Cisco MDS 9000 Family Statement of Direction

Storage Challenges and Trends

Companies today are facing an increasingly competitive environment in which speed of innovation is critical for their success. The capability to do more with less, and to do so faster, is becoming increasingly important. As our customers continue to look for points of differentiation in their markets, the SAN continues to play a vital role in enabling businesses to adopt new technologies and applications to help them grow. For many businesses, increased user expectations along with government regulations for data storage, backup, and recovery make 24-hour access to critical information imperative. The creation of data center infrastructure that is flexible, intelligent, and able to evolve rapidly with the growing demands and applications of today and tomorrow while protecting customer investments is essential.

Cisco Storage Networking Vision and Strategy

Multiprotocol storage networking is central to Cisco® Unified Fabric, providing a networking platform for IT departments to achieve lower total cost of ownership (TCO), enhanced resilience, and greater agility through the Cisco MDS 9000 and Cisco Nexus® Family of products and services. Multiprotocol storage networks start with the enterprise-class features, reliable performance, and comprehensive, mature functions of Fibre Channel SANs and extend them transparently to Ethernet environments, resulting in a single network with the flexibility to deploy both protocols at any point in the path between server and storage resources. This one elegantly simple network can be all Fibre Channel, all Fibre Channel over Ethernet (FCoE), or any mix of the two, adding IBM Fiber Connection (FICON), Small Computer System Interface over IP (iSCSI), and Fibre Channel over IP (FCIP) when needed.

The next generation of the Cisco MDS 9000 Family, an important component of the Cisco Unified Data Center, provides outstanding flexibility through multiprotocol innovations, unlike disparate solutions. The freedom of choice coupled with a single, proven operating system and management point enable evolutionary adoption and consistent SAN and LAN networking operations. Cisco services-oriented SAN applications enable centralized, storage-vendor-neutral solutions to customer needs, including data encryption, data migration, and acceleration of backup and replication performance between distant data centers.

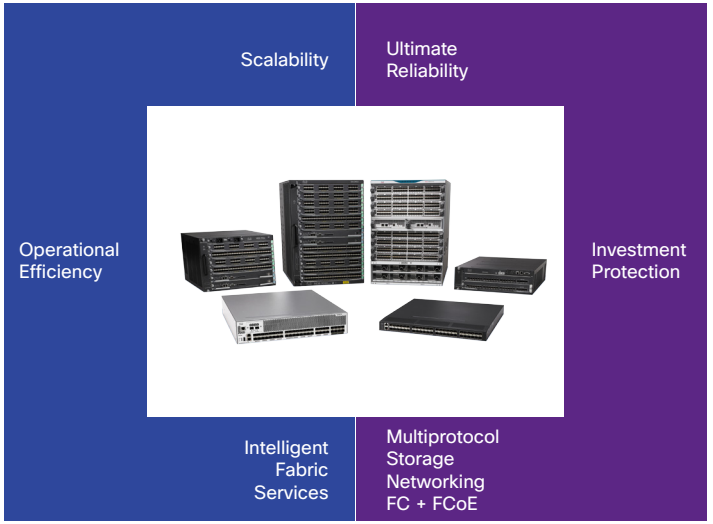
Market Leadership

The Cisco MDS 9000 Family has been deployed by thousands of customers worldwide in networks of varying sizes, supporting many of the most demanding application environments in the world.

Cisco Storage Networking Portfolio

Figure 1 shows the Cisco MDS 9000 Family portfolio.

Figure 1. Cisco MDS 9000 Family Portfolio



The new Cisco MDS 9710 Multilayer Director establishes a new benchmark for performance. It delivers more than three times the bandwidth of any director in the industry, providing storage connectivity into the future for mission-critical applications, massive amounts of data, solid-state drives (SSDs), and cloud-based environments, while preserving current IT operations and knowledge. Cisco extends the Cisco MDS 9000 Family heritage of nonstop decades of operations with the Cisco MDS 9710, providing the industry's most reliable storage director with N+1 fabric, fully redundant components, and fault-tolerant architectural design. The Cisco MDS 9710 is the industry's only 16-Gbps Fibre Channel SAN director that supports FCoE in the same chassis and is designed to scale in a multiprotocol environment.

