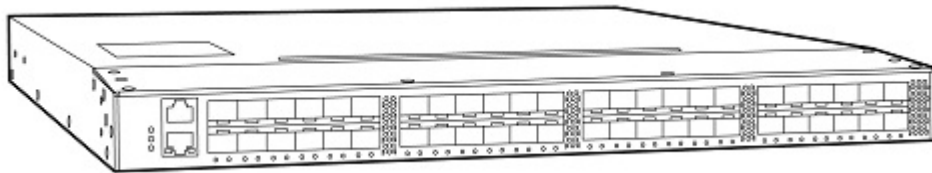


### Overview

The SN6000C 8Gb Fabric Switch (MDS 9148) is a high-performance, flexible, cost-effective platform providing high-density, line-rate 8-Gbps ports for storage networking deployments in small, medium-sized, and large enterprise environments. The SN6000C switch offers outstanding value by providing high-availability, security, and ease of use at a cost-effective price in a compact one-rack-unit (1RU) form factor. With the flexibility to expand from 16 to 48 ports in 8-port increments, the SN6000C offers the densities required to scale from an entry-level departmental switch to top-of-the-rack switch to edge connectivity in enterprise SANs. The SN6000C delivers a non-blocking architecture, with all 48 1/2/4/8-Gbps ports operating at line rate concurrently.

The SN6000C 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 advanced 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 SN6000C Fibre Channel Switch

### Key Features and Benefits

- **High Performance with exceptional flexibility**
  - Up to 768 Gbps of aggregate bandwidth in a 1 rack unit (RU)
  - Up to 48 autosensing Fibre channel ports capable of speeds of 1/2/4/8 Gbps
  - Pay as you grow flexibility with on-demand port activation licenses
- **Intelligent storage networking services at a cost effective price**
  - No additional cost for storage networking features like virtual SANs (VSANs), Inter-VSAN Routing (IVR) readiness, PortChannels, quality of service (QoS), and security
  - 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
  - FlexAttach feature enables transparent server deployment and movement without SAN reconfiguration
- **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

**Configuration support**

Please see the following Web site for configuration support at:  
<http://h18000.www1.hp.com/products/storageworks/san/documentation.html>

**Industry leading 8-Gb Performance Capability**

The switch offers full non-blocking 8-Gbps Fibre Channel performance on 48 line-rate ports and an aggregate bandwidth of 768 Gbps full duplex in a 1 Rack unit form factor.

**Scalability**

The SN6000C switch comes in two preconfigured models of 16 or 32 ports. These models may be upgraded onsite to enable additional ports by adding 8-port On-Demand Port Activation licenses for total scalability of 48 ports.

**Cost Effective Intelligent Storage networking**

The SN6000C switch comes standard with advanced features 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.

**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.

**N-Port Virtualization (NPV):**

The number of Fibre Channel domain IDs in a Fibre Channel SAN environment is limited. N-Port Virtualization (NPV) enables organization to scale there SANs without reaching these Fibre Channel domain ID limits because and switch with NPV does not use a Fibre Channel domain ID. NPV aggregates locally connected hosts into one or more uplinks to core switches in a pass through manner without using a Fibre Channel domain ID.

**FlexAttach:**

The C-series FlexAttach feature gives SN6000C 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

### Product Highlights

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 SN6000C 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.

The F-port channeling feature enables up to 16 physical uplinks between a SN6000C switch operating in NPV mode and the core switch to be bundled into a PortChannel.

#### **IVR (MDS 9000 NX-OS Software Release 5.1(0) or later):**

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.

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### High Availability

The SN6000C 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 SN6000C switch operating in NPV mode
  - Online diagnostics
-

### Product Highlights

#### **Simplified Storage Management**

The SN6000C 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 mid-sized-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.

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#### **Interoperability**

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

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#### **Diagnostics**

- Embedded diagnostics
  - Network analysis
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### **Software Components, Included**

#### **NX-OS**

SN6000C includes the Cisco MDS 9000 NX-OS Software operating system version 5.2(1) or higher with a complete set of security features, Cisco Data Center Network Manager, a full suite of configuration, maintenance and diagnostics tools. It also includes VSAN support, PortChannels, extended fabrics, per VSAN-based access control, hardware-enforced zoning, Port Security and Host/Switch Authentication (DH-CHAP), RADIUS and TACACS+ and Advanced Encryption Standard (AES) and non-disruptive firmware upgrade capability.

