

Tomorrow's Enterprise Data Center Today: Simplify, Scale, and Protect Investments with End-to-End Solutions from IBM and Cisco

What You Will Learn

More servers, more users, more storage, and increasing power and cooling demands are outstripping data center infrastructure capacity. To continue to deliver high-performing services and launch them quickly, IT departments need a new data center model that is simpler, scales more easily, reduces total cost of ownership (TCO), and provides a clear migration path to emerging technologies like Fibre Channel over Ethernet (FCoE).

This document describes the factors challenging today's data centers and goals for tomorrow's enterprise data center. The paper concludes by explaining how enterprises can meet their business and technology requirements with dynamic end-to-end data center solutions from IBM and Cisco.

Factors Challenging Today's Data Centers

Enterprise data centers are under pressure from:

- **Increased complexity:** Today's data centers support more servers, storage devices, and users than they were originally designed to support. They are also likely to support one or more connections to remote data centers used for business continuity and disaster recovery.
- **Higher TCO:** More complexity increases capital and operating expenses.
- **Increased bandwidth requirements:** New multicore computing and virtualization technologies increase server and storage utilization, which increases bandwidth requirements and the need for lower-latency switching.
- **Higher power and cooling demands:** Denser rack-mount and blade servers that support multiple virtualized environments use more power and cooling than older server technologies.
- **Multiple interconnect fabrics:** Data center servers generally connect to the SAN over Fibre Channel and to the LAN over Ethernet. Dual connections are costly. Direct costs include separate network interface cards (NICs) and interfaces, redundant cabling, more floor space, and more cooling. Indirect costs include a larger server form factor (to accommodate two NICs) and additional upstream switch ports. The need for two separate interconnect fabrics also complicates business continuity and disaster recovery and management.

These pressures are demonstrated by the following statistics:

- IT operating overhead has reached unprecedented levels: up to 70 percent of the IT labor budget (source: IBM).
- Power and cooling costs for data centers have increased 800 percent since 1996 (source: IDC™)¹.
- Server management and administration costs have increased 400 percent since 1996 (source: IDC).

Goals for the New Data Center

To meet requirements for performance, agility, and low TCO, organizations want a data center infrastructure that:

- **Improves asset utilization to reduce or defer capital expenses:** Asset utilization improves when IT departments can provision virtualized computing, storage, and network resources from shared pools. Today, in contrast, different lines of business, departments, or applications each require their own dedicated resources, resulting in poor capacity utilization and provisioning delays.
- **Provides the flexibility to quickly deploy new services in response to changing business needs:** Businesses are more agile when IT can make computing, storage, and network resources available as needed, from shared resource pools, rather than waiting to purchase and provision separate physical resources for each new service. For example, IT may need to rapidly provision resources to meet seasonal demand or prepare for the launch of a new Web 2.0 service.
- **Reduces power and cooling consumption to decrease costs and support green business goals:** Consolidating devices helps decrease power and cooling demands.
- **Is prepared for new technologies that support business goals:** These include service-oriented architecture (SOA), Web 2.0, and cloud computing.
- **Takes advantage of open standards:** Data center solutions based on open standards make it easier to integrate technology from multiple suppliers. The goal is an end-to-end automated service delivery model.

To meet these goals, organizations need a dynamic, agile infrastructure that can efficiently respond to changing workload demands and new service requests.

Migrating to a new data center is a process rather than a one-time project (Table 1). For early return on investment (ROI), good projects to start with include the server environment, the network's server access layer, and storage consolidation. Even modest improvements in the server and storage environments can deliver significant savings.