Cisco MDS 9500 Series Multilayer Directors share a common architecture and line-rate 8-Gbps switching and services modules that are backward and forward compatible across the entire Cisco MDS 9500 Series. The same Cisco NX-OS Software data center operating system powers the Cisco MDS 9000 Family and the entire Cisco Nexus Family of Ethernet switches, as well as the Cisco Unified Computing System™ (Cisco UCS®) fabric interconnects. The Cisco MDS 9500 Series can bridge the Ethernet and Fibre Channel portions of a Cisco multiprotocol storage network, providing full access to all devices on the SAN regardless of how they are attached.

The Cisco MDS 9200 Series Multiservice Switches deliver state-of-the-art multiprotocol and distributed multiservice convergence, offering high-performance SAN extension and disaster-recovery solutions, intelligent fabric services, and cost-effective multiprotocol connectivity.

The Cisco MDS 9100 Series Multilayer Fabric Switches are cost-effective, scalable, easy to install, and highly configurable Fibre Channel switches that are excellent for small to medium-sized businesses. The Cisco MDS 9148 Multilayer Fabric Switch offers the most line-rate 8-Gbps ports in a one-rack-unit (1RU) form factor and includes a full set of enterprise features. Cisco MDS 9000 Family fabric switches are also available in blade switch form factors for popular blade server chassis from IBM and HP.

A complete portfolio of optics is supported. The Cisco MDS 9000 Family supports a variety of transport-layer technologies and distances, including integrated coarse and dense wavelength-division multiplexing (CWDM and DWDM) optics that eliminate the need for optical transponder equipment.

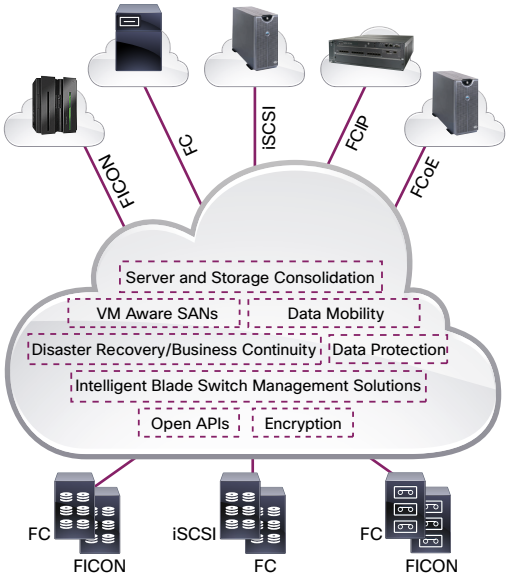
Cisco MDS 9000 Family Innovation

- **Innovative leadership in multiprotocol storage networking and Fibre Channel over Ethernet:** Cisco Unified Fabric consolidates separate LAN, SAN, and server cluster network environments into a single unified network. Multihop FCoE support in Cisco storage networks lets you mix and match Fibre Channel and FCoE anywhere in a SAN with the same scalability and management tools regardless of the protocol mix. This feature allows customers to adapt their SANs over time as they refresh old servers and storage resources and add new ones, all with the robust reliability for which the Cisco MDS 9000 Family has been known during its 10 years in the market.
- **Comprehensive end-to-end virtualization:** Expanded virtualization solutions at the network, server, and storage levels improve utilization and performance with unique features such as VSANs, built-in Inter-VSAN Routing (IVR), FlexAttach, N-Port ID Virtualization (NPIV), and F-port trunking that support end-to-end virtualized environments. The VMpath feature of Cisco Prime Data Center Network Manager (DCNM) provides path visualization, troubleshooting, and performance monitoring from the virtual machine all the way to the storage port.
- **Cisco UCS and Cisco Nexus integration:** The Cisco MDS 9000 Family offers superior integration with the Cisco Nexus Family and Cisco Unified Computing System. F-port PortChannels increase availability and provide load balancing across physical uplinks, and F-port trunking allows traffic from multiple VSANs to coexist on a single uplink or PortChannel. Cisco DCNM is designed to efficiently implement, visualize, and manage Cisco Nexus and Cisco UCS.
- **Services-oriented SANs:** The Cisco 9200 Series supports network-hosted storage services that can be extended to any SAN-connected host or storage device. This approach enables centralized, scalable performance of agile, reliable services to support changing customer needs in the virtualized data center. Features such as FCIP, Cisco I/O Accelerator (IOA), and Cisco Data Mobility Manager (DMM) address important customer needs related to data migration, backup, and replication. SAN extension over IP provides an integrated, cost-effective, and reliable business-continuance solution that uses the existing IP infrastructure.
- **Investment protection:** The Cisco MDS 9000 Family continues Cisco's tradition of delivering platforms with outstanding longevity due to forward-looking, state-of-the-art architectures, thus lowering operating expenses (OpEx) and capital expenditures (CapEx).

