



# The Business Case For Networked Storage

*Real world examples of how  
networked storage can reduce  
costs and improve performance*

EVANS RESEARCH CORPORATION

Jennifer Ewen, Senior Market Analyst – Storage Products

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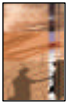
## Introduction

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The data storage requirements of Canadian businesses are exploding, with the amount of data to be stored doubling every 12 to 18 months. This is fueling unprecedented growth of storage technologies. New storage products are announced almost weekly, and the majority of these new products are networked storage, either Storage Area Network (SAN) products, or Network Attached Storage (NAS). These technologies were developed to address the limitations of traditional direct-attach storage in a client/server environment.

A SAN is a new high bandwidth network dedicated to storage traffic. This network connects storage devices to servers, such that all storage is available to all servers. A NAS is an optimized file server, complete with its own operating system and hardware, which is connected to the existing LAN infrastructure. These devices are simple to install, administer and maintain. In the past, NAS has been seen as a departmental solution, while SAN was an enterprise solution. Now, the distinctions between these two approaches are blurring, with high-end NAS products supporting clustering, and entry-level pricing on small SANs. In addition, new SAN-NAS fusion products are appearing, which allow organizations to exploit the benefits of a combination of SAN and NAS.

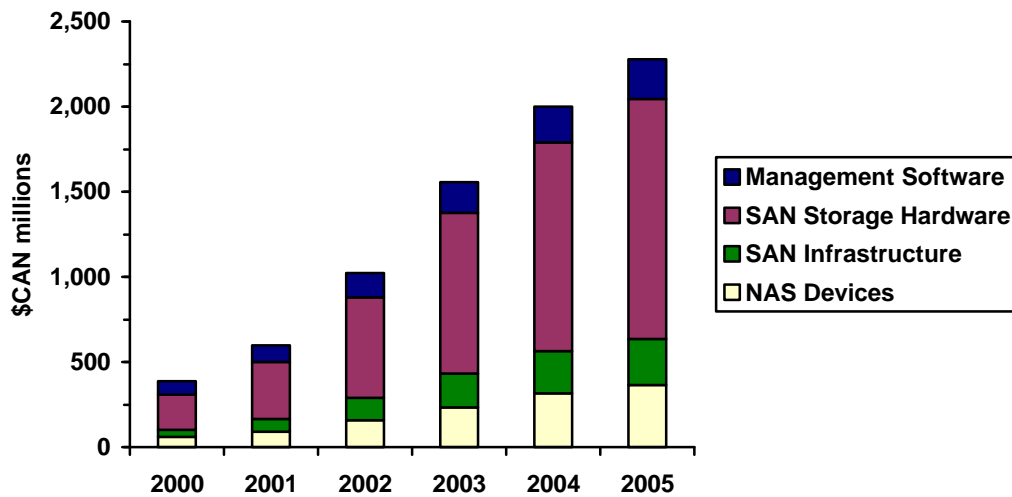
This paper will examine why networked storage is becoming the predominant form of storage in client/server environments. It will look at growth of this market in Canada in the past, and provide projections for future growth. As well, an in-depth look at the business value that storage networking gives over traditional direct attach storage will be taken. This business value is illustrated by a variety of case studies from across Canada and around the world.



## Market Forecast

Strong growth is projected for all types of storage networking products. This growth does not, however, represent new spending. Spending on networked storage will come at the expense of budgets for servers and traditional direct-attach storage.

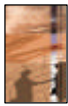
**Exhibit 1: Canadian Networked Storage Market  
2000-2005**



The total value of the Canadian network storage market is expected to grow at a compound annual growth rate of 37%, from less than \$390 million in 2000 to over \$2.2 billion in 2005 (all amounts in Canadian dollars). There are, however, somewhat different market dynamics in each component market.

The market for Network Attach Storage (NAS) devices was worth approximately \$90 million in 2001. This is an increase of 50% from the prior year, which was somewhat lower than expectations. The entry of many new vendors has lowered overall prices and revenues in this market. In 2002, these newer entrants are expected to attract new customers to grow the total market. Consequently, next year the NAS market is expected to show an even stronger growth next year of 75%, bringing total revenues to over \$150 million dollars. More modest growth is expected in subsequent years, as price competition increases. By 2005, total revenues in this market are expected to exceed \$360 million.

