

Harnessing the SAN to Create a Smarter Infrastructure



Redguides for Business Leaders

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- How a SAN underpins the smarter infrastructure
- The role of a SAN in meeting today's business challenges
- Case study and further references



Executive overview

The world is getting smaller and flatter, but it must also get smarter. Every day, the world is becoming more instrumented, interconnected, and intelligent, creating new opportunities at both a societal and organizational level. By harnessing our increasingly digitized world, we can solve intractable social problems, bring organizations closer to customers, and vastly shrink decision windows that help executives achieve competitive advantage.

Key challenges for today's organizations are to:

- ▶ Achieve superior, differentiated service delivery
- ▶ Reduce costs and optimize return on investment of all business assets
- ▶ Manage and mitigate business risk
- ▶ Act with agility and speed

Meeting any one of these challenges, let alone all of them, requires a high degree of flexibility and responsiveness within an organization's underlying business and IT infrastructure. Unfortunately, many of the assets that comprise today's infrastructure are rigid, siloed, and outdated, driving cost and complexity to unsustainable levels while hampering organizational maneuverability. Today's infrastructure is not prepared for tomorrow's challenges. For many organizations, change is imperative.

Change is possible, the tools exist, and the mission is clear. It is necessary but not sufficient to solve today's problems; we must also seize tomorrow's opportunities.

To achieve both, it is time to start thinking differently about infrastructure. IBM® has developed a strategy for a dynamic infrastructure that will help organizations address higher service expectations, rising cost pressures, and new risks and threats, while also laying a foundation for breakthrough productivity, accelerated value creation, and the increased velocity needed to achieve the faster pace that business and society demand.

In this smarter world, we need our infrastructure to propel us forward, not hold us back. This infrastructure becomes instrumented, interconnected, and intelligent to bring together the business and IT infrastructure to create new possibilities across the business.

How do we build a more dynamic infrastructure?

- ▶ Address today's operational challenges to free up resources for new investments.
- ▶ Converge business and IT infrastructure to work in concert, achieving breakthrough productivity and greater business value.

- ▶ Utilize alternative sourcing approaches, like cloud computing, to deliver new services with agility and speed.

In this IBM Redguide™ publication, we outline the IBM Storage Area Network (SAN) strategy for a dynamic infrastructure. Our pioneering new approach spans physical and digital assets, data center systems, distributed computing resources, business processes, and software solutions to address both today's and tomorrow's business imperatives. Through innovative offerings, flexible sourcing options, and effective collaboration, IBM can help you define the path and achieve meaningful progress toward developing a dynamic infrastructure.

The Storage Area Network

In this section, we introduce some of the concepts of a SAN. A SAN is an essential element that forms the bedrock that the information infrastructure will be built upon.

The Storage Network Industry Association (SNIA) defines a SAN as a network whose primary purpose is the transfer of data between computer systems and storage elements. A SAN consists of a communication infrastructure, which provides physical connections, and a management layer, which organizes the connections, storage elements, and computer systems so that data transfer is secure and robust. The term SAN is usually (but not necessarily) identified with block I/O services rather than file access services.

Note: The SNIA definition specifically does not identify the term SAN with Fibre Channel technology. When the term SAN is used in connection with Fibre Channel technology, the use of a qualified phrase such as *Fibre Channel SAN* is encouraged. According to this definition, an Ethernet-based network whose primary purpose is to provide access to storage elements would be considered a SAN. SANs are sometimes also used for system interconnection in clusters.

Putting this in simple terms, a SAN is a specialized, high-speed network attaching servers and storage devices and, for this reason, it is sometimes referred to as “the network behind the servers.” A SAN allows “any-to-any” connection across the network, using interconnect elements such as routers, switches, and directors.

A SAN eliminates the traditional dedicated connection between a server and storage, and the server effectively “owns and manages” the storage devices. It also eliminates any restrictions to the amount of data that a server can access, which is currently limited by the number of storage devices attached to the individual server. Instead, a SAN introduces the flexibility of networking to enable one server or many heterogeneous servers to share a common storage utility, which may be comprised of many storage devices, including disk, tape, and optical storage. Additionally, the storage utility may be located far from the servers that use it.

The SAN can be viewed as an extension to the storage bus concept, which enables storage devices and servers to be interconnected using similar elements used in local area networks (LANs) and wide area networks (WANs), that is, routers, hubs, switches, directors, and gateways. A SAN can be shared between servers or dedicated to one server. It can be local, or can be extended over geographical distances.

The diagram shown in Figure 1 on page 3 shows a minimalistic overview of a SAN connecting multiple servers to multiple storage systems. Of course, in the real world, SANs can be, and often are, much more complicated than this.

