

WHITE PAPER

Services in the SAN: Enhancing the Value of IT Assets in the Virtualized Data Center

Sponsored by: Cisco

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EXECUTIVE SUMMARY

The rapid consolidation of servers, storage, and networks, as well as organizations' desire to optimize IT system deployment and management in more efficient data centers, is reshaping how enterprises architect and acquire their core IT assets. It is also affecting the way IT organizations manage and introduce new capabilities into their data centers.

One of the key elements in this new approach is the unification of the SAN and data center network, which can reduce cabling complexities, lower network configuration costs, and deliver more predictable/reliable network performance. In addition, the intelligence and management capabilities built into these networks must play a pivotal role in helping organizations maximize the reliability and utilization of their virtualized storage and server assets.

As a leading provider of SAN and data center network solutions, Cisco is addressing this need with the introduction of its Services Oriented SAN solutions. These services can help enterprises address a range of critical requirements:

- Implementation of enhanced information security and data privacy processes
- Automation of application/data migration and movement activities across pools of virtualized IT assets
- Reduction in the cost of implementing business continuity policies within and between data centers

Most important, enterprises can use these Services Oriented SAN solutions to selectively and nondisruptively extend key services to all server and storage environments across increasingly virtualized data centers.

THE EVOLVING ENTERPRISE DATA CENTER

An efficient and strategic data center is the critical facilitator of the modern, extended enterprise in these challenging economic times. It is the key to spurring collaboration, communication, and innovation while also significantly reducing the cost of acquiring and operating IT assets.

Three forces are shaping the future evolution of the modern data center:

- ☒ Wholesale virtualization/consolidation of server, storage, and network environments within (the virtualized data center)
- ☒ Diversification of information sources and data management requirements (the information-rich data center)
- ☒ Optimization of IT system deployment (the efficient data center)

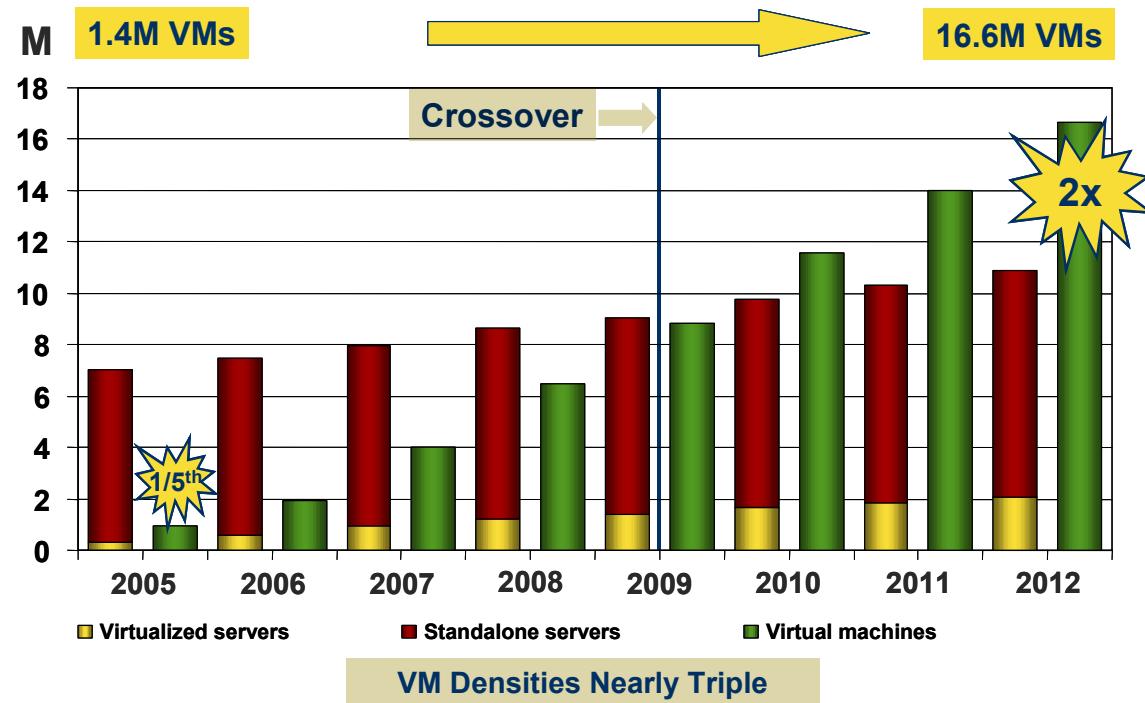
In combination, these three developments are reshaping how enterprises architect and acquire their core IT assets (servers, storage, and networks). They are also affecting the way IT organizations manage and introduce new capabilities into their data centers. They can't afford the time and effort associated with large scale "forklift" upgrades. Instead, they require solutions that make it easier to introduce new security, information management, and business continuity capabilities without disrupting existing systems and operations.