Table 1. Migration Path to Tomorrow's Enterprise Data Center

| Phase | Technologies | Business Benefits | Customer Example |
|----------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase 1: Simplified | Consolidate physical infrastructure, storage, servers, networks, and information to reduce redundant resources | Simplifies data center management and increases resiliency and security | By consolidating, optimizing, and virtualizing its servers and storage, a large medical center reduced its physical systems inventory by up to 60% and consolidated 40 storage subsystems to two SANs. By reducing energy, complexity, and labor, the medical center has been able to reduce costs by nearly US\$40 million. |

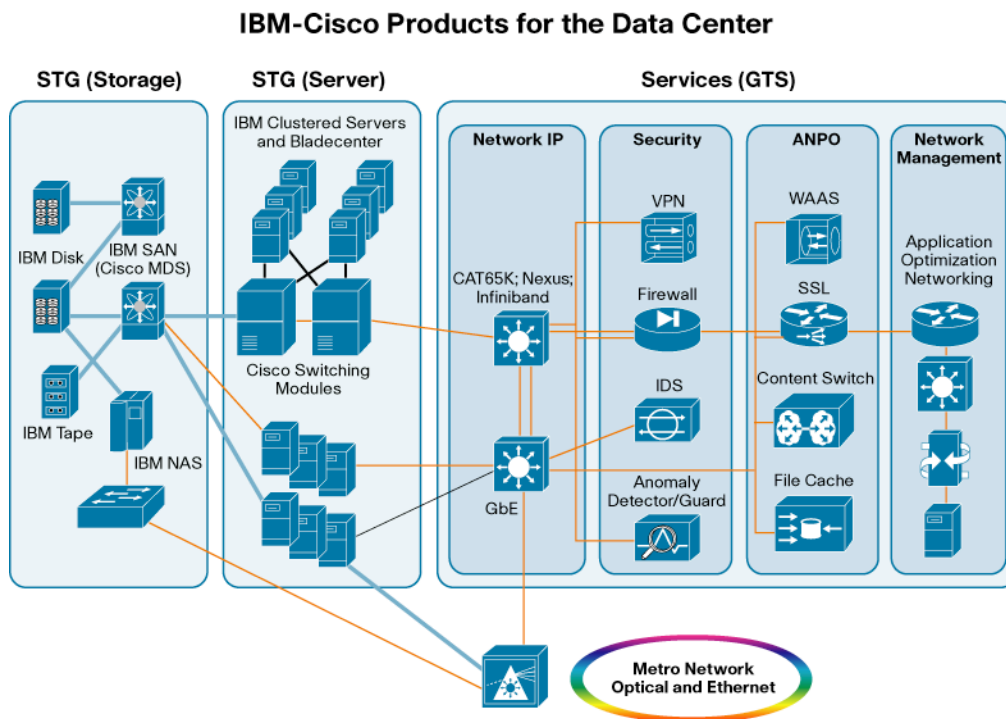
¹ IDC, "Virtualization 2.0: The Next Phase in Customer Adoption," Doc. 204904, December 2006

| Phase | Technologies | Business Benefits | Customer Example |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase 2: Shared | Create a shared IT infrastructure with virtualized resource pools for servers, storage, networks, information, and applications; each pool is managed as a single resource | <ul style="list-style-type: none"> Increases utilization and energy efficiency Facilitates rapid provisioning of new IT resources for seasonal growth or launch of a new service Enables more flexible service delivery and better control and balance of workload and data | Using IBM storage virtualization technology, a broadcaster in the Asia-Pacific region was able to pool resources across IBM and non-IBM storage servers. Ongoing benefits include faster creation of testing environments, increased utilization, greater flexibility, and 50% faster performance. |
| Phase 3: Dynamic | Remove the physical tie between services and the underlying infrastructure so that IT can rapidly bring new services online without concern for how the service is built and delivered | <ul style="list-style-type: none"> Automates and optimizes services Enables IT to quickly provision services and modify them without disrupting the business Increases efficiency by automating policies and processes | <p>To support its research team, the IBM IT department developed a research compute cloud (RCC), reducing the time and management overhead required to support constantly changing IT service needs.</p> <p>As a highly virtualized shared infrastructure with automated service management, the RCC enables researchers to obtain common application services, such as a new database, in minutes instead of days or weeks. Through this new venture the IBM IT staff has improved the research team's productivity and its satisfaction with IT.</p> |

Comprehensive Data Center Solutions from IBM and Cisco

Cisco and IBM provide a comprehensive portfolio of computing, storage, and networking solutions that enable tomorrow's enterprise data center (Figure 1). The solutions help organizations meet their goals for scalability, flexibility, and performance by consolidating, virtualizing, and automating data center resources. Acquiring all components from one source, IBM, simplifies procurement, deployment, management, and support and also reduces risk.