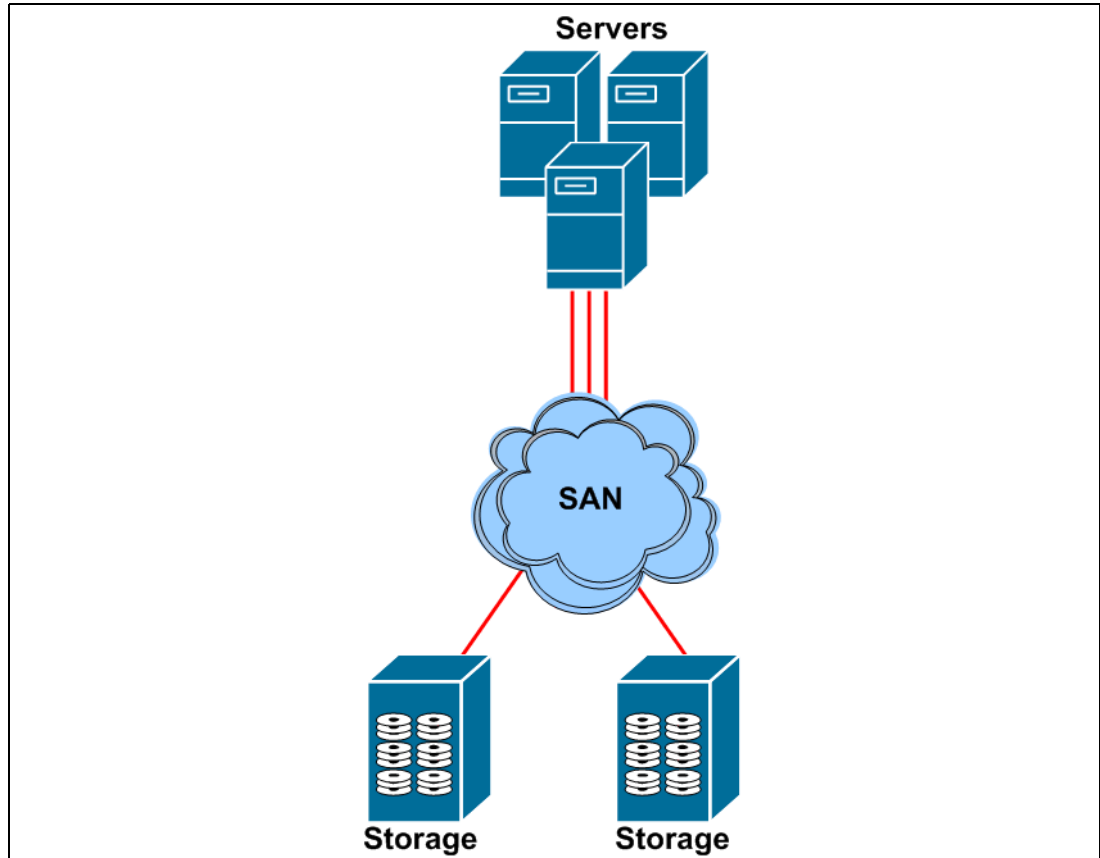


Figure 1 A simple SAN

SANs create new methods of attaching storage to servers. These new methods can enable great improvements in both availability and performance. Today's SANs are used to connect shared storage arrays and tape libraries to multiple servers, and are used by clustered servers for failover.

A SAN can be used to bypass traditional network bottlenecks and facilitates almost transparent, high-speed data transfers between servers and storage devices.

SANs allow applications that move data to perform better, for example, by having the data sent directly from the source to the target device with minimal server intervention. SANs also enable new network architectures where multiple hosts access multiple storage devices connected to the same network. Using a SAN can offers the following benefits:

- ▶ Improvements to application availability: Storage is independent of applications and accessible through multiple data paths for better reliability, availability, and serviceability.
- ▶ Higher application performance: Storage processing is off-loaded from servers and moved onto a separate network.
- ▶ Centralized and consolidated storage: Simpler management, scalability, flexibility, and availability.
- ▶ Data transfer and vaulting to remote sites: Remote copy of data enabled for disaster protection and against malicious attacks.
- ▶ Simplified centralized management: Single image of storage media simplifies management.

SAN components

As stated previously, Fibre Channel is the predominant architecture upon which most SAN implementations are built, with FICON® as the standard protocol for z/OS® systems, and FCP as the standard protocol for open systems.

So what are the components that make up the SAN “cloud”?

