Building **Intelligent** Storage Networks

More data will be created in the next three years than in the last 40,000 years. This fact is often quoted to illustrate the dramatic acceleration of information accumulation. Corporations are grappling with this growth on a daily basis. For many companies, storage requirements are doubling every year, and managing this growth is a competitive necessity. Nonstop access to business applications such as supply-chain management, customer care, and workforce optimization requires replication of data across multiple data centers and instant accessibility of that data from anywhere on the network.

Exponential information growth has led to three important trends in the storage market: the transition from direct-attached to networked storage, the movement from discrete storage-area network (SAN) silos to interconnected SANs, and the growth of SANs in small-to-medium businesses (SMBs).

Consider the first trend, the transition from direct-attached storage (DAS) to SAN. A traditional DAS architecture holds information captive in servers or storage subsystems. By migrating to SANs, storage resources can be consolidated, shared, and centrally managed. Storage networking increases capacity utilization, availability, and manageability of storage systems. As a result, the total cost of ownership (TCO) for storing information decreases. In fact, according to *The Storage Report*, a 2001 study by McKinsey and Merrill Lynch, networked storage results in a 55-percent total cost savings versus DAS over a three-year period.

This explains why networked storage is the fastest-growing segment of the storage market. Today, two-thirds of all storage is still direct attached, whereas only one-third is networked. Within three years, that ratio will be reversed.

The increased adoption of storage networks leads to the second important trend: the migration from discrete SAN silos to interconnected SANs. Today, many Fibre Channel SANs are deployed as independent silos, segregated by application or organization. Current product limitations such as lack of scalability, manageability, and security make it difficult—if not impossible—to build large-scale SANs. The critical need for business continuance, disaster recovery, and increased capacity utilization across the organization has made remote SAN connectivity a business imperative. To enable this, customers must be able to connect SAN islands within the data center and across geographically dispersed sites in a reliable, secure manner.

The third trend is that small and medium businesses are installing applications for Customer Resource Management, Sales Force Automation, Document Imaging, and Enterprise Resource Planning in order to more cost-effectively compete in the digital economy. These applications cause a tremendous growth in storage as they allow SMBs to store and analyze information on their customers, their supply chain, and their corporation. As the demand for storage grows for SMBs, the need for increased storage utilization, easier storage management, and improved business continuance solutions requires these businesses to purchase innovative, cost-effective SAN solutions.

Cisco is driving this innovation by introducing storage networking products with multiple layers of network and storage intelligence. By moving intelligence into the storage network, centralizing management, and introducing some familiar networking concepts to storage networking, Cisco is providing customers with the ability to build and manage integrated SAN infrastructures and to realize the significant financial and operational benefits of integrated storage networking.

The Cisco MDS 9000 Series for Enterprise Customers

The Cisco MDS 9000 Series of multilayer storage networking switches integrates numerous important storage networking innovations to deliver an intelligent, open platform. These switches support multiple storage connectivity protocols, including 1- and 2-Gbps Fibre Channel, Internet Serial Computer Systems Interface (iSCSI) and Fibre Channel IP (FCIP), networking services such as virtual SANs (VSANs), and network-based storage services such as virtualization, which are all unified by integrated management applications. This powerful combination enables companies to build highly scalable, available storage networks with comprehensive security and unified management.

With the Cisco MDS 9500 Series, Cisco is redefining the director-class storage switch. Available in 6-, 9-, and 13-slot configurations, the Cisco MDS 9500 Series supports up to 256 1- and 2-Gbps autosensing Fibre Channel ports in a single chassis and up to 768 Fibre Channel ports per rack. The scalable architecture supports high-availability hardware and software features and provides 1.44 terabits of internal system bandwidth, ensuring readiness for future 10-Gbps integration. The product line delivers industry-leading scalability, port density, and availability, providing outstanding investment protection and the ability to build and support integrated SAN infrastructures.

The Cisco MDS 9216 Multilayer Fabric Switch brings new functionality and investment protection to the fabric switch market. Sharing a consistent architecture with the Cisco MDS 9500 Series, the Cisco MDS 9216 offers the same multilayer intelligence in a modular fabric switch. Starting with 16 1- and 2-Gbps autosensing Fibre Channel ports, the fabric switch expansion slot allows for the addition of any Cisco MDS 9000 Series module, for up to 48 ports in a single fabric switch. As a company's storage network grows, Cisco MDS 9000 modules can be removed from the Cisco MDS 9216 and migrated into Cisco MDS 9500 directors, providing smooth migration, common sparing, and investment protection.

The Cisco MDS 9000 Series includes built-in storage management with all features available via a command-line interface (CLI) or Cisco Fabric Manager. Cisco Fabric Manager is a responsive, easy-to-use application that simplifies management of multiple switches and fabrics with a centralized management tool. 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. In addition, integration with CiscoWorks Resource Manager Essentials (RME) provides ease of administration to improve customer productivity, and open application programming interfaces (APIs) provide integration with third-party SAN and network or system management platforms.

