



Storage Challenges and Trends

Data center infrastructures are rapidly evolving to keep up with growing demands of new applications, improved resilience, and business responsiveness while minimizing overall power consumption. A highly competitive environment, with government regulations for data recovery, makes round-the-clock access to critical information imperative for many businesses. Storage costs continue to grow faster than server costs, resulting in the need for more efficient and cost-effective storage and lifecycle management.

Cisco Storage Networking Vision and Strategy

Storage networking is central to the Cisco® Data Center 3.0 architecture, providing a networking platform for IT departments to achieve lower total cost of ownership (TCO), enhanced resilience, and greater agility through Cisco MDS 9000 Family products and services.

Cisco MDS 9000 Family Market Share

Cisco is the industry leader in modular storage area network (SAN) revenue share (DellOro, Q4CY07) and is rapidly increasing its market share. The Cisco MDS 9000 family has been deployed by **thousands of customers** worldwide in networks of varying sizes.

Cisco MDS 9000 Family Innovation

Storage network as a platform for intelligent services:

The Cisco MDS 9500 Series and 9200 Series supports network-hosted storage services that can be extended to any SAN-connected host or system. By providing open APIs for Cisco and third-party applications, the Cisco storage networking platforms allow storage services to be deployed transparently. This approach enables scalable performance, and reliable service to support changing customer needs.

Innovative leadership with Unified I/O and Fibre Channel over Ethernet:

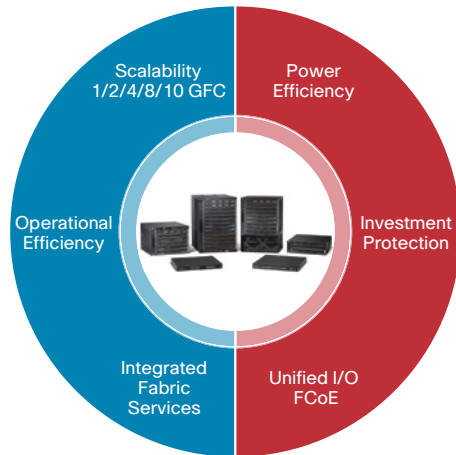
Unified Fabric and Unified I/O helps to consolidate separate Local Area Network (LAN), Storage Area Network (SAN) and server cluster network environments into a single unified network. Unified I/O at the port and cable level is an important benefit of a unified fabric. The transition from today's multiple heterogeneous data center networks to the unified data center network of tomorrow will be an evolution that will happen in phases.

Cisco is helping lead this transition in the standards organizations, working to define the protocol suite that will be the foundation for the new unified data center. An important pillar of this foundation is Fibre Channel over Ethernet (FCoE). FCoE allows Fibre Channel frames to be encapsulated in Ethernet packets without using TCP/IP and is one of the technologies enabling unified I/O.

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 MDS chassis shipped in 2002 supports 8G and FCoE!

Operational efficiency: By implementing rich 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.

Cisco Storage Networking Portfolio



Cisco MDS 9500 Series Multilayer Directors share a common architecture, the Cisco MDS 9000 SAN-OS operating system, and switching and services modules that are backward and forward compatible throughout the entire Cisco MDS 9500 Series Multilayer Directors and 9200 Series Multilayer Fabric Switches.

Intelligent Fabric Applications (such as Continuous Data Replication, Storage Media Encryption (SME), Data Mobility Manager, Network-based Volume Management) address important customer concerns related to storage provisioning, security, data migration and replication, backup and recovery, storage utilization, and increasing storage costs.

Cisco MDS 9200 Series delivers state-of-the-art multiprotocol and distributed multiservice convergence, offering high-performance storage area network (SAN) extension and disaster recovery solutions, intelligent fabric services and cost-effective multiprotocol connectivity.

The Cisco MDS 9100 Series Fabric Switches and Blade Switches are cost effective, scalable, easy to install, and highly configurable Fibre Channel switches that are ideal for small to medium-sized businesses. The fabric switches are also available as blade switch form-factors for the market-leading blade servers, including **IBM** and **HP** blade servers.

Cisco MDS 9000 Family: Looking Forward

Cisco is committed to delivering innovative new capabilities to the Cisco MDS 9500 Series Multilayer Directors, including transparent upgrade to 8-Gbps Fibre Channel interfaces; high-performance, scalable, intelligent fabric applications; and unified I/O connectivity.