SAN infrastructure includes devices for the interconnection of multiple storage devices and servers, such as switches, directors, and host bus adapters in both Fibre Channel and iSCSI environments. This market grew 76% last year to \$75 million.



Continued strong growth is expected in 2002, as SAN adoption rates increase. By 2005, this market will be valued at \$272 million.

The SAN storage hardware category covers the disk and tape storage devices in a SAN configuration. This category is the largest contributor to revenues in the networked storage market. In 2001, this segment grew 63% to \$337 million. In spite of declining costs per megabyte, growth is expected to continue to be strong, as IT budgets shift from direct-attach storage to networked storage. Revenue in this segment is expected to grow to \$590 million in 2002, and increase to over \$1.4 billion by 2005.

The software category includes dedicated storage virtualization products specific to the SAN environment, as well as more generic storage management tools and utilities, which work in a variety of environments. In 2001, this market was worth \$97 million, up 24% from the previous year. Growth is expected to increase substantially over the next year, as the high cost of storage management begins to impact profits. With static IT budgets, organizations will need to find ways to make the management of storage more cost effective. In 2002, the storage management software market will be worth \$145 million.

## **Limitations of Direct Attach Storage**

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Although the management of storage is a well-established discipline in the mainframe arena, users of client/server technologies in the mid-range space have not always given storage the attention it deserves. Typically organizations in a client/server environment have utilized the direct attached (DAS) model for storage, i.e., all storage is directly attached to a server, usually over a short SCSI cable. As additional storage space was required, storage was added to individual servers or more servers were purchased. The DAS approach has a number of limitations:

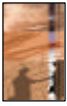
### **Scalability**

Storage in a DAS configuration is difficult to grow. As additional storage is required, the server must be taken offline to add the extra capacity. To avoid this downtime, IT managers often buy excess storage capacity in anticipation of future needs. Particularly in periods of declining hardware costs, it is more cost effective to buy capacity as it is required.

Furthermore, each server has physical and logical limitations in the amount of storage it can access. As storage requirements increase beyond the capacity of an individual server, storage may need to be spread among several servers. As the complexity grows, the management effort required will scale accordingly.

### **Availability**

When applications are not available due to server downtime, the productivity of employees is compromised. Downtime can be planned or unplanned. Unplanned downtime is a result of hardware failure. Planned downtime is necessary for capacity increases, as well as operating system and application upgrades. This cost of downtime can be considerable. Depending on the size of the organization, one hour of downtime can cost upwards of \$15,000 in lost productivity and lost business opportunities.



## Network Performance

As businesses move to 24/7 operations, backup windows are shrinking. This means backups have to be performed when the system is live. In a DAS environment, backup traffic flowing over the LAN infrastructure can compromise network performance for all users. Again, this loss of productivity is a quantifiable cost to the organization.

## Management/Staffing

Historically, organizations using client/server environments have not devoted enough human resources to storage management. As businesses rely on data as a mission critical asset, management of storage must include protection against both loss (through backups) and theft (through appropriate security provisions). Unfortunately, storage management is labour intensive, and therefore, expensive. Various estimates place the cost of managing direct attach storage between three and ten times the cost of the original capital expenditure.

Managing storage in a DAS environment is costly because it is complex. There are few multi-platform tools available to manage the storage pool as a whole. Consequently, each device must be managed separately, duplicating effort. As storage requirements increase, the staff required to manage it must also increase. Few organizations can afford to scale the IT department at a rate equal to the growth of storage. Because it represents such a large expense, management of storage is often the catalyst for the adoption of storage networking technologies.

# Business Case for Networked Storage

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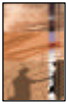
Fortunately, storage networking technologies have been developed to address the limitations of direct attach storage. The term network storage (or storage networking) encompasses many different technologies, including both SAN (Storage Area Network) and NAS (Network Attached Storage). In addition, there are software tools available that operate across SAN, NAS and DAS configurations. The advantages of storage networking may be realized by any of these technologies alone or in a combination that suits organizational requirements. Storage networking can address all of the limitations of direct attach storage.

