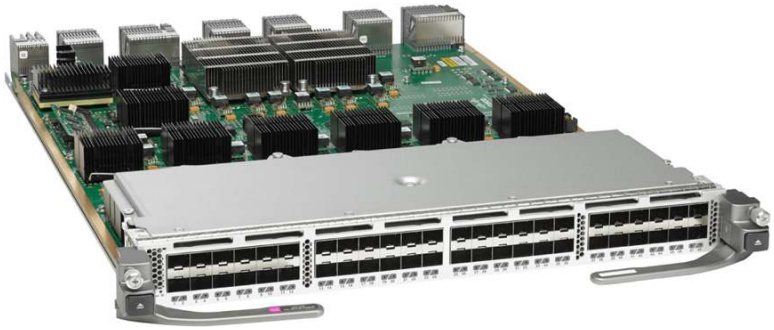
Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module

Product Overview

The Cisco® MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module deliver high performance and innovative features to enable convergence, scalability, and intelligence in large, virtualized data centers. With up to 384 line-rate 16-Gbps Fibre Channel ports per chassis, intelligent fabric services such as integrated VSANs, Inter-VSAN Routing (IVR), and PortChannels, the Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module (Figure 1) enables deployment of large, scalable, and virtualized data centers.

For the most demanding storage networking environments, the Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module delivers uncompromising performance. The 48-port 16-Gbps switching module delivers full-duplex aggregate performance of 768 Gbps, making this module well suited for attachment of high-performance 16-Gbps storage subsystems, 16-Gbps Inter-Switch Links (ISLs), and high-performance and virtualized servers.

Figure 1. Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module



The Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module enables you to consolidate SAN deployments with fewer hardware components, consolidate workloads from hundreds of virtual machines with performance, and scale with incremental updates as your SAN grows while protecting your existing investment. The Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module also provides Cisco VMpath technology, which enables advanced virtual machine-aware SAN provisioning and monitoring for virtualized data centers. With Cisco VMpath, you can monitor, manage, and control SAN resource allocation and performance on a per-virtual machine basis and map paths all the way from the server to storage, enabling end-to-end tracking of mission-critical workloads.

Cisco MDS 9700 Series Fibre Channel Switching Module is hot-swappable and compatible with 2/4/8-Gbps, 4/8/16-Gbps and 10-Gbps FC interfaces, and supports hot-swappable Enhanced Small Form-Factor Pluggable (SFP+) transceivers. MDS 9700 module also supports 10 Gigabit Ethernet clocked optics carrying 10Gbps Fibre Channel traffic. Individual ports can be configured with Cisco 16-Gbps, 8-Gbps, or 10-Gbps SFP+ transceivers. Each port supports 500 buffer credits for exceptional extensibility without requiring additional licensing. With the Cisco Enterprise Package, up to 4095 buffer credits can be allocated to an individual port, enabling full link bandwidth over long distances with no degradation in link utilization.

The 16-Gbps Fibre Channel switching module continues to provide previously available features such as predictable performance and high availability, advanced traffic management capabilities, integrated VSANs and IVR, resilient high-performance ISLs, comprehensive security frameworks, fault detection and isolation of errored packets, and sophisticated diagnostics.