The Virtualized Data Center

The most visible technological transition in today's enterprise data center is the widespread adoption of server virtualization as part of major server consolidation efforts. With the economic difficulties of 2009, this transition is crossing a critical threshold (see Figure 1).

FIGURE 1

Worldwide Server and Virtual Machine Shipment Forecast, 2005–2012



Source: IDC, 2009

For the past several years, companies of all sizes exploited this technology to arrest server sprawl associated with test/development, general IT workloads, and proliferating departmental reporting applications. The severe capital expense restrictions of 2009, along with improvements in the performance of multicore physical servers and the manageability of virtualized servers, spurred more aggressive and extensive use of server virtualization, including wide use in production environments. Based on current server sales and deployment patterns, 2009 will be the first year in which enterprises of all sizes and in all countries deploy more new application servers as virtual machines than as dedicated physical servers.

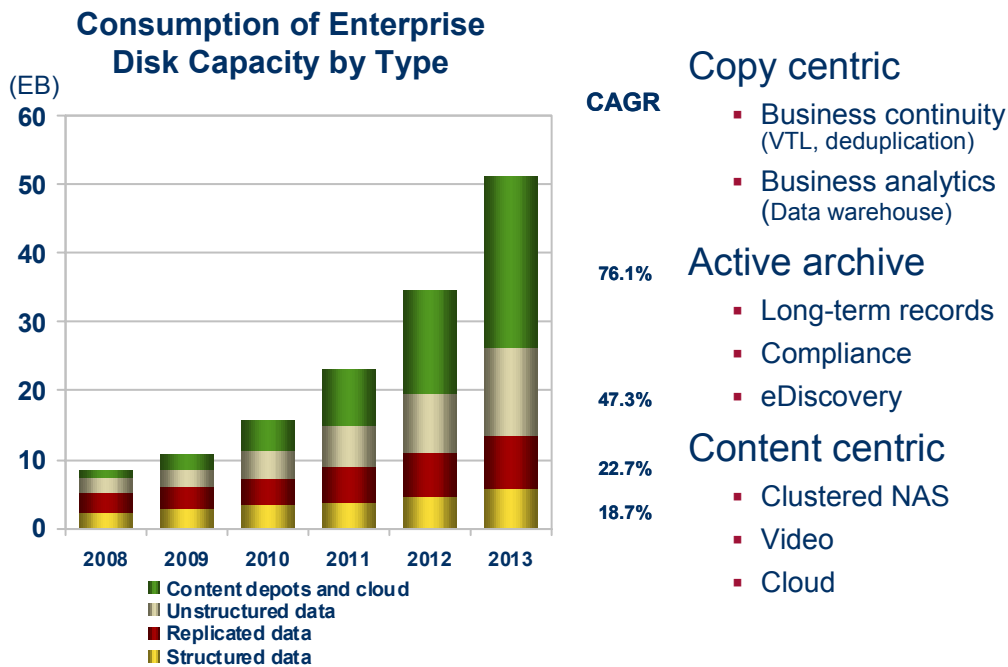
Within a few short years, the vast majority (>70%) of new and upgraded server deployments will be virtual servers. Given the normal churn of applications, it is quite clear that nearly all data centers in large and midsize enterprises will comprise primarily virtualized servers by 2011. Less visible, but of equal importance, is that other IT assets such as storage, networks, and even some desktop environments will also be transitioning to a more virtualized foundation. The challenge for IT executives will be to manage this transition in a way that optimizes up-front and long-term hardware and facilities investments.