  The next stage in the evolution of the Fibre Channel SAN is its extension to Ethernet. FCoE is an extension of the Fibre Channel SAN to devices that connect to it over Ethernet. It takes full advantage of the extensive capabilities and customer administrative knowledge of Cisco multiprotocol storage networks acquired over years. Whether the network uses Fibre Channel or FCoE, it is all one network.

  The recently introduced Cisco MDS 9710 is designed with the future in mind. It currently supports 16-Gbps Fibre Channel, with 10-Gbps FCoE support expected soon. The platform is built to support 32-Gbps Fibre Channel and 40-Gbps FCoE at full line rate with the current chassis and fabric cards. As standards evolve, the platform can host connectivity at higher speeds and for greater overall bandwidth, keeping current investments usable for a long time.
- **Operational efficiency:** By implementing robust instrumentation, building advanced management applications, and exposing the network through standards-based interfaces, Cisco offers the most manageable storage networking platforms in the industry today (Figure 2). Cisco Prime DCNM provides a comprehensive feature set, along with a customizable dashboard that provides enhanced visibility and automated fabric provisioning of dynamic data centers.

Figure 2. Cisco MDS 9000 Family Architecture



Cisco Storage Networking Solutions

- **Storage consolidation and migration:** The Cisco MDS 9000 Family's industry-leading SAN features facilitate smooth migration and consolidation of multiple SAN islands into a centralized scalable SAN. The Cisco MDS 9000 Family interoperates with existing solutions, thus enabling transparent migration to a consolidated SAN.
- **Automation:** Cisco MDS 9000 Family fabrics can be managed by leading industry storage management solutions through the industry-standard Storage Management Initiative-Specification (SMI-S) and Simple Network Management Protocol (SNMP).
- **Disaster recovery and business continuance:** Cisco multiprotocol storage networking solutions support Fibre Channel and FCIP SAN extension, hardware-based compression and encryption, and Cisco IOA.. PortChannels between sites can include links of widely varying lengths, enabling logical connections to withstand the loss of an entire data path through a redundant set of connections.
- **Data migration:** Cisco DMM transparently enables online data migration within the data center or between storage arrays in geographically disparate locations.
- **IBM FICON I/O infrastructure:** A reliable and highly available FICON infrastructure facilitates consolidation and scaling and disaster-recovery solutions. Advanced IBM FICON services include FICON Tape Acceleration of read and write operations, XRC (z/OS Global Mirror) Acceleration, cascaded FICON fabrics, VSAN-enabled intermix of mainframe and open systems environments, Geographically Dispersed Parallel Sysplex (GDPS) support, and N-Port ID virtualization for mainframe Linux partitions and virtualized zBX systems.

Cisco MDS 9000 Family: Looking Forward

Cisco is committed to delivering innovative new capabilities to the Cisco MDS 9000 Family. Primary areas of focus for ongoing development efforts include:

- **32-Gbps Fibre Channel:** 32-Gbps technology for the Cisco MDS 9000 Family is already under development.
- **FCoE:** FCoE support for intelligent SAN services will be enhanced. FCoE hardware support will be added to the Cisco MDS 9000 Family fabric switch portfolio, and higher-speed FCoE modules will be developed for Cisco MDS 9000 Family directors. 10-Gbps FCoE high-density cards are under development, and 40-Gbps FCoE is being considered for future development.
- **Software Defined Networks:** Future support is planned for the Cisco Open Network Environment (ONE) Platform Kit (onePK) API, an easy-to-use developer's toolkit for innovation, automation, and service creation. Cisco onePK delivers the benefits of network programmability on Cisco switches by allowing you to tie your network more effectively to changing application needs, providing improved business agility and decreased OpEx.

For More Information

- www.cisco.com/go/mds
- www.cisco.com/go/dc