Cisco MDS **9100** IP Series Fabric Switches

Cisco MDS 9100 Series Highlights

- Cost effective, intelligent storage networking: Advanced features in a compact cost-effective design simplify deployment and administration of small and medium scale storage area networks (SANs).

- Common platform architecture and intelligent services across all MDS 9000 Family switches ensures scalability and consistent service delivery as your SAN grows.

- Simplified storage management: The Cisco MDS 9100 Series includes built-in storage network management with all features available via CLI or Cisco Fabric Manager, a centralized management tool that simplifies management of multiple switches and fabrics.

- Intelligent network services: The Cisco MDS 9100 Series employs VSAN technology, Access Control Lists (ACLs) for hardware-based intelligent frame processing, and advanced traffic management features such as Fibre Channel Congestion Control (FCC) and fabric-wide QoS to enable migration from SAN islands to multilayer storage networks.

- TCO driven design: The Cisco MDS 9100 Series offers advanced management tools for overall lowest total cost of ownership (TCO). Virtual SAN (VSAN) technology for hardware-enforced, isolated environments within a single physical fabric for secure sharing of physical infrastructure, further decreasing TCO.

The Cisco MDS 9100 Series Fabric Switches—Layering Intelligent Features onto a Cost-Effective Compact Form-Factor.

MDS 9140 20-port Intelligent Fabric Switch

MDS 9140 40-port Intelligent Fabric Switch

- Comprehensive security framework: The Cisco MDS 9100 Series supports RADIUS authentication, SNMPv3, role-based access control, SSH, SFTP, FC-SP, VSANs, hardware-enforced zoning, and ACLs.
- Sophisticated diagnostics: Provides industry-first intelligent diagnostics, protocol decoding, and network analysis tools as well as integrated Call Home capability for added reliability, faster problem resolution, and reduced service costs.
- Industry leading port density. Up to 40 1-Gbps / 2-Gbps auto-sensing Fibre Channel ports in a compact design for environments requiring maximum port density per rack unit.
- Two options: Twenty and forty port configurations (MDS 9120, MDS 9140), packaged in a 1RU form-factor chassis with dual hot-swappable power supplies and fans provide the flexibility needed to address a broad range of deployment requirements.

Cisco MDS 9100 Series—Building Cost-Effective Intelligent Fabrics

The Cisco MDS 9100 Series elevates the standard for Fibre Channel fabric switches, bringing Cisco Intelligent Networking to small and medium scale SANs and Data Center edge applications. The MDS 9100 Series provides the ideal balance of cost performance and enterprise class features in a compact 1 RU form factor. Available in 20-port and 40-port configurations, the MDS 9100 Series offers the port densities required for a wide variety of storage environments. Providing class-leading scalability, availability, security, and management, the Cisco MDS 9100 Series allows you to deploy high performance storage-area networks with low total cost of ownership. Layering a rich set of intelligent features onto a cost-effective small profile switching platform, the Cisco MDS 9100 Series addresses the cost-performance, ease of management and connectivity requirements of small and medium scale storage environments and provides full feature compatibility with Cisco MDS 9500 series directors for seamless end to end service delivery in large data center core-edge deployments.

Optimized Connectivity

MDS 9100 Series switches optimize connectivity by matching switch port performance to the requirements of connected devices. Target-optimized ports are configured to meet the bandwidth demands of high performance storage devices, servers and inter-switch links (ISLs). Host-optimized ports deliver best in class port density and optimal bandwidth for host-attach. The MDS 9120 model switch is configured with 16 host-optimized ports and 4 target-optimized ports. The MDS 9140 model switch is configured with 32 host-optimized ports and 8 target-optimized ports. MDS 9100 Series switches include hot-swappable, small form-factor pluggable (SFP), LC interfaces. Individual ports can be configured with either short or long wavelength SFPs for connectivity up to 500m and 10km, respectively. Available CWDM SFPs support aggregation of multiple links onto a single optical fiber through a low cost passive optical multiplexor/demultiplexor. All interfaces are auto-sensing 1-Gbps / 2-Gbps compatible. Up to 255 buffer credits per port are supported on target/IS-optimized ports for maximum extensibility without the requirement for additional licensing. Host-optimized ports support 12 buffer credits per port.

Virtual Output Queuing

Cisco MDS 9100 Series switches improve system level performance with hardware-enabled virtual output queuing (VOQ). Storage area networks are often configured with a small number of target devices providing services to a large number of host devices. This fanout can lead to network congestion resulting in increased I/O latency. In a typical Fibre Channel switch, congestion on a single output port can impact traffic throughout the network through a condition called head of line blocking. MDS 9000 Family switches eliminate head of line blocking by providing dedicated virtual output queues for each port on the switch. VOQ helps to ensure consistent performance through the switch while minimizing the impact of port or device congestion.

Virtual SAN

The Cisco MDS 9100 Series brings Virtual SAN technology to cost-sensitive fabric environments. VSANs allow more efficient SAN utilization by creating hardware-based isolated environments within a single SAN fabric. Each VSAN can be zoned as a typical SAN and maintains its own fabric services for added scalability and resilience. VSANs allow the cost of SAN infrastructure to be shared among more users, while assuring absolute segregation and security of traffic and retaining independent control of configuration on a VSAN-by-VSAN basis.