Product Highlights

- Outstanding SAN Performance: The combination of the 16-Gbps Fibre Channel switching module and the Fabric-1 crossbar switching modules enables up to 1.5 Tbps of Fibre Channel throughput between modules in each direction for each of the eight Cisco MDS 9710 payload slots. This per-slot bandwidth is twice the bandwidth needed to support a 48-port 16-Gbps Fibre Channel module at full line rate. Cisco MDS 9700 architecture, based on central arbitration and crossbar fabric, provides 16-Gbps line-rate, nonblocking, predictable performance across all traffic conditions for every port in the chassis.
- High Availability: The Cisco MDS 9700 provides outstanding availability and reliability. The Cisco MDS 9710 is the industry's first director-class switch to enables redundancy on all major components, including the Fabric Card. It provides Grid Redundancy on Power Supply and 1+1 redundant Supervisors. Users can add additional fabric card to enable N+1 Fabric Redundancy.
- Industry-leading scalability: With up to 24 terabits per second (Tbps) of Fibre Channel system bandwidth and 384 2/4/8/16-Gbps full line-rate autosensing Fibre Channel ports in a single chassis or up to 1152 Fibre Channel ports in a single rack, the Cisco MDS 9710 leads the industry in scalability and is designed to meet the requirements of the largest data center storage environments.
- Intelligent network services: VSAN technology, access control lists (ACLs) for hardware-based intelligent frame processing, and fabricwide quality of service (QoS) enable migration from SAN islands to enterprisewide storage networks.
    - Integrated hardware-based VSANs and IVR: Integration of VSANs into port-level hardware allows any port in a system or fabric to be partitioned to any VSAN. Integrated hardware-based IVR provides line-rate routing between any ports in a system or fabric without the need for external routing appliances.
    - Intelligent storage services: The Cisco MDS 9700 operates with intelligent service capabilities on other Cisco MDS 9000 Family platforms to provide services such as acceleration of storage applications for data replication and backup and data migration to hosts and targets attached to the Cisco MDS 9700.
    - Smart Zoning: When the Smart Zoning feature is enabled, Cisco MDS 9700 Series fabrics provision the hardware access control entries specified by the zone set more efficiently, avoiding the superfluous entries that would allow servers (initiators) to talk to other servers, or allow storage devices (targets) to talk to other storage devices. This feature makes larger zones with multiple initiators and multiple targets feasible without excessive consumption of hardware resources. Thus, smart zones can correspond to applications, application clusters, hypervisor clusters, or other data center entities, saving the time that administrators previously spent creating many small zones and enabling the automation of zoning tasks.
- Virtual machine transparency: The Cisco MDS 9700 Series provides deterministic hardware performance and a comprehensive feature set that allows virtual machines to have the same SAN attributes as a physical server. On a per-virtual machine basis, the Cisco NX-OS Software offers VSANs, QoS policies, access control, performance monitoring, and data protection to promote the scalability and mobility of virtual machines. Cisco Prime Data Center Network Manager provides end-to-end visibility from the virtual machine to the storage, with resource allocation, performance measurements, and predictions available on a per-virtual machine basis to enable rapid troubleshooting in mission-critical virtualized environments.

- Comprehensive security: In addition to support for services such as VSANs, hardware-enforced zoning, ACLs, per-VSAN role-based access control (RBAC), and Cisco TrustSec® Fibre Channel link encryption, the Cisco MDS 9700 Series supports a comprehensive security framework consisting of RADIUS and TACACS+, Fibre Channel Security Protocol (FC-SP)[1], Secure File Transfer Protocol (SFTP), Secure Shell (SSH) Protocol, and Simple Network Management Protocol Version 3 (SNMPv3). Cisco TrustSec®[1] Fibre Channel link encryption delivers transparent, hardware-based 16-Gbps line-rate encryption of Fibre Channel data on 16-Gbps Fibre Channel switching modules in addition to 10-Gbps line-rate encryption.
- Resilient High-Performance ISLs: The Cisco MDS 9700 Series 16-Gbps Fibre Channel switching modules support high-performance ISLs consisting of 16-Gbps or 10-Gbps secure Fibre Channel. Fibre Channel switching modules also offer PortChannel technology, with up to 16 links spanning any port on any module within a chassis grouped into a logical link for added scalability and resilience. Up to 4095 buffer-to-buffer credits can be assigned to a single Fibre Channel port, providing industry-leading extension of storage networks up to 4000 km at 2 Gbps, 2000 km at 4 Gbps, 1000 km at 8 Gbps, 500 km at 16 Gbps, or 680 km at 10 Gbps while maintaining full link bandwidth. The Cisco MDS 9700 Series switch architecture helps ensure that frames can never be reordered within a switch.
- Sophisticated Diagnostics: The Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module provides intelligent diagnostics, protocol decoding, and network analysis tools as well as integrated Cisco Call Home capability for added reliability, faster problem resolution, and reduced service costs.
- Advanced FICON Services[1]: The Cisco MDS 9710 is mainframe ready, with full support for FICON and Linux environments.

Key Benefits

Lower Total Cost of Ownership with SAN Consolidation

With the exponential growth of data in today's business environment, organizations need to deploy large-scale SANs in the most efficient and cost-effective ways. To meet scalability requirements while managing total cost of ownership (TCO), the Cisco MDS 9710 offers industry-leading port densities of up to 384 16-Gbps Fibre Channel ports per chassis, 1.5-Tbps Fibre Channel performance per slot, up to 24-Tbps front-panel Fibre Channel line-rate nonblocking system-level switching, unparalleled capabilities with intelligent fabric services, VSANs for consolidating individual physical SAN islands while maintaining logical boundaries, and IVR for sharing resources across VSANs. These features enable the consolidation of an organization's data assets into fewer, larger, and more manageable SANs, thus reducing the hardware footprint and associated capital and operational expenses.