Switches and directors

Switches and directors provides high-performance, scalable, and simple-to-use fabric switching with up to 768 ports operating at 8, 4, 2, or 1 Gbps (depending on which optical transceiver is used).

Switches and directors allow Fibre Channel devices to be connected (cascaded) together, implementing a switched fabric topology between them. The switch intelligently routes frames from the initiator to responder and operates at full Fibre Channel bandwidth.

Routers

Multiprotocol routers and devices provide improved scalability, security, and manageability by enabling devices in separate SAN fabrics to communicate *without* merging the fabrics into a single, large SAN fabric. Depending on the manufacturer, they support a number of protocols and have their own features, such as zoning. As their name suggests, the protocols supported include:

- ▶ FCP
- ▶ FCIP
- ▶ iFCP
- ▶ iSCSI
- ▶ IP

IBM SAN switches, directors, and routers provide the reliable, scalable, and high performance Fibre Channel connectivity required to capitalize on enterprise-wide data sharing and collaboration. IBM offers a full line of intelligent SAN switches, directors, and routers to connect servers and storage systems in local, campus, metro, and global infrastructures. IBM was first to market with a comprehensive portfolio of 4 Gbps, storage, software, and switch solutions. IBM was also first to market with 4 and 10 Gbps metro connectivity and Gigabit Ethernet global connectivity SAN director features.

Storage

The SAN liberates the storage device so it is not on a particular server bus, and attaches it directly to the network. In other words, storage is externalized and can be functionally distributed across the organization. The SAN also enables the centralization of storage devices and the clustering of servers, which has the potential to make for easier and less expensive centralized administration that lowers the total cost of ownership (TCO).

The storage infrastructure is the foundation on which information relies, and therefore must support a company’s business objectives and business model. In this environment, simply deploying more and faster storage devices is not enough. A SAN infrastructure provides enhanced network availability, data accessibility, and system manageability, and it is important to remember that a good SAN begins with a good design. This is not only a maxim, but must be a philosophy when we design or implement a SAN.

Servers

The server infrastructure is the underlying reason for all SAN solutions. This infrastructure includes a mix of server platforms such as Windows®, UNIX® (and its various flavors), and z/OS. With initiatives such as server consolidation and e-business, the need for SANs will increase, making the importance of storage in the network greater.

The importance of standards

Should we care about standards? Standards are the starting point for the potential interoperability of devices and software from different vendors in the SAN marketplace. SNIA, among others, defined and ratified the standards for the SANs of today, and will keep defining the standards for tomorrow. All of the players in the SAN industry are using these standards now, as these are the basis for the wider acceptance of SANs. Widely accepted standards potentially allow for heterogeneous, cross-platform, multivendor deployment of SAN solutions.

As all vendors have accepted these SAN standards, there *should* be no problem in connecting the different vendors into the same SAN network. However, nearly every vendor has an interoperability lab where it tests all kind of combinations between their products and those of other vendors. Some of the most important aspects in these tests are reliability, error recovery, and performance. If a combination has passed the test, that vendor is going to certify or support this combination.

IBM participates in many industry standards organizations that work in the field of SANs. IBM believes that industry standards must be in place, and if necessary, re-defined for SANs to be a major part of the IT business mainstream.

Probably the most important industry standards organization for SANs is the Storage Networking Industry Association (SNIA). IBM is a founding member and board officer in SNIA.

What the SAN of the future will look like

Are SANs themselves evolving or are they likely to become extinct? Will they be overtaken by other technology? Certainly reports of the death of SANs have been greatly exaggerated. There has been far too much investment made for SANs to quietly lay down and go the way of the dinosaurs. There is no new “killer application” or technology in the immediate future that is threatening the SAN world. However, there is a gradual evolution that is beginning to pick up pace in the SAN world.

The evolution that is taking place is one of diversity. More and more we are seeing advances in technology finding their way into the SAN chassis. What is quickly happening is that SANs are becoming multiprotocol capable, and infinitely more diverse. The industry recognizes that it is no longer acceptable to build a solution that will either create SAN islands (in much the same way as islands of information existed), or take an inordinate amount of cabling, support, power, and management.

Also, with energy costs now consuming up to 71 cents for every dollar that is spent on enterprise IT, achieving improvements in energy efficiency will require IT managers to move beyond their traditional role as technology providers.

Managing the energy impact of the enterprise IT infrastructures requires IT managers to develop a comprehensive understanding of actual energy consumption. Many SAN vendors that integrate with IBM are actively working to reduce both their effect on the carbon footprint, and becoming more energy efficient.

Taking a long term outlook, the trend towards the simplification of the SAN infrastructure, alongside the adoption of industry standards, has certainly taken a turn for the better. In a single footprint, multiple technologies that were once competing for floor space now happily sit alongside the “competition” in a single chassis.