## Scalability

Storage networking allows storage to be scaled as needs increase, preventing over-buying of capacity. SAN configurations are hot-swappable. NAS devices can be added to an existing network in minutes, and individual are often hot swappable, in case of failure. In addition, newer software tools allow a single view of storage, such that under-utilized resources can be allocated to areas of need. With the monitoring offered by such tools, disk utilization can be increased to between 80% and 90%.

## Availability

The hot swappable features of storage networking also has positive implications for data availability. Since storage growth and drive failures can be rectified without taking down the servers, application uptime is increased. This supports the “five nines” availability demanded by today’s 24/7 business operations. Furthermore, because storage



networking allows for the creation of point-in-time copies, multiple versions of corporate data can be maintained. This is particularly useful for OS or application upgrade testing. When testing can be completed on a true copy of business data, planned downtime is reduced. As planned and unplanned downtime is decreased through storage networking, productivity is enhanced.

### **Network Performance**

With storage networking, backups can occur in LAN-free mode, that is, offloaded from the main network backbone. With the heavy load of backup traffic removed, backups can occur at any time of day, without compromising network performance. With quicker network response times, staff productivity is increased.

### **Management**

Management and staffing issues represent the most compelling area of potential cost savings. The centralization possible with storage networking means that the amount of storage managed by each IT staff can increase. Some vendors report an increase of up to 10 times the amount of storage managed by existing staff with the implementation of storage networking.

In addition, centralization also allows organizations to take a more proactive role in managing storage. With storage networking, backups can be automated, freeing staff to focus on other important data protection tasks, such as security management. Therefore, storage networking not only increases the amount of storage each staff can manage, it also improves the quality of that management, so that data is better protected from loss and theft.

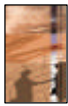
Storage networking technologies is a more cost effective approach to storage growth.

## **Calculating Costs**

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When considering the financial implications of implementing storage networking, there are three possible metrics to use: TCO (Total Cost of Ownership), payback, and Return on Investment (ROI). Although these three models are often used interchangeably, they represent three different approaches to calculating cost savings.

TCO methods are used to compare different technological approaches to solving a business issue, e.g., comparing growing storage requirements through direct attach or networked storage. This approach quantifies costs for each approach for both initial acquisition costs (the cost of the solution including all hardware and software, training costs, and implementation) operating costs (space, power consumption, and management costs). In addition, TCO should also include “softer” costs to the business for data availability, including the cost of lost business opportunities due to downtime or data loss. For each business issue, the TCO of various alternatives are considered, with the lowest TCO selected as the optimal solution.



TCO is used for each business issue, and is usually measured in a time horizon of three to five years. ROI and payback methods are used on a project basis. ROI and payback are often used interchangeably, but they are two distinct calculations.

Payback measures the amount of time the capital investment will be returned to the business in the form of operational savings. This is typically measured in months. Payback includes all the hard and soft costs for implementation, and a comparison of operating costs for the new solution compared to existing practices. A project with a payback period of less than 12 months should be implemented.

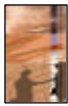
For ROI, the same data for payback are expressed as a percentage. That is, the future savings are seen as a revenue stream for the firm, producing returns as any other investment in capital. Projects are expected to produce a minimum return on investment for the organization. ROI is often used to rank the relative contributions of various projects across the organization.

Any of the sponsors of this white paper and their resellers would be pleased to assist you in quantifying the specifics of your situation. They can demonstrate how storage networking technologies can save you money, no matter which metric you prefer to use.

## **C o n c l u s i o n**

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Storage networking technologies are a cost-effective solution to the demands for increasing storage. These technologies offer real, quantifiable benefits over traditional direct attach approaches. The following pages are case studies detailing how different organizations have implemented storage technologies as a cost-effective solution to their business issues. These cases are only a sampling of how others have saved money and improved service through implementing storage networking.