Enterprise-Class Availability

The Cisco MDS 9700 was designed from the beginning for high availability. Beyond meeting the basic requirements of nondisruptive software upgrades and redundancy of all critical hardware components, the Cisco MDS 9700 software architecture offers outstanding availability.

Virtual Machine-Aware SAN Deployment

Growing adoption of server virtualization in the data center increases the number of hosts attached to the SAN, places higher workloads on the SAN, requires more storage, and increases the need for SAN services. Cisco VMpath technology, part of Cisco Prime Data Center Network Manager, provides end-to-end visibility from the virtual machine to the storage, with resource allocation, performance measurements, and predictions available on a per-virtual machine basis to enable rapid troubleshooting in mission-critical virtualized environments.

Advanced Traffic Management

Advanced traffic management capabilities integrated into every Cisco MDS 9700 Series 16-Gbps Fibre Channel Switching Module simplify deployment and optimization of large-scale fabrics.

- Virtual Output Queue (VOQ): Helps ensure line-rate performance on each port, independent of traffic pattern, by eliminating head-of-line blocking.
- Up to 4095 Buffer-to-Buffer Credits: Can be assigned to any individual port for optimal bandwidth utilization across distance.
- PortChannels: Allow you to aggregate up to 16 physical ISLs into a single logical bundle, providing optimized bandwidth utilization across all links; the bundle can be a mix of any port from any module in the chassis, helping ensure that the bundle can remain active even in the event of a module failure.
- Fabric Shortest Path First (FSPF)-based Multipathing: Provides the intelligence to load-balance across up to 16 equal-cost paths and dynamically reroute traffic in the event of a switch failure.
- QoS: Helps manage bandwidth and control latency to prioritize critical traffic; available on every port.
- Lossless Networkwide In-Order Delivery Guarantee: The Cisco MDS 9700 Series switch architecture guarantees that frames can never be reordered within a switch. This guarantee extends across an entire multiswitch fabric, assuming that the fabric is stable and that no topology changes are made.

Advanced Diagnostics and Troubleshooting Tools

The Cisco MDS 9700 Series integrates proactive diagnostics, tools to verify connectivity and route latency, and mechanisms for capturing and analyzing traffic, helping simplify the management of large-scale storage networks. The power-on self-test (POST) and online diagnostics provide proactive health monitoring. Starting with Cisco MDS 9000 NX-OS 6.2, the powerful Cisco Generic Online Diagnostics (GOLD) framework replaces the Cisco Online Health Management System (OHMS) diagnostic framework on the new Cisco MDS 9700 Series Multilayer Director chassis. Cisco GOLD is a suite of diagnostic facilities to verify that hardware and internal data paths are operating as designed. Boot-time diagnostics, continuous monitoring, standby fabric loopback tests, and on-demand and scheduled tests are part of the Cisco GOLD feature set. This industry-leading diagnostics subsystem enables the rapid fault isolation and continuous system monitoring critical in today's continuously operating environments. Integrated hardware functions enable diagnostic capabilities such as Fibre Channel traceroute to identify the exact path and timing of flows, and Switched Port Analyzer (SPAN) and Remote SPAN (RSPAN) to intelligently capture network traffic. Captured Fibre Channel traffic can be analyzed with the embedded Cisco Fabric Analyzer. Comprehensive port-based and flow-based statistics enable sophisticated performance analysis and service-level agreement (SLA) accounting.

Comprehensive Solution for Robust Security

Addressing the need for fool-proof security in storage networks, the Cisco MDS 9700 Series 16-Gbps Fibre Channel line card offers an extensive security framework to protect the highly sensitive data crossing today's enterprise networks. The Cisco MDS 9700 employs intelligent packet inspection at the port level, including the application of ACLs for hardware enforcement of zones, VSANs, and advanced port security features. VSANs are used to achieve higher security and greater stability by providing complete isolation of devices that are connected to the same physical SAN. IVR enables controlled sharing of resources between VSANs. In addition, FC-SP[1] provides switch-to-switch and host-to-switch Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) authentication supporting RADIUS or TACACS+ to help ensure that only authorized devices access protected storage networks. Cisco TrustSec®[1] Fibre Channel link encryption, available on the Cisco MDS 9700 Series 16-Gbps modules, allows you to transparently encrypt ISLs at up to line-rate speeds, providing an additional layer of protection for traffic within and between data centers. The Cisco MDS 9700 supports a fabric binding feature that helps ensure that ISLs are enabled only between specified switches in the fabric binding configuration.

Integrated Mainframe Support (Supported in a Future Software Release)[1]

The Cisco MDS 9700 is mainframe ready, with full support for IBM System z FICON and Linux environments. The Cisco MDS 9700 supports transport of the FICON protocol in both cascaded and noncascaded fabrics, as well as an intermix of FICON and open systems Fibre Channel Protocol traffic on the same switch.