It is not uncommon to see FCIP, iFCP, and iSCSI within the same chassis, and they are working together rather nicely. With the evolving standard of Fibre Channel over Ethernet (FCoE) we are also likely to see some significant announcements throughout 2009, making it an exciting time for the SAN industry.

Couple this with the fact that most IT vendors also have virtualization solutions that can present a single view of storage, and management solutions that provide a view at an enterprise level, the SAN has quietly become an enabler for many technologies and protocols to share the same arena, without the somewhat tiresome arguments of which is “best.”

So, it is a case of evolution, not revolution, in the SAN world.

The role of a SAN in solving business problems

Previously, we introduced the basics of SAN by presenting a standard SAN definition, as well as a brief description of the underlying technologies and concepts that are behind a SAN implementation. From the conceptual understanding of the SAN, you can then see how they form part of a smarter infrastructure.

In the following topics, we extend this discussion by presenting some of the real-world issues, and how the IBM portfolio can help mitigate those issues. We present an overview of some of the major problems faced in the industry today, and show specific solutions that IBM has to offer, as well as further sources of information.

Motivations for implementing a SAN

In this section, we describe the main motivators that drive SAN implementations, and present some of the key benefits that this technology might bring to data-dependent business.

Determining if there is a problem to be solved

As illustrated in Figure 2 on page 7, the 1990s witnessed a major shift away from the traditional mainframe, host-centric model of computing to the client/server model. Today, many organizations have hundreds, even thousands, of distributed servers and client systems installed throughout its IT infrastructure. Many of these systems are powerful computers, with more processing capability than many mainframe computers had only a few years ago.

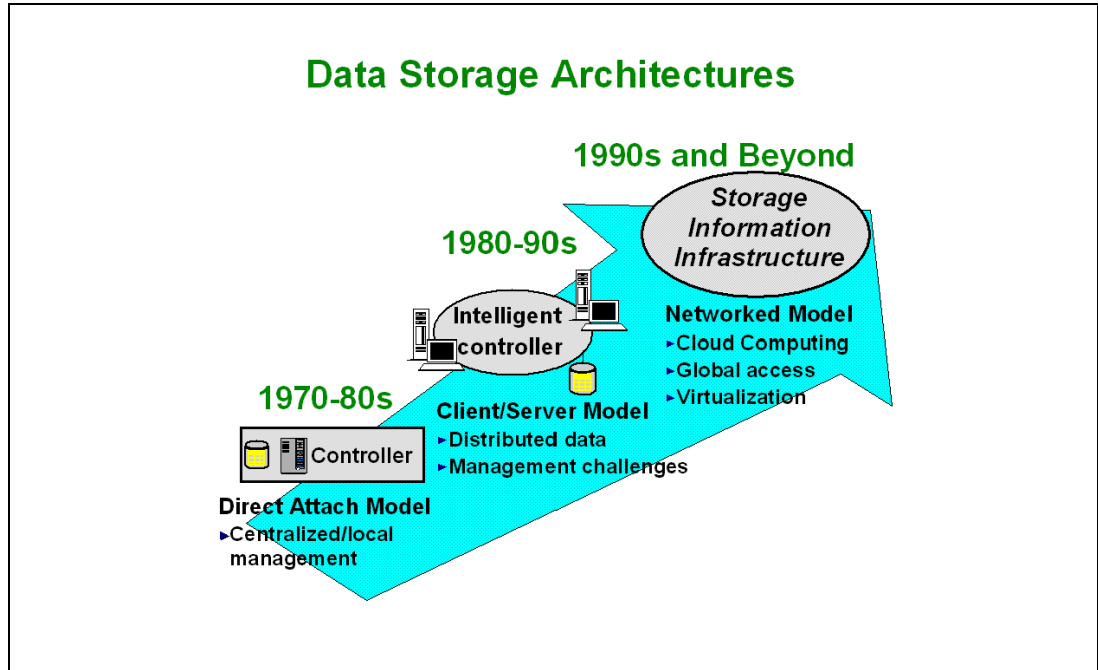


Figure 2 The evolution of storage architecture

Storage, for the most part, is directly connected by a dedicated channel to the server it supports. Frequently, the servers are interconnected using local area networks (LAN) and wide area networks (WAN), to communicate and exchange data. The amount of disk storage capacity attached to such systems has grown exponentially in recent years. It is commonplace for a desktop personal computer or ThinkPad today to have storage in the order of tens of gigabytes. There has been a move to disk arrays, comprised of a number of disk drives. The arrays may be “just a bunch of disks” (JBOD), or various implementations of redundant arrays of independent disks (RAID). The capacity of such arrays may be measured in tens or hundreds of gigabytes, but I/O bandwidth has not kept pace with the rapid growth in processor speeds and disk capacities.