## Vendor Case Studies

### County Saves \$375,000 by Buying Network Attached Storage Instead of Server

Located in the San Francisco Bay area, the County of Contra Costa is the ninth most populous county in California. A large imaging operation is required to maintain the County's real property records and vital statistics. "We operate on a first in/still here basis," said Barbara Chambers, assistant county recorder. "Because we are always adding records and never deleting any, we are faced with the need to continually expand storage space."

"There was a lot of work involved in maintaining two separate servers," said Jeana Pieralde, network technician for the County. "I spent about three hours a day cleaning out user directories, rebooting the system and performing backup operations."

About a year ago, the County began to run out of space on their existing servers. They considered purchasing another server but found the cost would be approximately \$300,000 for the new server and \$200,000 for storage. Adding another server would also add to the county's already fairly onerous maintenance requirements, so they began investigating the NAS approach.

Auspex won the bid for a NAS system at a price \$50,000 less than a system offered by a larger competitor. The installation process went very smoothly. Auspex worked closely with the County, so that it was up and running in a single day.

The original Auspex solution was configured with 500 GB of storage but it can easily be expanded to handle the county's requirements for many years to come. The NAS also has an attached DLT tape system that has dramatically reduced backup time requirements.

The Auspex NetServer cost \$125,000 compared to a \$500,000 cost for purchasing a new server and disk storage, resulting in savings of \$375,000. The NS2000 can be expanded to 9 terabytes of data storage, sufficient to handle the County's projected needs for decades.

"The NAS system also requires much less maintenance than our server attached storage, saving me about 10 hours per week," Pieralde added. "The DLT tape system backs up 100 GB per hour, making it possible to complete the backup process in only about three hours. Completing the backup so quickly greatly reduces our vulnerability to problems in the backup process."

**Customer Profile:**

Located in the San Francisco Bay area, the County of Contra Costa has a population of 930,000. The mission of the County Clerk-Recorder is to serve as custodian of public records and recorder of real property documents for the County, and to issue and register public documents.

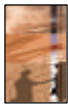
**Business Challenge**

The county was running out of storage space and didn't want to pay the high price of buying another server with attached storage.

**Solution**

Auspex NetServer:  
The county saved \$375,000 and reduced administration and backup time.





## BAKBONE'S NETVAULT PROVES ITSELF AT THOR•LO, THE WORLD'S LARGEST ATHLETIC SOCK MANUFACTURER

Thor•lo® is the original and world's leading sports specific sock brand which is available to consumers throughout the United States and in more than 35 countries, worldwide. Thor•lo's computer network stretches over three sites in North Carolina, each site with its own unique data needs.

The company's growing data storage load required the company to look at increasing its storage capacity. As the amount of data grew rapidly, Jay Harris, Thor•lo's IT director, found their existing backup software fell woefully short of meeting his growing challenges. "I don't have anyone on staff whose sole job is managing data backups and restores. So we have to keep up with what is on our tapes. And the old software didn't do that well: my operations managers could not restore lost data in a number of cases. And that's crucial; ultimately, nobody cares about backups. Restores are where it's at. When you need it, you need it...and you need it now."

Harris began looking for another alternative.

In the course of his research, Harris downloaded BakBone's NetVault software for an evaluation. NetVault is BakBone Software's award-winning, high-speed backup/restore software, combining unparalleled power with ease of use throughout the entire product lifecycle. It has been specifically rearchitected to meet the emerging needs of networked storage, including support for the full range of topologies, ranging from direct-attached to network-attached storage (NAS), storage area networks (SANs) and IP storage.

"Our evaluation was very straightforward," says Harris. "We installed NetVault and had it up and running and connected into R/3. We were doing test backups in less than 30 minutes, and that pleasantly surprised us.

Using NetVault, Harris says Thor•lo has been able to run its data backups and restores more efficiently and in less time. "NetVault did what we bought it to do. It has given us the assurance that the information we need to save will be there when we need it, and that we can easily manage to process."