Comprehensive Security

Recognizing the need for airtight security in storage networks, the Cisco MDS 9100 Series applies extensive security measures at all possible points of attack. SSH, RADIUS, SNMPv3, and Role Based Access Control are employed against unauthorized management access. To guard against compromising control traffic, Fibre Channel Security Protocol is employed. FC-SP provides confidentiality, data origin authentication, and connectionless integrity across the fabric. Data plane traffic is secured with VSANs, guaranteeing segregation of traffic across shared fabrics, and with zoning to satisfy traffic segregation requirements within a VSAN. Hardware-based ACLs provide further granularity for advanced security options. The Cisco MDS 9100 Series leverages Cisco's experience securing the world's most sensitive data networks to deliver the industry's most secure storage networking platform.

Advanced Diagnostics and Troubleshooting Tools

Cisco MDS 9100 Series switches include advanced network analysis and debug tools. For fault management in large-scale storage networks, the Cisco MDS 9100 Series delivers commands such as FC Traceroute for detailing the exact path and timing of flows and uses Switched Port Analyzer (SPAN) to efficiently capture network traffic. Once traffic has been captured, it can then be analyzed with Cisco Fabric Analyzer, an embedded Fibre Channel analyzer. In addition, integrated Call Home capability is provided for added reliability, faster problem resolution, and reduced service costs. With the Cisco MDS 9100 Series, Cisco delivers the most comprehensive toolset for troubleshooting and analysis of an organization's storage network.

Availability

The Cisco MDS 9100 Series Multilayer fabric switch was designed from the ground up for class-leading availability. Hot—swappable redundant fans and power supplies and the unique ability to automatically restart failed supervisor processes combine to define a new standard for fabric switch availability. High availability is implemented at the fabric level via the industry's most robust and highest performance ISLs. PortChannel capability allows users to aggregate up to 15 physical links (MDS 9140) into one logical bundle.. The bundle can sustain the failure of any physical link without causing a reset. Additionally, Fabric Shortest Path First (FSPF) multipathing provides the intelligence to load balance across up to 15 equal cost paths (MDS 9140) and, in the event of a switch failure, to dynamically reroute traffic. The Cisco MDS 9100 Series takes fabric switch availability to a new level, minimizing TCO.

Ease-of-Management

Delivering on the promise of SANs means delivering on management capabilities. To meet the needs of all users, the Cisco MDS 9100 Series provides three principal modes of management: Cisco MDS 9000 Family Command Line Interface (CLI), Cisco Fabric Manager, and integration with third-party storage management tools. The Cisco MDS 9100 Series presents the user with a consistent, logical CLI. Adhering to the syntax of widely known Cisco IOS® CLI, the Cisco MDS 9000 Family CLI is easy to learn and delivers broad management functionality. The Cisco MDS 9000 Family CLI is an extremely efficient and direct interface designed to provide optimal functionality to administrators in enterprise environments. Cisco Fabric Manager is a responsive, easy-to-use Java application that simplifies management across multiple switches and fabrics. Cisco Fabric Manager enables administrators to perform vital tasks such as topology discovery, fabric configuration and verification, provisioning, monitoring, and fault resolution. All functions are available through a secure interface, which enables remote management from any location. Cisco Fabric 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.

Specifications

Performance/Port Configurations
- Port speed: 1-Gbps / 2-Gbps auto-sensing, optionally configurable
- Buffer credits: Up to 255 per port (target-optimized ports), 12 per port (host-optimized ports)
- Ports per chassis: 20 (MDS 9120), 40 (MDS 9140)
    – Port Configuration - MDS 9120: 16 host-optimized ports, 4 target-optimized ports
    – Port Configuration - MDS 9140: 32 host-optimized ports, 8 target-optimized ports
- Ports per rack: 1680 1-Gbps / 2-Gbps Fibre Channel ports (MDS 9140)
- PortChannel: Up to 7 ports (MDS 9120), Up to 15 ports (MDS 9140)
- Supported optics, media, and transmission distances

Fibre Channel Optics	Media	Distance
1-Gbps—SW, LC SFP	50/125 micron multimode	500 m
1-Gbps—SW, LC SFP	62.5/125 micron multimode	300 m
1-Gbps—LW, LC SFP	9/125 micron single-mode	10 km
1-Gbps—CWDM, LC SFP	9/125 micron single-mode	Up to 100 km
2-Gbps—SW, LC SFP	50/125 micron multimode	300 m
2-Gbps—SW, LC SFP	62.5/125 micron multimode	150 m
2-Gbps—LW, LC SFP	9/125 micron single-mode	10 km
2-Gbps—CWDM, LC SFP	9/125 micron single-mode	Up to 100 km

Security
- Virtual SANs (VSANs)
- Zoning
  - N_Port WWN
  - N_Port FC-ID
  - Fx_Port WWN
- Fibre Channel Security Protocol (FC-SP)
- Management access
  - SSH v2
  - SNMP v3