The Information-Rich Data Center

Transactional applications such as ERP, CRM, and OLTP that typically create and access structured data remain major consumers of new storage capacity; however, new applications and IT use cases are now more voracious consumers of storage capacity in many enterprises (see Figure 2).

FIGURE 2

Changing Enterprise Data File: Development of Role-Based Storage



Source: IDC, 2009

These new applications and IT use cases include:

- ☒ Virtual machine images (for servers and desktops) that enable improved application availability, system recovery, and rapid provisioning
- ☒ Collaborative applications such as email and SharePoint
- ☒ Analytic and decision support applications such as data warehouses
- ☒ Digital image and video archiving systems

In this information-rich environment, customers and governmental organizations expect companies to quickly deliver the right information to the right person in a timely fashion. The collection, storage, and control of information assets are critical. Information must be protected from loss or misuse. New systems must directly address the rapidly expanding and increasingly diverse needs of organizations through a number of technology initiatives. The most significant are:

- ☒ Improvements in data access, reliability, and cost-effectiveness through adoption of new network technologies such as 8Gbps FC and FCoE running over 10GbE
- ☒ Logical abstraction (e.g., volume virtualization, thin provisioning, data deduplication) of physical storage elements
- ☒ Inclusion of data movement and security services to improve data protection, data privacy, and data compliance practices

These technology changes are already having positive effects on operational efficiency, scalability, and responsiveness to business requirements. As they are more broadly adopted, however, they are driving significant changes in storage system/network design, storage management processes, and storage administrator responsibilities. IT executives need a scalable, services-enabled networked storage solution that is an integrated part of the data center, not an impediment to growth.

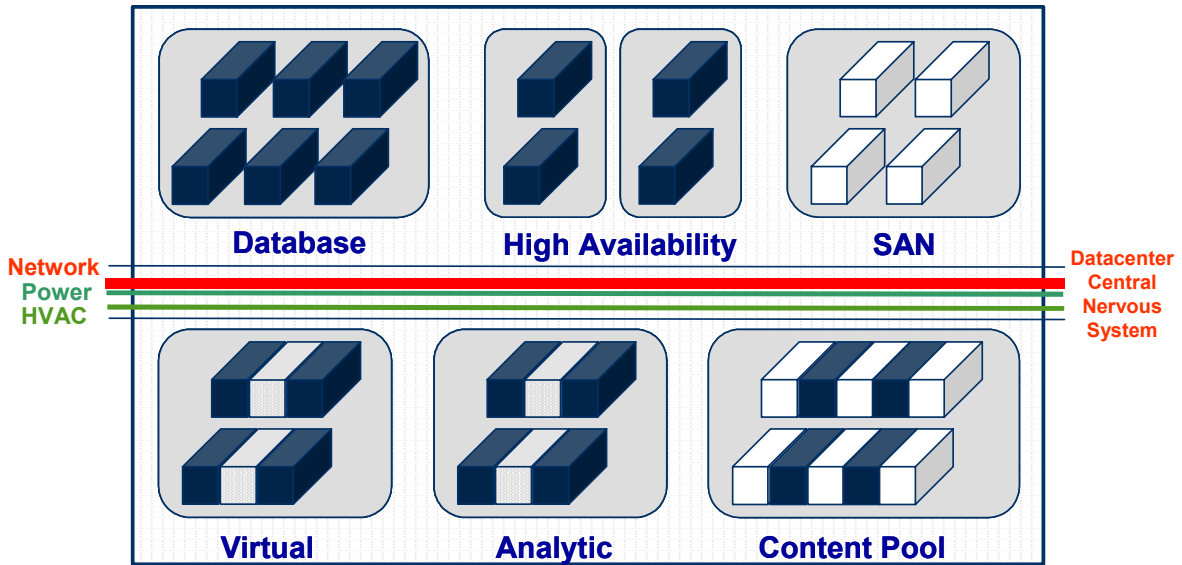
The Efficient Data Center

Large and midsize enterprises are consolidating their data centers through greater use of virtualization, networked storage, and rackmounted or bladed servers. When deployed effectively, these technologies improve data center density, minimize maintenance costs, and reduce facilities costs (e.g., power, HVAC, and cabling). Containerized data centers are the most obvious example of a modularized data center; however, the more useful approach for most organizations is the introduction of modular pods within a traditional data center environment (see Figure 3).