#### **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.

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### Product Highlights

#### Software Components, Optional

- 8-Port Upgrade License** The flexibility of the SN6000C switch is provided by the C-series SN6000C On-Demand Port Activation license, which allows the addition of 8-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 SN6000C 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.
- HP 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 HP MDS 9100 Enterprise Package.

### Service and Support 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:

[www.hp.com/services/deployment](http://www.hp.com/services/deployment)

**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.

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#### Service and Support

##### Services to accelerate time to results

HP Storage Services bring you a rich portfolio of consulting and support services designed to add value to our core storage products and solutions. We have the know-how and experience to put storage technology to work for you. We work closely with you as your strategic partner, leveraging our full services portfolio to make sure that everything works to optimize your enterprise.

Choose from services aligned to our storage product offerings and lifecycle. From mission-critical onsite services to innovative web-based remote support, you choose the precise level of attention and support your business demands.

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**Discover, plan, and design** Choose from a rich portfolio of services to make the most of HP StoreFabric Storage, so you can efficiently and affordably consolidate, manage, and extract value from unstructured data.

**HP Services can help you discover needs and create a plan for simplifying the environment, reducing risk, and maximizing your storage investments**

**HP Storage Efficiency Analysis** - The HP Storage Efficiency Analysis provides customers with a view of their storage infrastructure and operating environment, highlighting recommendations for improvements. The report provides extensive insight about the existing storage environment, opportunities for efficiency gains, asset aging and replacement through interaction with key decision makers.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA3-6727ENW.pdf>

**HP Storage Impact Analysis (SIA):** The HP Storage Impact Analysis service provides a 2-4 week discovery engagement with executive summary presentation. The goal of this service is to help provide customers guidance on storage related issues and develop remediation plans.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-1174ENW.pdf>

**HP Storage Modernization Service:** The HP Storage Modernization service is a 4-6 week service that defines the customer's envisioned target storage environment based on a proven solution design methodology. HP architects will quickly perform tool-assisted automatic discovery and facilitate a two-day strategy workshop with all key stakeholders involved in the storage infrastructure initiative.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA3-4620ENW.pdf>

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#### Deploy and integrate

**We can help you configure, set up, and efficiently use your HP SN8500C Director as well as help migrate data, improve capacity utilization, and establish information management standards used**

### Service and Support and Warranty Information

**across backup, replication, and archiving needs.**

**HP Enhanced Implementation Service for SANs** - Select this service for complete design and implementation support for Fibre Channel, FCoE, FCIP, SAS, and iSCSI SAN connectivity components.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-8527ENW.pdf>

**HP Storage Data Migration Services** - End-to-end data migration service providing seamless discovery, assessment, planning, and design, completely customizable to your organization's storage area network or network attached storage environment and using innovative software to help you migrate to HP storage quickly and efficiently.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA3-0774ENW.pdf>

**HP Storage and Data Consultant Residency Service** - Strategic augmentation of your current environment with HP resources who become your trusted advisor to provide answers that are right for your storage and backup environment.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA3-9481ENW.pdf>

**HP Proactive Select** - A flexible way to purchase services to fit your environment with an extensive menu of HP Proactive Select event and technical services, such as onsite firmware upgrades, health checks, assessments, and education.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-3842ENW.pdf>

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### Operate and support

**Choose the right support to maximize uptime, free up your resources, and achieve improved value-as you get the most out of the existing IT assets while accelerating time-to-revenue.**

**HP Proactive Care 24x7** - Hardware and software support services designed specifically for your technology with rapid access to Advanced Solution Center Specialists plus firmware and software management and best practice advice.

<http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855ENW.pdf>

**HP Proactive Care Personalized Support** - An option-if you have HP Proactive Care- to bring increased personalization of the Proactive Care support experience through the assignment of an Account Service Manager (ASM) who provides IT best practice advice to help address IT issues and projects.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-3446ENW.pdf>

**HP Foundation Care 24x7** - HP Foundation Care 24x7 connects you to HP around the clock for assistance on resolving issues with hardware onsite response within four hours and software call back within two hours after opening your case.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-0226ENW.pdf>

**HP Education Services** - Comprehensive training for new, as well as experienced, storage administrators designed to expand your skills and keep you up to speed with the latest storage and virtualization technology from HP Storage.