Distributed clients and servers are frequently chosen to meet specific application needs. They may, therefore, run different operating systems (such as Windows NT®, UNIX of differing flavors, Novell® NetWare, VMS, and so on), and different database software (for example, DB2®, Oracle®, Informix®, and SQL Server®). Consequently, they have different file systems and different data formats.

Managing this multi-platform, multivendor, networked environment has become increasingly complex and costly. Multiple vendor’s software tools, and appropriately skilled human resources, must be maintained to handle data and storage resource management on the many differing systems in the enterprise. Surveys published by industry analysts consistently show that management costs associated with distributed storage are much greater, up to 10 times more, than the cost of managing consolidated or centralized storage. This includes costs of backup, recovery, space management, performance management, and disaster recovery planning.

Disk storage is often purchased from the processor vendor as an integral feature, and it is difficult to establish if the price you pay per gigabyte (GB) is competitive, compared to the market price of disk storage. Disks and tape drives, directly attached to one client or server, cannot be used by other systems, leading to inefficient use of hardware resources. Organizations often find that they have to purchase more storage capacity, even though free capacity is available in other platforms.

In addition, it is difficult to scale capacity and performance to meet rapidly changing requirements, such as the explosive growth in e-business applications, and the need to manage information over its entire life cycle, from conception to intentional destruction.

Information stored on one system cannot readily be made available to other users, except by creating duplicate copies, and moving the copy to storage that is attached to another server. Movement of large files of data may result in significant degradation of performance of the LAN/WAN, causing conflicts with mission-critical applications. Multiple copies of the same data may lead to inconsistencies between one copy and another. Data spread on multiple small systems is difficult to coordinate and share for enterprise-wide applications, such as e-business, Enterprise Resource Planning (ERP), Data Warehouse, and Business Intelligence (BI).

Backup and recovery operations across a LAN may also cause serious disruption to normal application traffic. Even using fast Gigabit Ethernet transport, sustained throughput from a single server to tape is about 25 GB per hour. It would take approximately 12 hours to fully back up a relatively moderate departmental database of 300 GBs. This may exceed the available window of time in which this must be completed, and it may not be a practical solution if business operations span multiple time zones. It is increasingly evident to IT managers that these characteristics of client/server computing are too costly, and too inefficient. The islands of information resulting from the distributed model of computing do not match the needs of the enterprise.

New ways must be found to control costs, improve efficiency, and simplify the storage infrastructure to meet the requirements of the modern business world. IBM has the answer to the questions we posed. This answer is the IBM Storage Information Infrastructure.

SAN enablement of the Storage Information Infrastructure

To stay competitive in the global marketplace, people need to have access to the right information at the right time in order to be effective, creative, and highly innovative. IBM offers a comprehensive portfolio of SAN switches, storage, software, services, and solutions to reliably bring information to people in a cost effective way. IBM provides flexible, scalable, and open standards-based business-class and global enterprise-class storage networking solutions for the on demand world.

The Storage Information Infrastructure

As we have said, with the explosive growth in data and information coming from both traditional sources and new, intelligent devices, coupled with increasing concerns over information availability, security, regulatory and compliance requirements, and power consumption, IT infrastructures and storage administrators are reaching a breaking point.

Because the health of any business often depends on its ability to take advantage of information in real time, a sound, intelligent information infrastructure becomes critical to delivering required business services.

IBM offers an innovative approach to help you manage information growth more effectively and mitigate risks with a dynamic infrastructure that efficiently and securely stores and protects information, and optimizes information access.

Control, protect, manage, and gain new intelligence from your information with IBM leading-edge Storage Information Infrastructure products, services and integrated solutions, supported by world-class expertise and access to top experts from around the world.

Information infrastructure solutions

IBM Information Infrastructure solutions are designed to help you manage the information explosion and address challenges around information compliance, availability, retention, and security. This will lead your company toward improved productivity, service delivery, and reduced risk while streamlining costs.

Information availability solutions

Success thrives on information. Providing access to critical information when and where it is needed has an immediate impact on employee productivity, client satisfaction, and your bottom line. Even one hour of downtime can have dramatic effects and cause significant expense. Organizations must take steps to ensure users have reliable access to critical information in real time.

