

WHITE PAPER

The Evolution of the Multi-Protocol SAN

Sponsored by: Cisco

Richard L. Villars

July 2010

RECOVERY AND IT TRANSFORMATION: CHANGING PRIORITIES AND REQUIREMENTS

The recession and global economic crisis in 2009 had a profound effect on organizations' investment and operations priorities. Some of these (e.g., delayed capital expenditures and staff reductions) are of a temporary nature, but others accelerated long developing, fundamental changes in business practices and IT operations.

Taken in combination, they translate into a number of fundamental changes in how organizations are setting priorities for new IT investments. Put simply, senior executives want to shift the ratio of capital IT expenditures to operational IT expenditures to more strongly favor operational expenditures. This "operational" transformation of IT is intended to make it easier for organizations to react quickly to major positive or negative changes in the business environment.

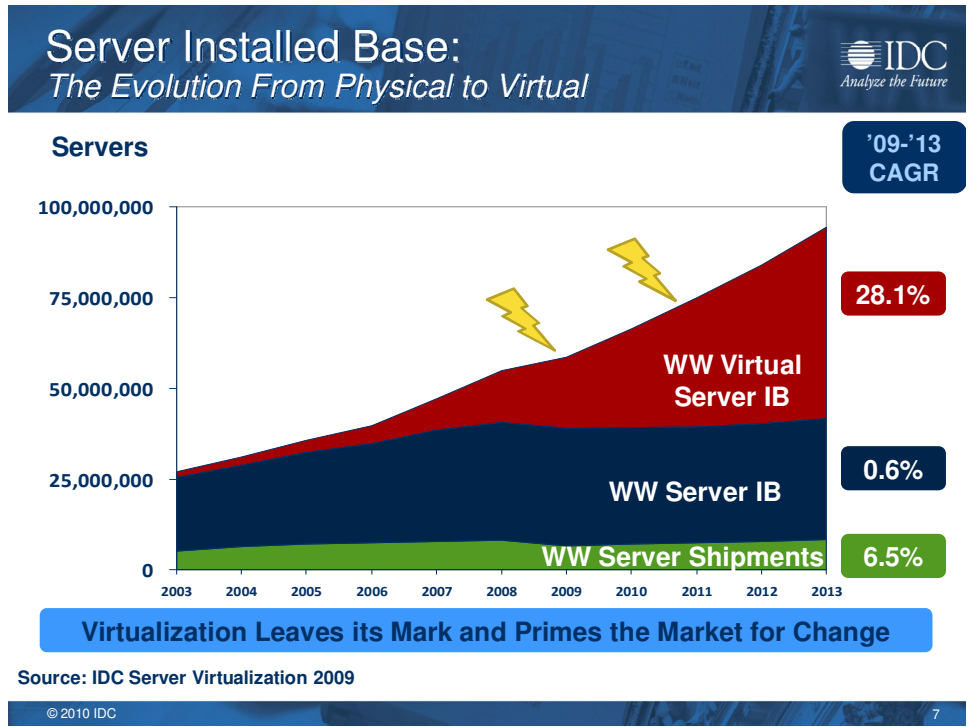
Translating this "operational" mandate from senior management into IT infrastructure investment assessments is now a high priority for IT executives. Two major developments in the data center are at the center of this transformation:

- The transition to a highly virtualized data center environment which is effecting how organizations buy and manage server, storage, and network assets
- The explosion in data generation and the diversification of data use which is driving the adoption of more role-based storage solutions within the data center

Transition to the World of Virtualized IT

Within the data centers around the world, the past year was a pivotal year in the use of server virtualization technology. IDC believes that 2009 was the first year in which more new application instances were deployed as virtual machines on a virtualized server than were deployed on a dedicated physical server. IDC believes that the majority of all installed server applications in will soon be running as virtual machines (See Figure 1).