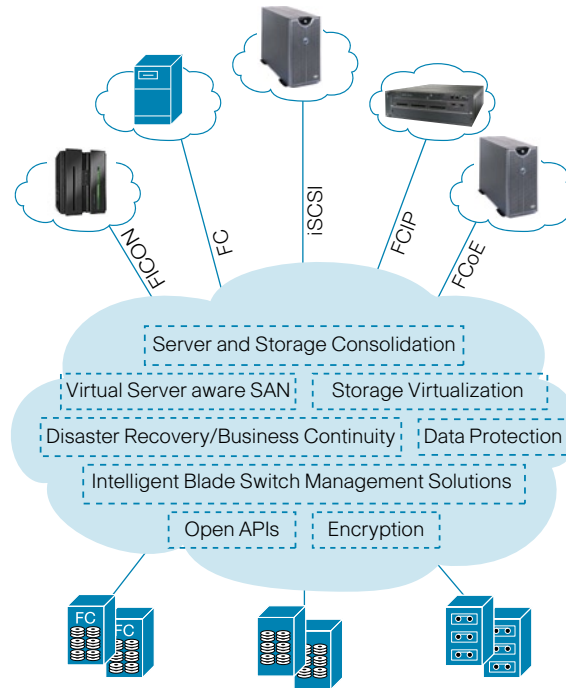
Main areas of focus for ongoing research and development efforts include the following:

- **Seamless upgrade to 8-Gbps technology:** Cisco MDS 9513, 9509, and 9506 chassis will support, without any limitation or need for a major upgrade, new 8-Gbps Fibre Channel switching modules, delivering higher bandwidth per slot and helping ensure continued investment protection for existing customers.
- **Scalable, high-performance Intelligent Fabric Applications:** Applications will be delivered as transparent services to help optimize network and storage utilization, protect data, and dramatically lower TCO. The Intelligent Fabric Applications enable the Cisco MDS 9500 and 9200 Series platforms to deliver fabric wide scalable applications such as Network-Based Volume Management, Storage Media Encryption (SME), Data Mobility Manager, Continuous Data Protection, SAN Extension, and I/O Acceleration.
- **Fibre Channel over Ethernet (FCoE):** Support for FCoE modules in existing Cisco MDS 9500 Series Multilayer Directors ensures coexistence with prior and future generations of Fibre Channel switching and service modules, extending flexibility and providing investment protection.
- **Enhancement to support Blade Servers and Virtual Machines:** Simplified management, end-to-end virtualization including virtual machines, virtual san, volume management, and enhanced blade switch and virtual machine resiliency.
- **Comprehensive end-to-end virtualization:** The expanded virtualization solutions at the network, server, and storage levels, improve utilization and performance with unique features (such as N port Identifier

Virtualization (NPIV, VSAN, F-port trunking) that support end-to-end virtualized environments

- **Complete portfolio of optics:** The solution supports a variety of transport layer technologies and distances.

Figure 2. Cisco MDS 9000 Architecture



Cisco Storage Networking Solutions

Storage Virtualization: Hosting virtualization intelligence in the actual fabric itself helps ensure the scalability and robustness of the solution. This approach allows data management activities such as provisioning, data migration, storage upgrades, and maintenance to be transparent for both physical servers and virtual machines.

Storage Consolidation and Migration: The Cisco MDS 9000 Family's industry-leading SAN features facilitate a smooth migration and consolidation of multiple SAN islands into a centralized scalable SAN. The Cisco solutions provide a better return on investment (ROI) by reducing costs and enabling easy deployment. The Cisco MDS 9000

Family interoperates with legacy solutions, thus enabling transparent migration to a consolidated SAN.

Automation: Cisco VFrame Data Center (DC) enables the coordinated provisioning and reuse of physical and virtualized computing, storage, and network resources from shared pools, using the network to help ensure that applications are dynamically supported throughout the infrastructure.

Disaster recovery and business continuance: Solutions support Fibre Channel and Fibre Channel over IP (FCIP) SAN Extension, hardware-based compression and encryption, and I/O Acceleration. The 2-Gbps, 4-Gbps, and 10-Gbps dense wavelength-division multiplexing (DWDM) 32-wavelength Optics dramatically reduce transport cost. Continuous Remote Replication and Continuous Data Protection solutions help provide immediate data recovery and reduced WAN expenses.

Data-at-rest Encryption: Cisco Storage Media Encryption offers data-at-rest encryption as a transparent fabric service for tapes and virtual tape libraries (VTLs), including comprehensive key management.

Data migration: Cisco Data Mobility Manager (DMM) transparently enables online data migration, within the datacenter or between storage arrays in geographically disparate locations.

FICON SAN infrastructure: A reliable and highly available FICON infrastructure facilitates consolidation and scaling and provides disaster recovery solutions. Advanced FICON services include cascaded FICON fabrics, VSAN-enabled intermix of mainframe and open systems environments, and N_Port ID virtualization for mainframe Linux partitions.

For More Information

- www.cisco.com/go/storage
- www.cisco.com/go/dc
- www.cisco.com/go/datacenter