<http://education.hp.com/curr-storsan.htm>

### Service and Support and Warranty Information

#### Choose from three levels of operate and support care

**Optimized Care** - Delivers the highest levels of performance and stability through deployment and proactive management practices

**HP Proactive Care 24x7-Plus, 20 credits per year**

**Additional options** - HP Proactive Care Personalized Support (once per Proactive Care support new environment), an additional day of HP Personalized Support, and 10 additional HP Proactive Select credits per year.

**Standard Care** - maintains high level of uptime, along with expert help to cut the cost and complexity of implementation and support

**HP Proactive Care 24x7-Plus, 10 credits per year**

**Additional options** - HP Proactive Care Personalized Support (once per Proactive Care support new environment), an additional day of HP Personalized Support, and 10 additional HP Proactive Select credits per year.

**Basic Care** - Minimum recommended support

**HP Foundation Care 24x7**

**Additional options** - 10 HP Proactive Select credits per year.

#### For more information

[www.hp.com/services/storage](http://www.hp.com/services/storage)

To learn more on HP Storage Services, please contact your HP sales representative or HP Authorized Channel Partner

HP Care Pack Services are sold by HP and HP Authorized Service Partners:

- Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools.
- Customers purchasing from a commercial reseller can find HP Care Pack Services at [www.hp.com/go/lookuptool](http://www.hp.com/go/lookuptool)



### Family Information

	<b>HP StoreFabric SN8500C 8-slot 16Gb FC Director</b>	<b>HP SN8000C 13-Slot Supervisor 2A Fabric3 Director</b>	<b>SN8000C 9-Slot Director w/ Dual Supervisor 2A</b>	<b>SN8000C 6-Slot Director w/Dual Supervisor 2A</b>	<b>SN6000C 8Gb Fabric Switch</b>	<b>Cisco MDS 8Gb Fabric Switch for HP BladeSystem c- Class</b>	<b>HP MDS 9222i</b>
<b>Introduction Date</b>	August 2013	May 2012	May 2011	May 2011	June 2010	November 2010	November 2007
<b>Switch Type</b>	Multilayer Director	Multilayer Director	Multilayer Director	Multilayer Director	Multilayer Fabric Switch	Embedded Fabric Switch	Multilayer Fabric Switch
<b>Maximum ports</b>	384 Fibre Channel	528 Fibre Channel, 44 IP ports	336 Fibre Channel, 28 IP ports	192 Fibre Channel, 16 IP ports	Up to 48 Fibre Channel ports	16 Internal, 8 auto-sensing 8/4/2 Gb Fibre Channel ports	18 fixed auto- sensing 4/2/1 Gbps Fibre Channel ports, 4 1Gb Ethernet ports
<b>Number of slots per chassis</b>	Eight	Thirteen	Nine	Six	N/A, Fixed FRU	N/A, Fixed FRU	Two, One fixed

### Configuration Information

The HP SN6000C 8Gb Fabric Switch comes preconfigured with 16 or 32 autosensing Fibre Channel ports capable of 8, 4, 2, and 1 Gps in a compact 1RU form factor chassis. An On-Demand Port Activation license is available for "pay as you grow" expansion in 8-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
<b>HP SN6000C 16-ports Active Fabric Switch</b>	Base 48-Port Fabric Switch with 16 8-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)	AW585A
<b>HP SN6000C 32-ports Active Fabric Switch</b>	Base 48-Port Fabric Switch with 32 8-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)	AW586A

#### Step 2 - Optional Software

On Demand Port Activation License	Description	Part Number
HP SN6000C 8-port Upgrade LTU	8 port upgrade license for SN6000C 16 Port Switch (AW585A) and 32 Port Switch (AW586A)	TA829A
<b>Management Software</b>		
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:

<b>8 Gb FC Transceivers</b>	Quantity	Part Number
HP MDS 9000 8Gb FC SFP+ Short Range XCVR <b>NOTE:</b> Optional - Must be ordered separately.	1 min, 48 max	AJ906A
HP MDS 9000 8Gb FC SFP+ Long Range XCVR <b>NOTE:</b> Optional - Must be ordered separately.	1 min, 48 max	AJ907A
<b>4 Gb FC Transceivers</b>		
HP MDS 9000 4Gb FC SFP, 4pk Shrt Range XCVR <b>NOTE:</b> Optional - Must be ordered separately.	1 min, 12 max	AE379A
HP MDS 9000 4Gb FC SFP, Lng Range XCVR <b>NOTE:</b> Optional - Must be ordered separately.	1 min, 48 max	AE380A