FIGURE 1



Source: IDC, 2010

Consequence of Aggressive Server Virtualization: IT Convergence

This transition to the rapid virtualization of server assets is clearly part of efforts to reduce capital costs through aggressive consolidation while boosting asset utilization. IDC finds, however, that expectations for further boosts in IT asset use and operational efficiency often fail to materialize. The shift to virtualized servers often leads to significant disruptions in a number of areas:

- ☒ Overload of Fibre Channel (FC) storage and Ethernet data network facilities and the proliferation of new storage network technologies such as iSCSI.
- ☒ Overprovisioning of storage and network capacity and a quantum leap in storage and network administration tasks
- ☒ Missed or incomplete data backups and uncertain application recovery

In combination, these problems can quickly overwhelm any hoped for benefits as the scope of virtual server deployment expands.

Regaining control of fast growing virtual environments requires a more systematic approach to deploying and managing IT assets in the highly virtualized data center of the future. Faced with a future where organizations need to deploy and effectively use hundreds, thousands, even tens of thousands of server (and/or desktop) application

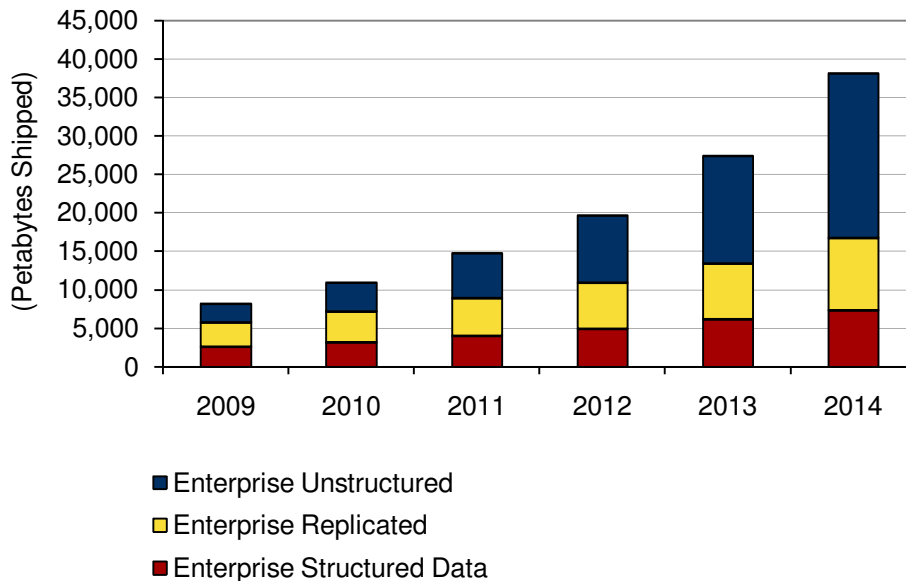
instances in a virtual environment, IT teams are rethinking the entire IT infrastructure process from purchasing, to configuration, to ongoing operations.

Digitization and The Data Explosion

Concurrent with the expanded use of virtualization, IT organizations of all sizes are also struggling to deal with the tremendous growth in data and the complexity of storage management. They are supporting a growing array of data intensive applications (e.g., business analytics) and content rich applications (e.g., digital images or video). They are also improving application availability and disaster recovery through great use of disk-based data protection/replication (See Figure 2).

FIGURE 2

Worldwide Enterprise Disk Storage Consumption Model, Capacity Shipments by Segment, 2005–2014 (PB)



Source: IDC Document #223234, 2010

In this rapidly diversifying and information intensive environment, IT managers need to optimize the capacity and performance of storage systems while working to reduce complexity and lower costs. The traditional method for dealing with these data increases has been to move to larger disk drives, larger disk systems, multiple tiers of storage, and use of different storage interconnects (FC SANs, iSCSI SANs, and NFS/CIFS) for different application and data sets.

Many of these technologies and techniques have been effective at storing large amounts of data, but they have not necessarily simplified management of the data or the systems that store it.