Minimum Software Requirement
- SAN-OS release 1.2(1)

Compatibility
- Fibre Channel Protocols
  - FC-PH, Revision 4.3
  - FC-PH-2, Revision 7.4
  - FC-PH-3, Revision 9.4
  - FC-GS-2, Revision 5.3
  - FC-GS-3, Revision 7.01
  - FC-FLA, Revision 2.7
  - FC-FG, Revision 3.5
  - FC-SW-2, Revision 5.3

- – FC-AL, Revision 4.5
- – FC-AL-2, Revision 7.0
- – FC-PLDA, Revision 2.1
- – FC-VI, Revision 1.61
- – FCP, Revision 12
- – FCP-2, Revision 7a
- – FC-SB-2, Revision 2.1
- – FC-BB, Revision 4.7
- – FC-FS, Revision 1.7
- – FC-PI, Revision 13
- – FC-MI, Revision 1.99
- – FC-Tape, Revision 1.17
- IP over Fibre Channel (RFC 2625)
- Extensive IETF-standards based TCP/IP, SNMP v3, and RMON MIBs
- Class of service: Class 2, Class 3, Class F
- Fibre Channel standard port types: E, F, FL
- Fibre Channel enhanced port types: SD, TE, TL

Fabric Services
- Name server
- Registered State Change Notification (RSCN)
- Login services
- Private loop
- Public loop
- Translative loop
- Broadcast
- In-order delivery
- Name server zoning

Diagnostics and Troubleshooting Tools
- Power-on-self-test (POST) diagnostics
- Online diagnostics
- Internal loopbacks
- SPAN
- FC Traceroute
- FC Ping

- FC Debug
- Cisco Fabric Analyzer
- Syslog
- Online system health
- Port-level statistics

Management
- Access methods
  - Out-of-band 10/100 Ethernet port
  - RS-232 serial console port
  - In-band IP-over-FC
- Access protocols
  - CLI—via console and Ethernet ports
  - SNMPv3—via Ethernet port and in-band IP-over-FC access
- Security
  - Role-based access control using RADIUS based AAA functions
  - TACACS+ (not sure if in 1.2 or later release)
  - VSAN-based roles
  - SSHv2
  - SNMPv3
- Management Applications
  - Cisco MDS 9000 Family CLI
  - Cisco Fabric Manager
  - CiscoWorks 2000 Resource Manager Essentials

Availability
- Stateful process restart
- Per VSAN fabric services
- Hot swappable 1+1 redundant power
- Hot-swappable 1+1 fan trays
- Hot swappable small form-factor pluggable (SFP) optics
- PortChannels (up to 7 ports MDS 9120, up to 15 ports 9140)
- Fabric-based multipathing
- Online diagnostics

Serviceability

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

Environmental

- Temperature, ambient operating
  - 32°F (0°C) to 104°F (40°C)
- Temperature, ambient non-operating and storage
  - −40°F (−40°C) to 158°F (70°C)
- Humidity (RH), ambient (non-condensing) operating
  - 10% to 90%
- Humidity (RH), ambient (non-condensing) non-operating and storage
  - 5% to 95%
- Altitude, operating
  - Sea level to 6500 feet (2000 m)

Physical Characteristics

- Dimensions (H x W x D)
  - 1.75 x 17.2 x 23.1 in. (4.45 x 43.7 x 58.7 cm) — 1RU
    - Rack mountable in standard 19 inch EIA rack.
- Weight
  - Fully configured chassis: 25 lb (11.4 kg)

Power and Cooling

- Power Supplies (300W AC) (two per chassis)
  - Input: 100–240VAC nominal (±10% for full range)
        12A maximum
        50-60Hz nominal (±3 Hz for full range)
  - Output: 300W (100VAC @ 12A)
        300W (200VAC @ 12A)

- Airflow
  - 250 linear feet per minute (lfm) average system velocity and 42 cubic feet per minute (cfm) total flow through system
  - Front to rear air flow

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

MDS 9120 Ordering Information

Part Number	Description
346700-B21	Cisco MDS 9120 Multilayer Fabric Switch 20-port, 1/2 Gb Fibre Channel Fabric Switch w/20 short wave transceivers
332313-B21	Transceivers, Small-Form-Factor-Pluggable, Long Wave 1 or 2 Gb Fibre Channel Long Wave Small Form Factor Pluggable Transceiver

MDS 9140 Ordering Information

Part Number	Description
346701-B21	Cisco MDS 9140 Multilayer Fabric Switch 40 Port, 1/2 Gb Fibre Channel Fabric Switch, w/40 short wave SFPs
332312-B21	Transceivers, Small-Form-Factor-Pluggable, Short Wave 1 or 2 Gb Fibre Channel Long Wave Small-Form-Factor-Pluggable Transceiver
332313-B21	Transceivers, Small-Form-Factor-Pluggable, Long Wave 1 or 2 Gb Fibre Channel Long Wave Small-Form-Factor-Pluggable Transceiver

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