For more information, visit the following address:

http://www-03.ibm.com/systems/information_infrastructure/information_availability/index.html

Watch the video at the following address:

http://www.ibm.com/software/info/television/index.jsp?lang=en_us&cat=storage&item=xm1/C122805W18948A05.xml

Information retention solutions

Regulations and business policies have resulted in longer retention periods for business records. Increased volumes create a cost burden. The inability to purge records on schedule creates additional costs and risks.

Businesses with a clear information retention policy know which information should be retained, how it should be protected, and how to manage retention policies. Policy-based records retention enables efficient use of tiered storage, which can significantly reduce power consumption and costs.

For more information, visit the following address:

http://www-03.ibm.com/systems/information_infrastructure/information_retention/index.html

Watch the video at the following address:

<http://www.ibm.com/software/info/television/index.jsp?cat=storage&media=ALL&item=xm1/X231221L20962W86.xml>

Information security solutions

Organizations must be able to protect and securely share information across the enterprise, as well as with their partners and customers. This includes enabling secure business collaboration with controls that protect intellectual property and ensure the privacy of information without slowing down business processes. It means providing anytime, anywhere access to information while also ensuring information confidentiality, privacy, and immutability.

For more information, visit the following address:

http://www-03.ibm.com/systems/information_infrastructure/information_security/index.html

Watch the video at the following address:

<http://www.ibm.com/software/info/television/index.jsp?cat=storage&media=ALL&item=xm1/H072709N32985S39.xml>

Information compliance solutions

Today, organizations are adapting to a number compliance regulations, data privacy laws, and court orders impacting electronic records. As data and regulations increase, organizations must define and implement policies, processes, and procedures to confidently pass compliance audits.

While these requirements can seem to hamper an organization's effectiveness, they also provide an opportunity to streamline and automate core business processes. A well-designed information infrastructure helps improve operational efficiency while simplifying compliance and audit processes.

For more information, visit the following address:

http://www-03.ibm.com/systems/information_infrastructure/information_compliance/index.html

Watch the video at the following address:

<http://www.ibm.com/software/info/television/index.jsp?cat=storage&media=ALL&item=xm1/I392031Y96505M88.xml>

Storage innovations for the dynamic infrastructure

So what are some of these innovations for the dynamic infrastructure? Can IBM walk the talk? We think so. The following sections are a sample of some of the offerings, with links to other useful information sources.

Data deduplication and information retention

Protect more. Store less. Squeeze up to 25 TBs of data onto only 1 TB of disk to obtain information efficiency through deduplication.

IBM has the broadest portfolio of deduplication solutions in the industry and allows you to retain information longer with less resources. IBM has an expanded portfolio of data deduplication technologies designed to reduce physical storage requirements and empower you to retain data longer, more efficiently and more reliably than ever before.

For more information, visit the following address:

<http://www-03.ibm.com/systems/storage/solutions/retention/index.html>

Full disk encryption and information security

Stolen hard drive? Who cares? IBM full disk encryption secures your data at rest.

IBM adds drive-level disk encryption to its information security portfolio with the IBM System Storage™ DS8000® series that comes with encryption and key management. An innovative self-encrypting disk solution secures all information on disk drives when physically removed from the system. Clients no longer have to worry about the sensitive data on drives that are

returned for repair, retired, or re-purposed, and data is automatically protected against unauthorized access.

For more information, visit the following address:

<http://www-03.ibm.com/systems/storage/solutions/security/index.html>

Virtualization and information availability

The IBM SAN Volume Controller offers an Entry Edition that can deliver up to a 30% increase in disk utilization.

As the most widely installed heterogeneous disk storage virtualization appliance, the SVC Entry Edition includes advanced features such as high performance, space efficient FlashCopy®, and thin provisioning. Increased disk utilization helps clients delay storage purchases while newly available storage is used for new growth.

Also, IBM extends its lead in high-availability, high-performance storage solutions with new efficiency-oriented products and services with the IBM XIV® Storage System.

Now you can take a small step to gain an amazing leap in storage functionality! The IBM breakthrough disk solution, the IBM XIV Storage System, is now available in a 65% smaller initial capacity configuration, making it a great fit for those with more mid-size capacity needs.

For more information, visit the following address:

<http://www-03.ibm.com/systems/storage/solutions/availability/index.html>

Tape encryption solutions and information compliance

Data is one of the most highly valued resources in a competitive business environment. Protecting that data, controlling access to it, and verifying its authenticity while maintaining its availability are priorities in our security-conscious world. Increasing regulatory requirements are also helping to drive the need for the security of data. Encryption is a powerful and widely used technology that helps protect data from loss and inadvertent or deliberate compromise.