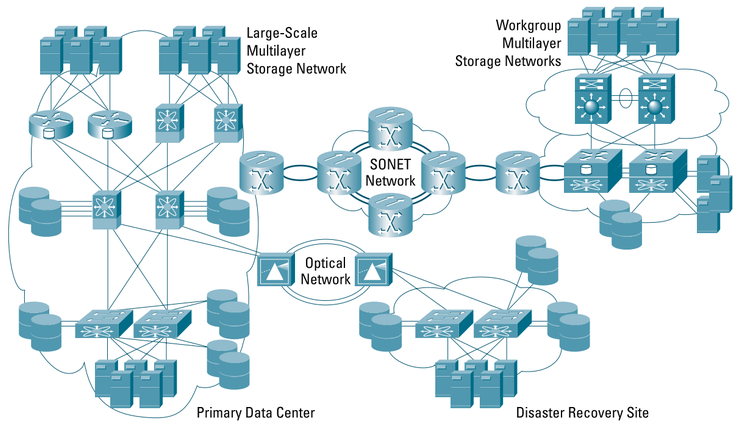
The Cisco 5400 Series for Small- and Medium-Sized Businesses

SAN deployment has eluded small and medium businesses because of the complexity and challenges of installing SANs. With the Cisco SN 5428 Storage Router, storage/network/system administrators are finally provided with an easy way to migrate from DAS to a more cost-effective and scalable networked storage solution. Unlike other workgroup SAN solutions that focus purely on Fibre Channel connectivity, the Cisco SN 5428 features a combination of both Fibre Channel and iSCSI technologies.

By deploying the Cisco SN 5428, administrators can utilize their installed base of Ethernet and IP connectivity and training to deploy a SAN solution at a fraction of the cost of installing a new Fibre Channel network. The Cisco SN 5428 provides two Gigabit Ethernet ports, supporting iSCSI and eight Fibre Channel fabric switch ports. Almost all servers can utilize iSCSI with the industry's broadest support of operating systems provided by Cisco's iSCSI software drivers. With Cisco's storage solutions for small and medium businesses, administrators manage their SANs with familiar IP network management features such as Simple Network Management Protocol (SNMP) and virtual LANs (VLANs). SMBs can also create secure storage pools by using devices such as access control lists (ACLs), RADIUS and TACACS+ authentication, LUN mapping, LUN masking, and Fibre Channel zoning.

The Cisco Portfolio of Intelligent Storage Networking Solutions

The Cisco MDS 9000 Series and the Cisco 5400 Series complement all Cisco products, including IP storage networking and metro optical solutions. Cisco Metro Optical products provide connectivity across the metropolitan-area network (MAN) for connectivity between a primary data-center SAN and a disaster recovery site. With multiple protocol support and multiple layers of network and storage intelligence, Cisco's storage networking solutions can meet storage networking requirements for customers of any size and in any phase of SAN deployment. Backed by Cisco's proven networking expertise, storage technology innovation, and leadership in driving industry standards, Cisco is ushering in a new era of storage networking.



For more information, including storage case studies and white papers, please visit: www.cisco.com/go/storagesolutions

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Wireless Retail™ Builds Multiprotocol SAN to Eliminate Storage Growth Pains

Wireless Retail, based in Scottsdale Arizona, is one of the nation's top five retailers of wireless products and services. The company has over 1,400 retail locations throughout the United States and more than 4,500 employees. Wireless Retail has experienced significant growth by using its "store-in-a-store" concept that places a professionally staffed Wireless Retail kiosk in major retail stores such as Wal-Mart, Sam's Club, Kmart and Menards. The company's "store-in-a-store" business model has fueled tremendous growth for Wireless Retail, resulting in the addition of more than 1,000 retail locations in the last two years.

The Challenge

Wireless Retail's growth greatly increased the need for storage on its direct-attached storage servers, some of which were quickly running out of storage space. Additionally, in order to better manage the increasing flow of paper contracts into their Scottsdale headquarters, Wireless Retail was planning to add a document imaging system. This system would allow Wireless Retail to access scanned images of contracts rather than having to find the actual paper copies of contracts, saving the company significant time and money in the handling of hard-copy contracts. Wireless Retail was expecting its current 1.5 Terabytes of data to double in the next two years.

The Solution

In order to better manage their storage growth, Wireless Retail began to look at SAN solutions. A Cisco multiprotocol SAN solution allowed Wireless Retail to build a cost-effective SAN that allowed them to dynamically add disk storage to servers as their storage needs grew and to accommodate the additional storage required for the planned document imaging application.

"To meet our growing storage needs, we needed to move to a consolidated storage pool. Only the Cisco SN 5428 allowed us to keep our servers on the IP network using iSCSI while using Fibre Channel technology to connect our new pool of disk storage. Keeping our servers on the IP network allowed us to greatly reduce the cost of our SAN implementation," said Chris McMahan, CIO at Wireless Retail, Inc.

With its ability to support both iSCSI and Fibre Channel protocols, the Cisco SN 5428 allows Wireless Retail to cost-effectively connect most of their servers into the SAN using Gigabit Ethernet while having Fibre Channel ports for storage and high performance servers. This combination allowed Wireless Retail to install a SAN with its current staff that had IP knowledge, but little fibre channel knowledge. The Cisco SN 5428 also has ACLs and server authentication that allows Wireless Retail to restrict server access to only the specific LUNs and targets that the server has authorization to access.

Wireless Retail has been able to achieve the benefits of a SAN including: easier storage management, the capability to add storage dynamically and the ability to add additional storage-intensive applications by implementing an Intelligent Storage Network with the Cisco SN 5428.