### Customer Profile:

Thor•lo is the world's leading athletic sock manufacturer based in North Carolina. Due to the company's commitment to research and development, storage requirements have grown from 13GB to over 400GB in less than two years.

### Business Challenge

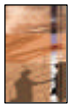
Existing backup software could not handle exponential growth of data, resulting in data loss.

### Solution

NetVault 6.03 running on Windows NT

"It's software that supports our needs today, and gives us the flexibility to expand tomorrow."—J. Harris, IT Director





## BROCADE BASED SAN PRODUCES 525% ROI FOR INTUIT

Brocade has developed a detailed ROI Model for use by Brocade and Brocade Partners to determine the anticipated benefits of an organization's SAN deployment – and the rate of return on the investment. The Brocade ROI Model focuses specifically on ROI and analyzes the return on an investment in terms of current monetary value.

Specifically designed to calculate the benefits of SAN-enabled applications through scenarios such as storage consolidation, high-availability clustering and backup and restore, the Brocade ROI Model uses the three common financial metrics of Payback Period (PP), Internal Rate of Return (IRR) and Net Present Value (NPR).

As an example, Intuit, a leading financial software company that files tax returns for 25% of US taxpayers, moved from direct-attached storage environments to Brocade based SANs. Within two months of implementing a Brocade-based SAN, Intuit increased its system availability and realized a 525 % ROI. As a result, Intuit:

- o can now dynamically provision terabytes of storage on demand resulting from a 300% ROI in 4 months from storage consolidation.
- o has reduced operational costs by optimizing storage, server, and personnel resources and enabled much more efficient data management. SAN enabled back and restore resulted in 125% ROI in 9 months and a reduction in backup time from 26 hours to 3 hours.
- o and has significantly reduced downtime during backup, minimizing lost revenue due to application/system downtime and realized through SAN enabled high availability a 525% ROI in 2 months.

Data storage has moved to the forefront of business concerns, growing at exponential rates. SANs have proven to be high-ROI solutions to data storage, offering reduced capital expenditures, increased IT staff efficiency, higher system and application availability, a highly scalable and flexible storage architecture, and an enhanced ability to exploit the full value of a company's information assets.

**Customer Profile:**

Intuit® has revolutionized the world of small business and personal finance by developing and marketing best-selling small business, tax preparation and personal finance software. Headquartered in Mountain View, California, Intuit employs more than 5,000 people, and reaches more than 25 million customers.

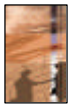
**Business Challenge:**

Lost revenue due to increased application system downtime and underutilized server storage, resulting in less efficient data management.

**Solution**

Implemented a Brocade-based SAN to reduce downtime and operational costs while increasing availability and scalability.





## SECRÉTARIAT DU CONSEIL DU TRÉSOR (QUEBEC TREASURY BOARD) IMPLEMENTS SAN SOLUTION TO IMPROVE PERFORMANCE, SCALABILITY AND INTEROPERABILITY

Safeguarding critical data requires storage solutions that reach across multiple platforms and provide data and storage availability, scalability, interoperability, high performance and superior management features to comprehensively address the challenges faced by organizations today. Confronted with these requirements, the Secrétariat du Conseil du Trésor chose BrightStor™ ARCserve Backup Storage Area Network Option from Computer Associates (CA).

Located in Quebec City, Quebec, the Secrétariat du Conseil du Trésor is a division of the provincial government responsible for the management of the Government's infrastructure including: human resources, financial information and technology resources. The Secrétariat du Conseil du Trésor is comprised of over 1,600 employees, divided into seven sectors. The sector for Direction Générale des Télécommunications (DGT) consists of 175 people, supported by an IT team of seven.

The IT team was faced with the daunting responsibility of managing and storing mission-critical information in an efficient manner for all government divisions. To assist the Secrétariat du Conseil du Trésor to meet their mandate of storing critical information, reducing back-up time and improving overall performance, the organization deployed BrightStor ARCserve Backup SAN Option, which was completed in December 2000.