For more information, visit the following address:

<http://www-03.ibm.com/systems/storage/solutions/compliance/>

Videos and podcasts

IBM TV for IT Solutions has a dedicated channel to bring a unique multimedia experience to the information infrastructure. Case studies, solutions, and product introductions can all be access through IBM TV, available at the following address:

http://www.ibm.com/software/info/television/index.jsp?lang=en_us&cat=storage&media=ALL

Case study

Hong Kong Air Cargo Terminals Ltd. (HACTL) is the largest single air cargo terminal operator in the world. The company handled 2.63 million tons of air cargo in 2007, representing around 70% of air cargo throughput at the Hong Kong International Airport.

The challenge

To maintain its pole position as the leader in regional air cargo hub operations, HACTL needs to deliver the best uptime and business continuity for its operations, while having the scalability to meet future cargo business demands and growth.

The solution

IBM implemented a new disaster recovery and storage infrastructure blueprint based on the IBM System Storage DS8300 storage server, IBM System Storage SAN Volume Controller (SVC), IBM System Storage SAN Director, and IBM Virtual Tape Library TS7500 series.

The benefits

The new robust disaster recovery IT infrastructure improved HACTL's reliability, backup, and recovery times, and IT efficiency and scalability to support future business growth.

Since its founding in 1976, HACTL has used innovation to meet its client expectations. With its world-renowned SuperTerminal 1, a US\$1 billion state-of-the-art logistics complex built in 1998, the company can potentially handle over 3.5 million tons per annum. Today, its services are used by over 90 international airlines and 1,000 freight forwarders.

Building on trust

Reliability is one of the most important factors for HACTL's continued success. For its multi-national clients, it means that they can rely on a logistics partner for reliable cargo handling and for meeting their diverse needs effectively.

Behind this promise of reliability lies HACTL's huge investment in IT. Over the years, the company has been investing in the revamp of its IT infrastructure to meet the increasing demands from clients for information and 24 x 7 service availability. Ongoing initiatives, such as e-freight, also demand reliability, better manageability, and increased data volumes.

Downtime is not a luxury HACTL could afford either. "To maintain HACTL's leadership position as a premier air cargo terminal operator in the region, we must deliver the highest available uptime and business continuity for our operations,"¹ said Andy Bien, General Manager, Information Services, HACTL.

So the company decided to upgrade its business continuity plan and develop a forward-looking disaster recovery plan. All Mr. Bien and his team needed was an IT solutions provider that could deliver in five key areas:

- ▶ High Availability: The cargo business requires HACTL's infrastructure to be available 24 x 7. This means that all non-scheduled outages, changes, and migration needed to be streamlined to reduced downtime.

¹ http://www-01.ibm.com/software/success/cssdb.nsf/CS/LMCM-7MDVJU?OpenDocument&Site=sttotalstorage&cty=en_us

- ▶ **Disaster Recovery:** For a mission-critical cargo business like HACTL's, disaster recovery is an important risk management strategy that assures its clients that their data or its integrity will not be compromised.
- ▶ **Backup and restore:** In addition to disaster recovery, HACTL wanted to improve its backup and recovery times, so as to provide additional data protection and improve the company's reactions to unforeseen circumstances.
- ▶ **Utilization:** With reducing carbon footprint becoming a key business concern worldwide, HACTL sought to improve IT resource utilization and decrease energy usage, along with the reduction of total cost of ownership (TCO).
- ▶ **Scalability and Resource Management:** To make sure that the company is able to optimize upcoming business opportunities and expand its own business, HACTL wanted to improve scalability and manageability of its IT Infrastructure.

After an exhaustive search, their needs were answered by IBM's proven expertise and innovative solutions.

Rebuilding the foundation

HACTL's road to enhanced reliability began with a detailed study of its existing IT infrastructure by IBM. This culminated in a blueprint to enhance its existing storage infrastructure using a slew of virtualization, new disaster recovery, and innovative backup features from IBM that provided an all-round answer.

Virtualization ensures that HACTL would not be limited by IT resources availability and could rapidly deploy new services as business needs dictated. This not only dramatically reduces overall operational costs, but also improves IT-business alignment so that the company can dynamically respond to market changes.

The IBM answer to HACTL began with the enterprise-class IBM System Storage DS8300 storage server and IBM System Storage SAN Director. Together, they improve infrastructure scalability by 11 times and eliminate all previous single points of failure.

After consolidating HACTL's enterprise storage infrastructure, HACTL decided to take a step forward with the deployment of IBM System Storage SAN Volume Controller (SVC). Through its innovative use of storage virtualization, the SVC helped HACTL to virtualize the second- and third-tier storage that simplified storage management, and to easily deploy a Service-Oriented Tier Storage architecture that was more aligned with its business needs.