Figure 1. Integrated Computing, Storage, and Networking Solutions from Cisco and IBM



IBM System Storage

The IBM System Storage Advantage

Take control of the information explosion by developing and implementing an information infrastructure that aligns with your business goals, addresses your risk and compliance concerns, and helps you to streamline operations for increased efficiency and improved capacity.

Introducing a new, integrated IBM System Storage strategy which helps you build an information infrastructure with solutions designed to build the foundation you need to deliver improved service levels, reduce business risks, and manage the information explosion

See more at: <http://www-03.ibm.com/systems/storage/>

IBM Servers

IBM Systems Offer the Solutions to Your Toughest Issues

Gain immediate advantages with IBM To compete in today's economy you need an infrastructure that's agile enough to change as rapidly as your business strategies change. That flexibility requires a high level of integration, which is why IBM takes a comprehensive view of IT operations. We can work within your budget to provide you the high-performance technology and world-class expertise to set you on the right path for years to come. [Learn more reasons to migrate](#)

Regardless of your current IT infrastructure, IBM's integrated approach offers you a clear roadmap to improve the performance of both your hardware and software. By doing more with less, you can regain control of your infrastructure and reduce energy and facilities costs. [Reduce IT complexity and costs](#)

Discover how IBM's advanced virtualization, server consolidation and storage consolidation strategies can relieve much of the burden of your complex, multivendor environment by helping you build and maintain a cost-effective, highly utilized data center that conserves energy to save you money.

See more at: <http://www-03.ibm.com/systems/migratetoibm/index.html>

IBM Information Infrastructure

IBM offers a range of systems, storage, software, and services to help manage the continuing growth in information and address challenges related to information compliance, availability, retention, and security. IBM servers provide outstanding per-core performance and scalability and the capability to reallocate resources quickly. Similarly, IBM System Storage combines IBM's industry-leading virtualization and storage management technologies to simplify the storage infrastructure and optimize storage utilization.

IBM Information Infrastructure solutions are an important part of IBM's New Enterprise Data Center strategy. They enable an evolutionary new model for efficient IT delivery plus a resilient infrastructure for securely storing information and mitigating business risks. A new enterprise data center can help companies take control of their information, apply it for competitive advantage, and reduce their carbon footprints.

IBM Information Infrastructure solutions include:

