



## Cisco's Big Jump Into Storage Networking — The New *MDS 9000* Family Of Switches

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### Management Summary

Imagine a swimming pool full of kids playing on a sunny, hot day. There are splashes, giggles, balls flying, snorkels, and a host of other fun things to pass away a summer afternoon. **Then dad steps into scene, walks onto the diving board, and bounces a couple of times to prepare for the Cannonball.** Everybody pauses to watch. He launches his mass into the air, curls into a ball, and *KASPLASH* – the sound of hitting the water is somewhere between a loud slap and a thud. Water splashes everywhere and on everyone, and mini-tidal waves bounce around the pool.

This spectacle is not unlike Cisco's entry into storage networking. The market for networked storage has blossomed into a sizable industry with a bright future. **The main reason is that it is a more efficient and cost-effective approach to handling the vast data requirements of the Information Age.** While Cisco is the giant of data networking and the Internet, until now it has only dipped its toe into storage area networks (SANs).

**The announcement of the new Cisco *MDS 9000* family of storage switches is an all-out plunge.** It includes both director-class and fabric switches that support Fibre Channel (the current de facto SAN standard) plus the up-and-coming IP protocols of iSCSI and FCIP. More than me-too products, the Cisco switches will actually deliver industry-leading features in several areas:

- **Scalability per director** – Up to 256 ports in one chassis (i.e., one hop) for creating large SANs with better cost and performance characteristics,
- **High internal bandwidth** – Up to 1.44 Tbps of internal bandwidth (10 Gig ready),
- **Virtual SAN** – For creating completely isolated SAN partitions (even from faults),
- **IP storage** – Extends storage connectivity into the LAN/WAN,
- **Advanced security** – Enforced along multiple fronts,
- **Quality of service** – Data traffic prioritization and optimization by port,
- **Diagnostics and repair** – Built-in traffic and protocol analysis, and
- **Network-hosted applications** – For running data and storage management applications.

**These various technical features can translate into more robust and cost-effective networked storage and greater value to the enterprise.**

So there is another SAN switch vendor making big waves in the pool. The Cisco products will become generally available in phases starting at the end of this quarter. Read on for a closer look at the *MDS 9000* family as well as issues to consider when evaluating it.

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## Cisco Jumps In

Cisco's big jump into storage networking has caught everyone's attention – it is the talk of the town. This market has been gaining momentum for the last several years. In fact, it will soon cross the 50% threshold and represent the majority of external storage sales, if it has not already. **It is a hot growth market because, at a time in history of rapid information growth and ballooning storage budgets, networked storage delivers a much lower storage total cost ownership (TCO) than its predecessor, direct-attach storage (DAS).**<sup>1</sup> It satisfies a great need of the Information Age.

Now, Cisco is the worldwide leader in data networking equipment (i.e., LAN, WAN, Internet). **It is the networking industry's 800-pound gorilla. Storage networking is a relatively new market for Cisco, but it has designated it as one of four strategic growth technologies.** Cisco first dipped its toe into the deep waters of storage with the SN 5420 and 5428 storage routers<sup>2</sup>, which provide block-level storage access over an Internet Protocol (IP) network using the iSCSI standard.<sup>3</sup> While this would bring the game onto Cisco's home turf, it is a nascent technology whose full impact has yet to play out. The mainstream market is currently dominated by the high-performance Fibre Channel (FC)<sup>4</sup> transport, and there are a number of established vendors that include Brocade, McData, Inrange, and QLogic.

It is Cisco's recent entry into the FC market that has created such a splash. **By all appearances, its new MDS 9000 family of**

**storage switches will surpass or at least equal the best functionality of the established players in several key areas (*more on this later*).** The products are backed by the Cisco brand, its market influence and financial resources, and a stated willingness to be a winner in this market. **This is a head-on challenge to the existing players, and for enterprises, it's a new vendor worth considering, with some caveats.**

## The Cisco MDS 9000 Family

### Overview

**The Cisco MDS 9000 series is a family of multi-protocol, intelligent switches for storage networking.** More simply, they are building blocks for storage area networks (SANs). The product line includes robust director-classes switches and a fabric switch. They are modular, and customers can plug in their own choice of connectivity and other features with line card modules. The switches support FC, iSCSI, and FCIP protocols and can route data between them. Other protocols may be added in the future, such as FICON. They also offer advanced features for fabric and device management, security, quality of service (QoS), and (eventually) hosting of data and storage management applications.