With all this information managed in one single, centralized location, data protection became paramount for success. So IBM deployed the IBM Virtual Tape Library TS7500 that overcame the limitations of physical tape solutions. It minimized the physical impact on tape drives, halved the backup window, and improved utilization through the use of virtual tape drives and cartridges that could be easily increased according to the company's needs.

With data scalability, management, and data protection improved, the next step was to bolster disaster recovery. So IBM deployed the latest mirroring technology, Metro Mirror, which enhanced HACTL's disaster recovery capabilities. It increased high-performance data synchronization by over eight times with no performance impact, and guaranteed zero data loss.

IBM TotalStorage® Productivity Center completed the entire comprehensive solution portfolio from IBM by centralizing enterprise storage infrastructure monitoring and management. Its tight integration with IBM solutions and enhanced data management features enabled granular management of large data volumes. Essentially, it gave back control to HACTL's IT

administrators and allowed them to manage HACTL's large pool of data more efficiently and effectively.

Conclusion

The enhanced storage infrastructure not only cemented HACTL's pole position in the air cargo industry but also enabled the company to maximize new business opportunities as the gateway to Mainland China.

"IBM helped us meet this challenge through a comprehensive evaluation of our business and by providing end-to-end solutions with professional project management service. Thanks to IBM, HACTL has built a more robust and resilient infrastructure that enhances our service delivery and positions us well to maintain our leadership role in the air cargo industry,"² said Mr. Bien.

HACTL was equally impressed with IBM's dedication and expertise that helped the company design and deploy the entire infrastructure in only six months, surpassing initial timeline expectations.

"The skills and dedication of IBM's team combined with IBM's innovative technology provided a perfect recipe for a smooth implementation. As a trusted technology partner, IBM understood – and helped us to address – our current and future business challenges," concluded Mr. Bien.

Additional case studies

More case studies can be found at the following addresses:

<http://tinyurl.com/4dytt4>

<http://tinyurl.com/dfrcnc8>

Summary

Information has become the lifeline for business sustainability and competitive advantage. Firms of all size are searching for practical ways to create business value: to get their arms around information, correlate insights, and to confidently predict outcomes and take action. For CIOs, the information era poses unique challenges: how to cost-effectively store, archive, and retrieve a virtual explosion of new information, how to protect and secure that information, meet compliance requirements, and make it accessible for business insight, where and when it is needed.

IBM is paving the way to help our clients implement information infrastructure solutions to manage their skyrocketing data more securely and efficiently. IBM has announced, and will continue to announce throughout 2009, new and enhanced products, services, and solutions to help our clients increase efficiencies and reduce risks.

² http://www-01.ibm.com/software/success/cssdb.nsf/CS/LMCM-7MDVJU?OpenDocument&Site=sttotalstorage&cty=en_us

Other resources for more information

As you may imagine, a company that is the size of IBM has an immense amount to offer. In this section, we have tried to consolidate some of the links that we have found useful in the past.

Videos and podcasts

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http://www.ibm.com/software/info/television/index.jsp?lang=en_us&cat=storage&media=ALL

Web links

- ▶ For more information about SAN, see *Introduction to Storage Area Networks*, SG24-5470, at the following address:
<http://www.redbooks.ibm.com/abstracts/sg245470.html?Open>
- ▶ For more information about IBM Redbooks®, go to the following address:
<http://www.redbooks.ibm.com/>
- ▶ For more information about using IBM for your SAN needs, see “Why IBM for SAN?” at the following address:
<http://www-03.ibm.com/systems/storage/san/why/index.html>
- ▶ For more information about the IBM/Brocade portfolio, go to the following address:
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- ▶ For more information about IBM System Storage products, refer to “IBM System Storage product guide - a quick reference for all IBM System Storage solution products” at the following address:
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- ▶ For more information about comparing SAN products, refer to the “IBM SAN product comparison guide” at the following address:
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- ▶ For more information about Information Infrastructure for mid-sized businesses, go to the following address:
http://www-03.ibm.com/systems/storage/news/center/market/smb/index.html?wm=7124001f4777&cm_sp=CT555-_-EV107A6-_-4777
- ▶ For more information about the Storage Information Infrastructure, go to the following address:
http://www-03.ibm.com/systems/storage/news/announcement/20090210_annc.html?wm=7124001f4771&cm_sp=CT555-_-HW200-_-4771

- ▶ For more information about IBM Storage on Twitter, go to the following address:
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- ▶ For more information about storage virtualization, go to the following address:
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- ▶ For more information about IBM Solid® State Storage, go to the following address:
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