Product Specifications

Table 1 lists the product specifications for the Cisco MDS 9700 Series 16-Gbps Fibre Channel switching modules.

Table 1. Technical Specifications

Feature	Description
Product compatibility	• Cisco MDS 9700 Series Multilayer Directors
Software compatibility	• Cisco MDS 9000 NX-OS Software Release 6.2.1 or later
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) ◦ 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)

Feature	Description
	◦ 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-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, FL, and B • Fibre Channel enhanced port types: SD, ST, and TE
Cards, ports, and slots	• 48 autosensing 2/4/8-Gbps or 4/8/16-Gbps Fibre Channel ports • 48 10-Gbps Fibre Channel ports
Features and Functions	
Fabric services	• Name server • Registered State Change Notification (RSCN) • Login services • Fabric Configuration Server (FCS) • Public loop • Broadcast • In-order delivery
Advanced functions	• VSAN • IVR • PortChannel with Multipath Load Balancing • Flow-based and zone-based QoS • NPIV

Feature	Description
Diagnostics and troubleshooting tools	• POST diagnostics • Online diagnostics • Internal port loopbacks • SPAN and RSPAN • Fibre Channel Traceroute • Fibre Channel Ping • Fibre Channel Debug • Cisco Fabric Analyzer • Syslog • Online system health • Port-level statistics • Real-Time Protocol Debug
Network security	• VSANs • ACLs • Per-VSAN RBAC • Fibre Channel zoning ◦ N-port Worldwide Name (WWN) ◦ N-port Fibre Channel ID (FC-ID) ◦ Fx-port WWN ◦ Fx-port WWN and interface index ◦ Fx-port domain ID and interface index ◦ Fx-port domain ID and port number ◦ Logical unit number (LUN) • Fibre Channel Security Protocol (FC-SP) [1] ◦ DH-CHAP switch-to-switch authentication ◦ DH-CHAP host-to-switch authentication • Port Security and Fabric Binding • Management access ◦ SSHv2 implementing Advanced Encryption Standard (AES) ◦ SNMPv3 implementing AES ◦ SFTP • Cisco TrustSec[1] Fibre Channel Link Level Encryption ◦ SSHv2 implementing AES
FICON[1]	• FC-SB-3 compliant • Cascaded FICON fabrics • Intermix of FICON and Fibre Channel FCP traffic • FICON Control Unit Port (CUP) management interface
Serviceability	• Configuration file management • Nondisruptive software upgrades for Fibre Channel interfaces • Cisco Call Home • Power-management LEDs • Port beaconing • System LED • SNMP traps for alerts • Network boot
Performance	• Port speed: 2/4/8-Gbps and 4/8/16-Gbps autosensing, optionally configurable for 10-Gbps Fibre Channel • Buffer credits: Up to 500 per port and up to 4095 on an individual port (with optional Cisco Enterprise Package license activated) • PortChannel: Up to 16 ports

Feature	Description		
Supported Cisco optics, media, and transmission distances	**Speed**	**Media**	**Distance**
	16-Gbps SW, LC, SFP+	50/125-micron multimode	125m
	16-Gbps SW, LC, SFP+	62.5/125-micron multimode	15m
	16-Gbps LW, LC, SFP+	9/125-micron single-mode	10 km
	10-Gbps SW, LC, SFP+	50/125-micron multimode	300m
	10-Gbps SW, LC, SFP+	62.5/125-micron multimode	33m
	10-Gbps LW, LC, SFP+	9/125-micron single-mode	10 km
	8-Gbps SW, LC, SFP+	50/125-micron multimode	150m
	8-Gbps SW, LC, SFP+	62.5/125-micron multimode	21m
	8-Gbps LW, LC, SFP+	9/125-micron single-mode	10 km
	8-Gbps ER, LC, SFP+	9/125-micron single-mode	40 km
	10-GbE SR, LC, SFP+	50/125-micron multimode	300m
	10-GbE LR, LC, SFP+	9/125-micron multimode	10 km
	10-GbE ER, LC, SFP+	9/125-micron multimode	40 km
Reliability and availability	• Hot-swappable module • Hot-swappable SFP+ transceivers • Online diagnostics • Stateful Process Restart • Nondisruptive Supervisor Failover • Any module, any port configuration for PortChannels • Fabric-based multipathing • Per-VSAN fabric services • Port Tracking • Virtual Routing Redundancy Protocol (VRRP) for management		
Network management	• Access methods through Cisco MDS 9700 Series Supervisor Module ◦ Out-of-band 10/100/1000 Ethernet port (Supervisor-1) ◦ RS-232 serial console port ◦ In-band IP over Fibre Channel • Access methods through Cisco MDS 9700 Series Fibre Channel Switching Module ◦ In-band FICON CUP over Fibre Channel • Access protocols ◦ Command-line interface (CLI) through console and Ethernet ports ◦ SNMPv3 through Ethernet port and in-band IP over Fibre Channel access ◦ FICON CUP • Distributed Device Alias service • Network security ◦ Per-VSAN RBAC using RADIUS- and TACACS+-based authentication, authorization, and accounting (AAA) functions ◦ SFTP ◦ SSHv2 implementing AES ◦ SNMPv3 implementing AES • Management applications ◦ Cisco MDS 9000 Family CLI ◦ Cisco Fabric Manager ◦ Cisco Device Manager		
Programming interfaces	• Scriptable CLI • Cisco Prime Data Center Network Manager web services API • Cisco Prime DCNM GUI		
Environmental	• Temperature, ambient operating: 32 to 104℉ (0 to 40℃) • Temperature, ambient nonoperating and storage: -40 to 158℉ (-40 to 70℃) • Relative humidity, ambient (noncondensing) operating: 10 to 90% • Relative humidity, ambient (noncondensing) nonoperating and storage: 10 to 95% • Altitude, operating: -197 to 6500 ft (-60 to 2000m)		

