55024
- EN50082-1
- EN61000-3-2
- EN61000-3-3
- EN61000-6-1

Summary of Changes

Date	Version History	Action	Description of Change
07-Aug-2017	From Version 10 to 11	Changed	Updated Services and Warranty urls, updated hardware dimensions and specifications, added flow-based QOS
11-Nov-2016	From Version 9 to 10	Changed	Changes applied to the entire document
21-Oct-2016	From Version 8 to 9	Changed	Changed made to the Product Highlights section
08-April-2016	From Version 7 to 8	Changed	Removed references to MDS 8Gb Fabric Switch for HP BladeSystem as products are, now, obsolete and updated Spock url..
20-Nov-2015	From Version 6 to 7	Changed	Removing all rebranding references.
06-Nov-2015	From Version 5 to 6	Changed	Corrected the buffer credit information
18-Sept-2015	From Version 4 to 5	Changed	Removed SN6000C switches as obsolete
10-Apr-2015	From Version 3 to 4	Changes	Corrected the part numbers for the 16Gb FC SFPs
20-Feb-2015	From Version 2 to 3	Changed	Removed MDS9222i as obsolete, corrected name of DCNM license, other minor formatting updates
12-Dec-2014	From Version 1 to 2	Changed	Changed Header name to HP SN6010C 16Gb Fibre Channel Switch (MDS9148S)

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