Consequence of Data Expansion: Role-based Storage

Going forward, organizations are coming to grips with the data proliferation and information management challenges by deploying storage solutions designed to support different business requirements. These include:

- ☒ Virtualized storage systems optimized to support virtual server and desktop environments with technologies such as thin provisioning
- ☒ Data protection/recovery storage systems optimized to reduce the time and resources required for application and data backup/recovery with technologies such as data deduplication
- ☒ Analytic-optimized storage designed to support the proliferation of data warehouse environments with technologies such as solid state disks (SSDs) and automated data replication
- ☒ Archival storage systems designed to cost effectively and securely store large volumes of structured and unstructured data for very long periods with technologies such as encryption, compression, and data indexing

The greater adoption of such role-based storage solutions, however, requires the use of a common method for safely moving data across heterogeneous networks and between diverse storage domains.

NETWORKS PLAY KEY ROLE MAKING IT TRANSFORMATION A REALITY

The key elements in a successful IT transformation effort are:

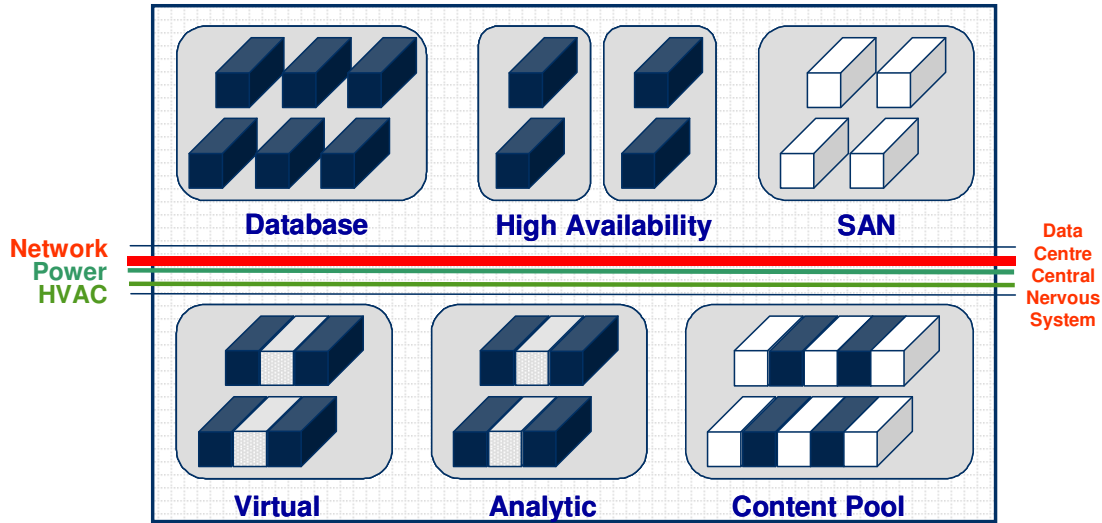
- ☒ Improve utilization and security of installed IT assets with technologies such as 8 Gbps Fibre Channel, data deduplication, and network-based data encryption
- ☒ Continue aggressive consolidation of servers, storage and network assets through the use of technologies such as virtualization (server and storage) and unified networks (10 GbE with FCoE)
- ☒ Reduce costs associated with system, data, and application maintenance and migration through use of automated online data migration and data movement

These efforts will improve use of installed server and storage assets for database and other legacy environments while also accommodating greater use of converged IT infrastructure solutions (i.e., highly virtualized and automated server, storage, and network elements) for new applications and data repositories (See Figure 3).

FIGURE 3

Data Center Build-Out & Provisioning

The days of the monolithic data center are numbered



Unified Automated Data Movement is Critical

Source: IDC, 2009

The long term strategy for effectively using IT assets in such a data center is adoption of a unified network for both storage and data network traffic to reduce cabling and reconfiguration costs while also providing greater network capacity for future growth. The reality of today's data center environment, however, is that IT organizations must manage multiple networks:

- ☒ They have major investments in 8 Gbps [FC SANs and storage systems that will continue to play a vital role in support of mission critical applications
- ☒ They will also be investing in 10 GbE Ethernet and supporting SAN technologies such as iSCSI and FCoE as part of data center upgrades and converged IT infrastructure initiatives

As noted above, a key challenge is enabling automated data and application movement between systems on these diverse networks. As a consequence, organizations require solutions from their network suppliers that support a wide range of network options. They must also provide a common set of network management and data management services that work across diverse networks. The remainder of the White Paper assesses network solutions from Cisco that can help organizations meet their goals for building and operating highly virtualized data center environments and managing the proliferation of storage solutions. These goals include:

- ☒ Insure that all of purchased IT assets are used to their maximum level
- ☒ Enable more cost effective and predictable spending on servers, storage and network equipment
- ☒ Reduce the operational and management burdens associated with new application deployment, application/data migration, and business continuity

CISCO'S SAN AND UNIFIED FABRIC SOLUTIONS FOR THE DATA CENTER

Cisco Systems is a leading worldwide supplier of data center infrastructure solutions, including FC SAN switches, Ethernet switches, management software, SAN extension between data centers, servers and 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, role-based storage, and unified networks) as well as evolving data center strategies (IT asset consolidation, tiered storage, and converged IT infrastructure) 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 vision for more unified and 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 different storage and network domains

Extending the Value of FC SANs

One of the key elements in this Data Center strategy is to extend the value and capabilities of its current FC SAN network solutions (the MDS Family of FC switches) by providing support for 8 Gbps FC and delivering an integrated suite of network-based storage and data management services. These services include:

- ☒ I/O Accelerator: Consistent MAN and 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,)
- ☒ Storage Media Encryption: 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: High speed data movement between SAN attached storage systems to reduce the time and cost of storage system upgrades, replacements, and reallocations

Delivering Data Center Ready Unified Fabrics

With growing customer interest in converged IT infrastructure and use of 10 GbE, Cisco has also introduced a new generation of data center Ethernet switch solutions (the Nexus family of 10 GbE switches). These switches are based on the same software foundation as the MDS family to ensure that both systems interoperate and deliver the same levels of reliability and manageability.

Organizations deploying Nexus switches can now set up a scalable unified fabric to support servers connecting to storage via FCoE, iSCSI, or file protocols such as NFS and CIFS. In addition, companies can also connect these servers directly to FC SAN environments to maximize the value of legacy storage assets.

Providing Value Across Multiple Network Environments

As noted above, the major challenges for organizations as they evolve and expand their data centers are minimizing the management burdens and asset use inefficiencies associated with running multiple network environments (e.g., FC SANs and iSCSI SANs on an Ethernet network). Cisco's use of a common software foundation for both its MDS and Nexus product lines makes it possible for IT organizations to perform management tasks across multiple network environments.

A powerful example of the usefulness of this capability is the movements of virtual machines between servers (e.g., VMotion in a VMware environment). Normally, such VM movements can only occur between servers using a common SAN infrastructure (e.g. an iSCSI SAN or a FC SAN). This limitation makes it difficult for companies to migrate applications to new environments or make maximum use of all server and storage assets. Using Cisco's MDS and Nexus solutions, IT teams can easily move a virtual machine from a server on a FC or iSCSI network to a server on an FCoE network. This capability boosts asset utilization and improves the ability of IT teams to leverage all IT assets for improved availability and DR. It also enables non-disruptive upgrade of virtualized physical servers from iSCSI or FC to FCoE.

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 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, as 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 server and storage virtualization.

In addition, enterprises are rarely concentrated in a single data center. As companies extend the use of converged IT infrastructure across multiple data

centers, Cisco must ensure that its unified fabric solutions also extend capabilities across geographically dispersed IT resources.

CONCLUSION

In line with the developments of the multi-protocol SAN, Cisco has taken solid steps in extending the value of FC and 10 GbE storage network assets in fast evolving data center environments. The integration of services across both legacy and unified fabrics will make it easier for many enterprises to reduce operating costs while adding major new capabilities to their data center environments.

When evaluating data center networking solutions, IT managers need to put equal focus on the 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 and converged IT infrastructure 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.

Copyright Notice

External Publication of IDC Information and Data — Any IDC information that is to be used in advertising, press releases, or promotional materials requires prior written approval from the appropriate IDC Vice President or Country Manager. A draft of the proposed document should accompany any such request. IDC reserves the right to deny approval of external usage for any reason.

Copyright 2010 IDC. Reproduction without written permission is completely forbidden.