The *MDS 9500* series directors are built for large, mission-critical SANs that require 99.999+% uptime and fast, non-blocking<sup>5</sup> performance. A crossbar-switch architecture delivers very high bandwidth. High availability features include redundant components, power and cooling management, hot-swappable modules, non-disruptive firmware upgrades, inter-switch link (ISL) trunking, and stateful failover and process restarts. Specific models are:

- **MDS 9513** – Up to 256 FC ports, 13 slots for modules
- **MDS 9509** – Up to 224 FC ports, 9 slots for modules
- **MDS 9506** – Up to 128 FC ports, 6 slots for modules

**The MDS 9216 is a midrange fabric switch with a base configuration of 16 FC**

<sup>1</sup> Networked storage simplifies management (the largest component of TCO), increases storage utilization, shrinks backup windows, and scales well to meet rising information requirements.

<sup>2</sup> See *Cisco SN 5428 Storage Router – The Time Has Come for Workgroup SANs* in **The Clipper Group Navigator** dated May 22, 2002, at <http://www.clipper.com/research/TCG2002018.pdf>.

<sup>3</sup> These products are, in effect, a bridge between Fibre Channel storage area networks (SANs) and data networks (LANs and WANs) using the ubiquitous, mature, and relatively inexpensive Internet Protocol (IP).

<sup>4</sup> See *Fibre Channel – The Defending Champion Has Staying Power* in **The Clipper Group Explorer** dated December 14, 2001, at <http://www.clipper.com/research/TCG2001012.pdf>.

<sup>5</sup> That is, actual bandwidth per port is not limited or attenuated as all of the ports are filled.

**ports plus one slot (up to 48 total FC ports).**

It is well-suited for medium-sized SANs and as an “edge” switch to fan-out to a large number of servers in a core-edge configuration.

**The plug-in modules for configuring the switches are interchangeable across the product line, providing flexibility and investment protection.** There are both 16- and 32-port FC modules (1 or 2 Gbps auto-sensing). The 16-port module delivers 2 Gbps of bandwidth to each port for full performance, while the 32-port module emphasizes economy with 4 Gbps delivered to 4-port groups. There is an 8-port, Gigabit Ethernet module for IP networking that supports iSCSI and FCIP. Finally, two storage services modules are in development that will run storage and data management applications in the SAN.

*Cisco Fabric Manager*, a JAVA-based graphical utility, and a Cisco-IOS-like CLI (command line interface) provide device and fabric management. Cisco also provides full management access via an API (application programming interface) so third-party software can support the MDS 9000 family. Early partners include IBM Tivoli and BMC.

**Advantages**

Though this is Cisco’s first foray into FC SAN switches, it is putting forward a product line that improves upon or at least matches the current state-of-the-art along several dimensions:

- **Scalability per director** – In one chassis, the MDS 9513 scales to 256 ports, which minimizes or eliminates ISLs required for large SANs. ISLs are necessary to create larger fabrics from smaller switches, but they reduce the number of usable ports (increasing net cost per port) and can impact the aggregate bandwidth and performance.
- **High internal bandwidth** – The 9500 series delivers a whopping 1.44 Tbps of internal bandwidth when configured with redundant controllers. This level is high enough to support 10 Gbps FC or Ethernet when the technologies become available in the future.