FIGURE 3

Data Center Buildout and Provisioning

The days of the monolithic data center are numbered



Unified Automated Data Movement Is Critical

Source: IDC, 2009

When enterprises ask about the optimal layout for this next-generation data center environment, IDC suggests that they deploy their IT assets (servers, storage, and networks) in modular, repeatable pods. This approach maximizes the return on capital investments while laying a foundation for rebalancing the mix of capital and operational expenditures.

In combination with server and storage virtualization, this dense, prewired pod can support hundreds to thousands of logical servers, a data/content repository with hundreds of terabytes of pooled storage capacity, and a high-performance data analytics and decision support system — all linked via a high-speed network.

THE CRITICAL ROLE OF THE NETWORK IN THE VIRTUALIZED DATA CENTER

The move to virtualized data centers reflects a major evolution in technology packaging, operational best practices, and changing investment priorities. The transition, however, poses its own challenges.

Virtualization Stresses Existing Data Center Networks

The use of server virtualization to drive real server consolidation was one of the major IT success stories of the past several years in many large and midsize enterprises. IT staffs won major kudos for reducing costs and boosting responsiveness to end-user requests for new and expanded applications. Despite this success, however, extensive use of server virtualization creates challenges for IT departments.

IDC has spoken to countless IT administrators who report that stress on existing storage provisioning and data protection practices leads to unanticipated spending on hardware, software, and network products. They often mention that connection of virtualized servers to existing data networks and SANs increases network/cabling complexity while also disrupting network performance and reliability.

Information Growth Drives Need for More Intelligent Networks

The digitization of information is also seen as a boon for employees and customers because the access to content and the move to disk-based data protection boost productivity and responsiveness while opening up new business opportunities. This information explosion, however, also creates a new range of problems:

- Excessive duplication of data
- Spiraling data migration and data replication costs
- Concerns about digital data security and privacy

Many companies are looking at a wide array of standalone storage appliances, each of which targets a specific problem (backup or encrypted data at rest), but IDC has spoken to many IT executives who worry that such an approach only complicates the management task. They would prefer a solution that addresses all of these needs through a common hardware and network foundation.

Using a Common Network Infrastructure to Deliver New Services Faster

IDC expects to see greater convergence of diverse network, SAN, and server interconnect environments across all data center environments. Based on existing investments, individual organizations will tend to use either 8Gbps FC or 10GbE (e.g., FCoE, iSCSI, NFS, or CIFS) networks as the starting point for convergence. The move toward standard network technologies delivers a number of benefits:

- Reduced cabling costs and complexities
- Lower network and storage configuration costs
- More predictable/reliable network performance

In this modular IT environment, the intelligence and management capabilities built into networks will also play a key role in helping enterprises maximize the reliability and utilization of their virtualized storage and server assets. More important, it will be a critical services delivery platform for introducing and expanding advanced services, including:

- ☒ Reducing the cost of implementing and scaling business continuity within and across data centers (data compression and WAN acceleration)
- ☒ Automating application/data migration and movement within and across modular data centers as well as the wider enterprise (automated data replication)
- ☒ Quickly and cost-effectively improving information security and data privacy processes (data encryption)

The remainder of this white paper assesses the data center network solutions from Cisco Systems and discusses how Cisco's products help companies make the move to more virtualized data centers. It also examines how enterprises can leverage the intelligence in Cisco's data center solutions more quickly and nondisruptively, adding and extending new services around these increased data center capabilities.