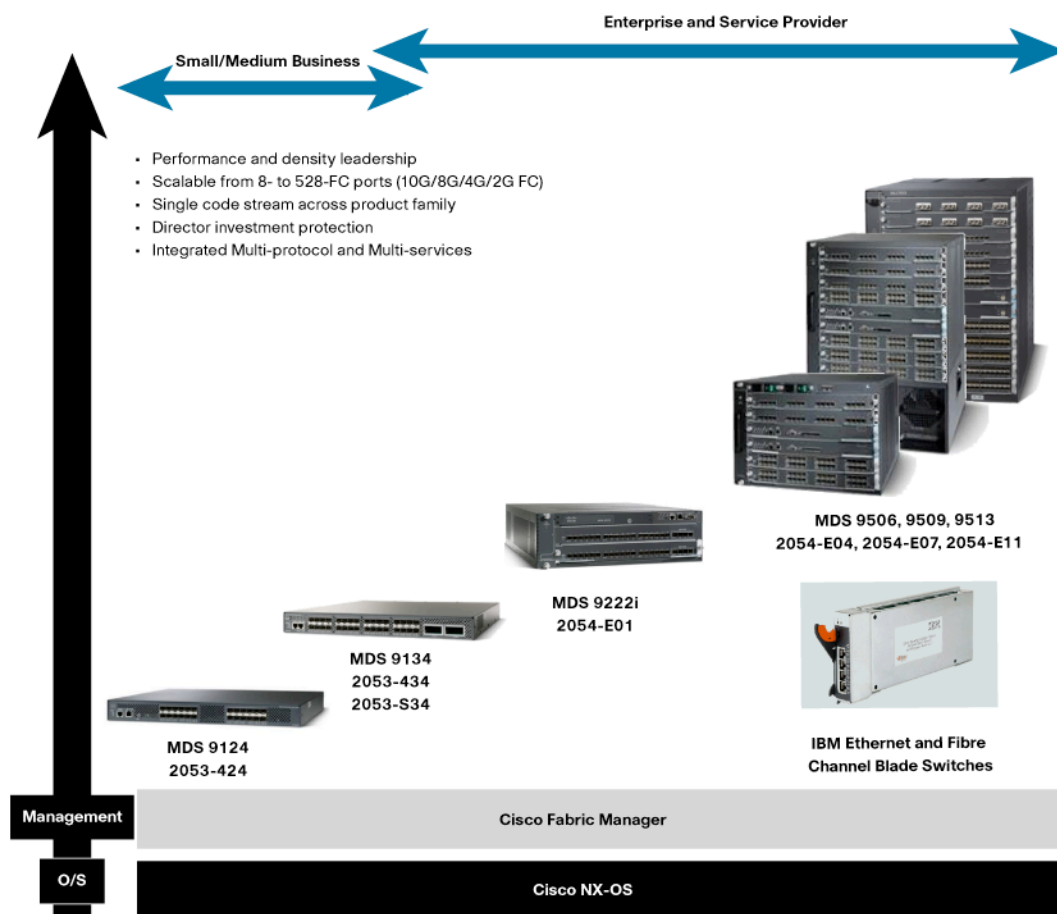
- **Information compliance solutions:** Address the challenges of a complex regulatory environment with compliance solutions based on best practices for information lifecycle management.

- **Information availability solutions:** Improve decision making with continuous and reliable access to the information that the business needs, when it is needed. Enabling technologies include virtualization, simple management, and data migration.
- **Information retention solutions:** Address legal demands, regulatory policies, business requirements, and the need for longer information retention. IBM's tiered storage, compression, deduplication, and archiving solutions are designed to simplify and automate archiving tasks.
- **Information security solutions:** Protect confidential information from security threats with storage solutions featuring encryption, highly secure access control, and continuous data protection.

Cisco MDS 9000 Series SAN Switches

The Cisco® MDS 9000 family of SAN switches includes multilayer fabric switches and multilayer directors (Figure 2).

Figure 2. Multilayer SAN Switch Architecture



All SAN switches in the Cisco MDS 9000 family have a common operating system, Cisco NX-OS Software, which meets the goals of the new data center in the following ways:

- **Storage virtualization:** Cisco MDS 9000 family switches are designed to combine storage capacity from multiple disk systems into a single reservoir of capacity. Managing a single pool of storage rather than separate boxes takes less time and enables the creation of a tiered storage environment in which the cost of storage can be better matched to the value of data.
- **SAN consolidation and simplification:** The Cisco MDS 9000 family of switches facilitates consolidation from multiple SAN islands into a centralized scalable SAN. IT groups often just set up one virtual SAN (VSAN) to replace each of the previous physical SANs, simplifying management. Cisco MDS 9000 family switches also interoperate with an organization's existing SAN switches from other vendors, lowering migration costs.
- **Automation:** The IT group can manage IBM Fiber Connection (FICON) VSANs with any of several interfaces: integrated Cisco Fabric Manager, Cisco command-line interface (CLI), or IBM Control Unit Port (CUP)-enabled management tools. The latter include the IBM S/390 Resource Measurement Facility (RMF) and dynamic channel path management (DCM).
- **Disaster recovery and business continuance:** Cisco MDS 9000 family solutions support Fibre Channel and Fibre Channel over IP (FCIP) SAN extension, hardware-based compression and encryption, and I/O acceleration; 2-, 4-, and 10-Gbps dense wavelength-division multiplexing (DWDM) can significantly reduce transport cost, and continuous remote replication and continuous data protection solutions enable immediate data recovery and also reduce WAN expenses.
- **FICON SAN infrastructure:** This reliable and highly available FICON infrastructure facilitates consolidation and scaling and enables disaster recovery. Advanced FICON services include cascaded FICON fabrics, VSAN-enabled intermix of mainframe and open systems environments, and N-port ID virtualization (NPIV) for mainframe Linux partitions.