**NOTE:** Each port on the SN6000C may be configured to accept Short, Medium or Long Wave SFP optical transceivers. However, when ordering the SN6000C, 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, FCoE, FCIP, SAS, and iSCSI SAN connectivity components, select **HP Enhanced Implementation Service for SANs**

### Configuration Information

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

Product	Description	Installation	
AW585A	HP SN6000C 8Gb 16-port FC Switch	2/16 FC switch Installation	HA113A#5FE
AW586A	HP SN6000C 8GB 32-port FC Switch	2/16 FC switch Installation	HA113A#5FE

#### ***Recommended Cables***

##### **HP 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

##### **HP 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 5.2(1)

#### Performance and port configuration

- Port speed: 8-, 4-, 2-, and 1-Gbps autosensing with 8 Gbps of dedicated bandwidth per port
- Buffer credits: Up to 128 for a group of 4 ports, with a default of 32 buffer credits per port and a maximum of 125 buffer credits for a port
- Ports per chassis: Up to 48 8-Gbps ports
- Base configuration with 16 ports; additional configuration for 32 ports available.
- Upgrade ports in 8-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 2.1 (BSR INCITS 460-200x)
- FC-PI-4, Revision 8.0 (INCITS 450-2009)
- FC-FS, Revision 1.9 (ANSI/INCITS 373-2003)
- FC-FS-2, (BSR INCITS 424-200x)
- FC-FS-3, Revision 0.9 (BSR INCITS PN-1861-D-200x)
- FC-LS, Revision 1.62 (ANSI/INCITS 433-2007)
- 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, (BSR INCITS 461-200x)
- FC-GS, (ANSI INCITS 288-1999)
- FC-GS-3, Revision 7.01 (ANSI/INCITS 348-2001)
- FC-GS-4, Revision 7.91 (ANSI/INCITS 387-2004)
- FC-GS-5, (ANSI INCITS 427-2007)
- FC-GS-6, (BSR INCITS 463-200x)
- FC-BB, Revision 4.7 (ANSI/INCITS 342-2001)
- FC-BB-2, Revision 6.0 (ANSI/INCITS 372-2003)

### Technical Specifications

- FC-BB-3, Revision 6.8 (ANSI/INCITS 414-2006)
- 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-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-SP, Revision 1.6 (ANSI/INCITS 426-2007)
- FC-DA, Revision 3.1 (INCITS TR-36-2004)
- SNPing (ANSI INCITS 443-2008)
- MIB-FA (INCITS/TR-32:2003 (R2008))
- FAIS Revision 1
- Extensive IETF-standards-based TCP/IP, SNMPv3, and Remote Monitoring (RMON) MIBs
- Class of service: Classes 2, 3, and F
- Fibre Channel standard port types: E, F, and FL
- Fibre Channel enhanced port types: SD, and TE

### Fabric Services

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

### Advanced Services

- NPIV
- VSANs
- PortChannels
- NPV mode
- FlexAttach
- F-port trunking and channeling
- IVR (in Cisco MDS 9000 NX-OS Software Release 5.1(0) or later)

### Diagnostic and Troubleshooting

- POST diagnostics
- Online diagnostics
- Internal loopbacks
- SPAN
- 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

### Technical Specifications

- 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 5.1(0) 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

- Nondisruptive 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 18.89 in. (4.47 x 43.59 x 47.98 cm)
- Weight of switch with dual power supplies: 22.2 lb (10 kg)
- Ambient operating temperature: 32 to 104°F (0 to 40°C)
- Ambient nonoperating temperature: -40 to 158°F (-40 to 70°C)
- Humidity (RH), ambient (noncondensing) operating: 10 to 90%
- Humidity (RH), ambient (noncondensing) nonoperating and storage: 5 to 95%
- 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
- Airflow: Rear to front (toward ports)

### Safety

- UL 60950 -1
- CAN/CSA-C22.2 No. 60950 -1
- EN 60950 -1
- IEC 60950 -1
- AS/NZS 60950
- IEC 60825

### Technical Specifications

#### EMC

- EN 60825
- 21 CFR 1040
- FCC Part 15 (CFR 47) Class A
- ICES-003 Class A
- EN55022 Class A
- CISPR22 Class A
- AS/NZS CISPR22 Class A
- VCCI Class A
- EN55024
- KN24
- EN50082-1
- EN61000-3-2
- EN61000-3-3
- EN61000-6-1
- CISPR24
- ETSI
- ETS 300 019 Storage Class 1.1
- ETS 300 019 Transportation Class 2.3
- ETSI 300 019 Stationary Use Class 3.1

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