CISCO'S SOLUTIONS

Cisco Systems is a leading worldwide supplier of data center networking infrastructure solutions, including FC SAN switches and Ethernet SAN switches, SAN management software, SAN extension between data centers, and holistic professional services offerings. It has resale and services partnerships with leading storage and server manufacturers worldwide.

Cisco recognizes that emerging technologies (e.g., server virtualization, storage virtualization, bladed servers, and unified computing) as well as evolving data center strategies (e.g., IT asset consolidation, tiered storage, and efficient IT) are driving a major reevaluation of existing data center deployment and management practices. It has embarked on a number of product initiatives under the umbrella of Data Center 3.0 — Cisco's Unified vision for more dynamic Data Center architectures. The goals of this effort include:

- ☒ Unifying the data center (eliminating data center sprawl) through the widespread use of virtualization on standard systems/networks
- ☒ Simplifying the data center (reducing management complexity) through great automation and use of common services across silos

One of the key elements in Cisco's Data Center strategy is to extend the value and capabilities of its current SAN network solutions (the MDS family of FC switches) by delivering an integrated suite of network-based storage and data management services. The first of these services was the virtual SAN (vSAN) capabilities, which Cisco unveiled when it introduced MDS. Technologies such as vSAN make it easier for data center staff to segregate server and storage systems based on

performance requirements, access control, or administrative domain while maximizing the use of the entire physical SAN infrastructure.

Cisco is now taking advantage of the vSAN foundation to provide further value to customers through the introduction of Services Oriented SANs. These services leverage standard hardware and include the SAN fabric through Cisco's MDS product family. They also support all forms of connected storage systems (disk arrays, tape, etc.) across the entire SAN and are expandable in standard modular increments. Today, the services delivered include:

- ☒ **I/O Accelerator**, which provides WAN acceleration and compression services for disk and tape storage systems on FC SANs and FCIP WAN links (includes support for leading storage replication solutions, including for the mainframe)
- ☒ **Storage Media Encryption**, which offers common SAN-based data encryption services that can provide data at rest security for information on specific storage devices (disk or tape) or specific data volumes
- ☒ **Data Mobility Manager**, which provides high-speed data movement between SAN-attached storage systems to reduce the time and cost of storage system upgrades, replacements, and reallocations
- ☒ **Secure Erase**, which provides reliable, standards-compliant erasure of disk arrays and logical units, making it safe to decommission/dispose of old arrays while providing a record for compliance

The Services Oriented SAN solution also supports data management software from a number of third parties. Organizations can take advantage of this common foundation to support continuous data protection (CDP). In the near future, Cisco plans to further extend the capabilities of this platform with greater multiprotocol support (e.g., FCoE) as well as new services targeting the needs of bladed servers and virtual desktops.

Challenges/Opportunities for Cisco

The dynamics of the virtualized data center will continue to evolve as new environments (e.g., virtual desktops) and new use cases (e.g., business analytic warehouses and large content repositories) emerge in the coming years. The development of Cisco's Data Center 3.0 network solutions must keep pace with organizations' demands for even greater levels of consolidation, optimization, and business continuity.

In short, having a catalog of SAN products that meet demands for better cost performance, availability, and reliability isn't enough; IT managers need data center network suppliers to provide holistic solutions that quickly address new business requirements and work seamlessly with other technologies such as virtualization.

ESSENTIAL GUIDANCE AND FINAL THOUGHTS

Cisco has taken solid steps in extending the value of storage network assets in rapidly evolving data center environments. Solutions such as its Services Oriented SAN platform will make it easier for many enterprises to reduce operating costs while adding major new capabilities to their storage environments.

When evaluating storage networking solutions, IT managers need to put equal focus on the storage network technology and on the ability of Cisco and its business partners to properly deploy and support the solution based on their current and future needs.

Over the past several years, Cisco has also made significant investments in developing strong storage business partners around the globe. These partners focus on large enterprises with advanced data center and storage requirements. With this portfolio of network-based storage services offerings that bring advanced capabilities to new environments, Cisco and its business partners will be better able to target new applications and deliver effective implementation and support.

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