Protect Your Investment as Data Center Technologies Advance

Cisco MDS 9000 family switches are planned to support new data center technologies. As business needs evolve, you will be able to adopt these technologies at your own pace without having to purchase new SAN switches:

- **FCoE:** Support for FCoE modules in existing Cisco MDS 9500 Series Multilayer Directors is planned to help ensure coexistence with prior and future generations of Fibre Channel switching and service modules, extending flexibility and providing investment protection.
- 8-Gbps technology
- **Scalable, high-performance intelligent fabric applications:** These future applications will help optimize network and storage utilization, protect data, and lower TCO. Examples include network-based volume management, continuous data protection, SAN extension, and I/O acceleration.
- **Planned enhancements to support blade servers and virtual machines:** Examples include simplified management, end-to-end virtualization (including virtual machines, virtual SAN, volume management, and enhanced blade switches) and virtual machine resiliency.
- **Planned enhancements to support comprehensive end-to-end virtualization:** Expanded virtualization solutions at the network, server, and storage levels will improve utilization and performance with unique features that support end-to-end virtualized environments. Solutions include NPIV, VSAN, and F-port trunking.

Why Cisco and IBM?

- **Complete solution:** Other multivendor solutions address only a subset of the full spectrum of data center needs: computing, storage, networking, and services. IBM and Cisco let customers work with a single team for all their data center needs. Customers gain a complete, fully integrated solution and simplified business operations because they can reduce the number of vendors that they have to manage.
- **Technology roadmap:** IBM and Cisco optimize data center utilization, responsiveness, access, and resiliency through interoperability and integration. The two companies can propose a roadmap for the data center, helping organizations acquire solutions with a long lifespan.
- **Industry leadership:** The data center is a traditional strength of IBM, and the network and the services that operate over the network are Cisco strengths.
- **IBM and Cisco alliance:** The IBM and Cisco alliance applies the knowledge and experience of two industry leaders to a shared strategy of integrated solutions, technologies, products, and services designed to help global customers achieve their goals for productivity, IT improvement, and business resilience:
 - The IBM and Cisco alliance has more than 25,000 mutual customers worldwide.
 - More than 500 Cisco and IBM employees are focused on the alliance, ranging from executive sponsorship, to product integration, to sales, marketing, and services.
 - Cisco and IBM collaborate to develop, test, and demonstrate joint solutions in more than 160 IBM labs worldwide.
 - IBM and Cisco strategic alliance solutions are built on open standards, enabling communication across systems for faster application deployment.
 - IBM and Cisco provide product maintenance services for mutual enterprise customers in 46 countries. One integrated support offering combines IBM's extensive service-delivery capabilities and Cisco's technical expertise.

Conclusion

IBM and Cisco solutions for the data center enable IT departments to scale to meet increasing business demands with a low TCO. Evolving to a dynamic infrastructure reduces capital and operating expenses and gives IT the flexibility to rapidly provision new services from pools of shared resources in response to changing business needs. Advanced solutions for availability, business continuance, and data security support goals for resilience and regulatory compliance. Finally, IBM and Cisco solutions help protect today's data center investments by providing a roadmap to the future. Tomorrow's data center is here today, with dynamic, end-to-end data center solutions from IBM and Cisco.

For More Information

For more information about IBM server and storage solutions, visit <http://www-03.ibm.com/systems/migratetoibm/index.html>.

To read more about the Cisco MDS 9000 family SAN switches, visit <http://www.cisco.com/go/san>.

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