Feature	Description
Physical dimensions	• Dimensions (H x W x D): 1.75 x 15.9 x 21.8 in. (4.4 x 40.39 x 55.37 cm) • Weight: 17 lb (7.71 kg)
Approvals and compliance	• Regulatory compliance ◦ CE Markings per directives 2004/108/EC and 2006/95/EC • Safety compliance ◦ UL 60950-1 Second Edition ◦ CAN/CSA-C22.2 No. 60950-1 Second Edition ◦ EN 60950-1 Second Edition ◦ IEC 60950-1 Second Edition ◦ AS/NZS 60950-1 ◦ GB4943 2001 • EMC compliance ◦ 47CFR Part 15 (CFR 47) Class A ◦ AS/NZS CISPR22 Class A ◦ CISPR22 Class A ◦ EN55022 Class A ◦ ICES003 Class A ◦ VCCI Class A ◦ EN61000-3-2 ◦ EN61000-3-3 ◦ KN22 Class A ◦ CNS13438 Class A ◦ EN55024 ◦ CISPR24 ◦ EN300386 ◦ KN24

Ordering Information

Table 2 provides ordering information for the Cisco MDS 9700 Series 48-Port 16-Gbps Fibre Channel Switching Module.

Table 2. Ordering Information

Part Number	Product Description
DS-X9448-768K9	48-Port 16-Gbps Fibre Channel Switching Module
DS-SFP-FC16G-SW	16 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC16G-LW	16 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC10G-SW	10 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC10G-LW	10 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC8G-SW	8 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC8G-LW	8 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC8G-ER	8 Gbps Fibre Channel Extended Reach SFP+, LC
SFP-10G-SR	10GBASE-SR SFP Module[2]
SFP-10G-LR	10GBASE-LR SFP Module[2]
SFP-10G-ER	10GBASE-ER SFP Module[2]

Part Number	Product Description
Spare Components	
DS-X9448-768K9=	48-Port 16-Gbps Fibre Channel Switching Module
DS-X9448768B8K9=	MDS 9700 48-port 16Gbps FC Module + 48 8-Gbps SW SFP+, Spare
DS-X9448768BSK9=	MDS 9700 48-port 16Gbps FC Module + 48 16-Gbps SW SFP+, Spare
DS-SFP-FC16G-SW=	16 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC16G-LW=	16 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC10G-SW=	10 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC10G-LW=	10 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC8G-SW=	8 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC8G-LW=	8 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC8G-ER=	8 Gbps Fibre Channel Extended Reach SFP+, LC
SFP-10G-SR=	10GBASE-SR SFP Module[2]
SFP-10G-LR=	10GBASE-LR SFP Module[2]
SFP-10G-ER=	10GBASE-ER SFP Module[2]

[1] This feature will be supported in a future software release.
[2] 10G Ethernet optics use Etnernet clock rates but the pipe carries 10G FC traffic.

For More Information

For more information about the Cisco MDS 9700 Series Fibre Channel switching modules, visit http://www.cisco.com/go/storage or contact your local account representative.

For detailed information about supported optics, see Cisco MDS 9000 Family Pluggable Transceivers.

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