- **Virtual SAN** – The VSAN feature, inspired by VLANs in IP networks, is unique to Cisco. It subdivides a large network into multiple, logical SANs that are as isolated as physically separate fabrics, which is useful for environments with multiple departments or “customers”. Traffic cannot pass between VSANs and even faults are isolated because of separate zone servers, name servers, and FSPF<sup>6</sup>.
- **IP storage connectivity** – The iSCSI and FCIP protocols provide connectivity over IP networks. iSCSI can offer less-expensive storage access for midrange and workgroup servers that do not require the highest performance. FCIP provides long-distance connections (i.e., WAN/MAN) for backup, archiving, and disaster recovery.
- **Advanced security** – SAN security is enforced along multiple fronts that include role-based administrator access, secure management and SAN protocols (SSH, SFTP, SNMPv3, FC-ESP), server authentication for iSCSI (RADIUS), VSANs, and hardware zoning.
- **QoS** – Data traffic prioritization and optimization features help deliver more granular and consistent service levels to applications.
- **Diagnostics and repair** – Built-in port traffic analysis, route tracing, protocol analysis, and proactive call home are sophisticated features for network diagnostics and repair.
- **Network-hosted applications** – The SAN provides a common ground from which to run applications that can encompass all servers and storage arrays and, therefore, deliver more value to the enterprise.<sup>7</sup> Potential applications include volume management/virtualization, point-in-time copy, and remote mirroring.

<sup>6</sup> Fabric Shortest Path First automatically selects the most efficient routes for transferring data in a multi-switch environment.

<sup>7</sup> For more details about why and how, see *Intelligent Storage Networks – Creating A More Cost-Effective Storage Infrastructure* in **The Clipper Group Explorer** dated February 22, 2002, at <http://www.clipper.com/research/TCG2002006.pdf>.

### ***Business Benefits***

At the end of the day, the purpose of an IT solution is to make an enterprise more effective at accomplishing its goals by improving business processes. Corporate goals are often measured in terms of profitability (revenue minus costs), productivity (revenue per employee), and customer satisfaction. **The MDS 9000 advantages listed above work to lower technology acquisition costs, lower operating costs through simplified management, and improve access to information.** These benefits directly support corporate goals and, therefore, can help an enterprise be successful.

### ***Availability and Pricing***

The MDS 9216, MDS 9509, and the FC modules will be generally available by end of Q1 2003. The MDS 9506, MDS 9513, and the IP module will follow later, in the first half of the year. The storage service modules are slated as a future release. To date, IBM and HP have publicly committed to resell the product line, and other players in the storage industry will certainly follow suit. Director list pricing is in the range of \$2,000 per port.

### **Consider Your Starting Point**

Enterprises in the market for SAN equipment should evaluate Cisco's offering on its own merits – its products, services, solutions, and vision for storage networking. This is relatively straightforward. **But if your enterprise already has SAN infrastructure in place, then considering another brand (Cisco, in this case) also raises interoperability and management issues.**

The fact is that FC switches from different vendors may interconnect, if they conform to standards and have been qualified, but advanced features like hardware zoning (or VSANs), security, QoS, traffic management, trunking, etc., are vendor-specific and not shared between heterogeneous fabrics. Like oil and water, they don't mix. So if you like Cisco's feature set, be aware that it will not apply to the existing fabric. And if you run two fabrics, there will be incremental management overhead and training costs, though SAN management software is available that can mitigate this. **Enterprises in this position will have to decide if the**

**incremental benefits of Cisco outweigh the cost of either (1) trading out existing equipment and transitioning to an all-Cisco network, or (2) running two separate SAN fabrics.**

### **Conclusion**

The industry is just beginning to feel the waves of Cisco's big jump into storage networking. **Time will tell how much water it can displace – that is, how much market share and how many customers it can win.** While storage and data networking are different animals, and success in one does not necessarily imply success in the other, **Cisco's expertise in IP is a leverage point.** It can more readily bring IP's advantages in areas like QoS, traffic management, and security to its younger sibling, the SAN. Plus Cisco can credibly paint a future vision of a unified enterprise network, or at least two interconnected networks under a common management umbrella. This is a compelling idea in an increasingly networked world. **In any case, Cisco's desire and commitment to become a top-tier player in storage networking is plain to see.**

Though Cisco's SAN switches are new to the scene, their splash is big enough that you cannot help but get a little wet. They fit well in the midrange and high end. **Therefore, enterprises that want to deploy a medium-sized to large, data-center SAN should take a look at the new MDS 9000 family.**



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