The Secrétariat du Conseil du Trésor experienced significant improvements including:

- Dramatic reduction of backup time: more than a three-fold decrease. For example, the backup time for an Oracle database with a 15GB capacity was reduced to 2 hours from 7.
- Centralized management of the network backup function as BrightStor ARCserve Backup SAN Option operates enterprise-wide linking all servers to one operating console
- Flexible scheduling of backups without disruption to network traffic.

The implementation of BrightStor ARCserve Backup SAN Option provides the scalability required to meet the Conseil du Trésor's growing data management needs, while improving operating efficiencies and reducing costs.

### Customer Profile:

Located in Quebec City, the Secrétariat due Conseil du Trésor employs 1,600 and is a division of the provincial government responsible for the management of the Government's infrastructure including human resources, financial information and technology resources.

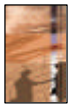
### Business Challenge:

The Treasury Board needed to reduce back-up time and improve overall performance in the management and storage of mission-critical information for all government divisions.

### Solution:

CA's BrightStor™ ARCserve Backup SAN Option  
The Board dramatically reduced back-up time more than three-fold without disruption to network traffic, and gained centralized management of the network backup function.





## RICE UNIVERSITY USES ISCSI FROM CISCO TO CONSOLIDATE STORAGE AND SAVE MONEY

Rice University realized significant financial efficiency as a direct result of its Internet Small Computer Systems Interface (iSCSI) deployment from Cisco Systems. Like many organizations, the university's storage growth requirements had previously been met by directly attaching storage to servers. However, Rice found that adding storage to servers was expensive to manage and inefficient. Server-attached storage is a point solution that does not accommodate a global approach to storage management. Because it was not possible to consolidate storage, the university's storage resource utilization was unacceptably low.

Rice's dilemma was not unusual. In fact, studies indicate that over half of server-based storage goes unused. To address the problem and provide a timely solution to a budget-breaking dilemma, Cisco introduced the SN 5420 Storage Router. Cisco's storage router provides the critical link between gigabit Ethernet and Fibre Channel. SCSI protocol blocks wrapped in TCP frames are converted to Fibre Channel Protocol or FCP. This provides a seamless link between the application and storage. As far as the applications are concerned, the storage devices appear to be directly attached.

Rice conducted an analysis and determined that new, more efficient operating practices were available with the advent of iSCSI-based storage networks. iSCSI uses a well-understood network and delivers a low-cost solution for consolidating storage. The result is equipment and staffing cost reductions through the improved efficiency that comes with iSCSI-based storage pools.

The University implemented a quad Fast Ethernet interface from their servers that trunked the quad interface for higher throughput and provided automatic failover among the trunked links. This solution takes into account that SCSI is both a physical interface and a protocol. Fibre Channel provides good switched access to storage, and iSCSI over Gigabit Ethernet is a cost-effective approach for connectivity for a larger number of servers. The net result is a hybrid system that uses the lower cost and networking advantages of Gigabit Ethernet linked into a Fibre Channel for access to multiple Fibre-Channel storage devices. Applications use the protocol to communicate with storage devices.

Cisco storage routers deliver the critical link between gigabit Ethernet and Fibre Channel. Cisco networks provide affordable network-based block storage solutions, delivering performance, growth, and flexibility. With the training and knowledge users already possess, now is a great time to transition to iSCSI.

### Customer Profile:

Rice University is consistently ranked one of America's best teaching and research universities. It is an independent, coeducational college of 4,500 full time students located in Houston, Texas.

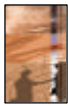
### Business Challenge

Existing direct-attached storage was not fully utilized. Increased storage requirements could not be met with current budgets for equipment and management.

### Solution

Rice University connected its existing storage resources on Fast Ethernet using Cisco's SN 5420 router affordable network-based block storage solutions, delivering performance, growth, and flexibility.





## ORCC SELECTS COMMVAULT'S GALAXY ENTERPRISE DATA & STORAGE MANAGEMENT SOFTWARE FOR XIOTECH SAN

The Ottawa Regional Cancer Centre (ORCC), an outpatient cancer treatment and research facility serving the needs of 16,400 plus patients each year was founded in 1943. The ORCC serves the National Capital Region, the Ottawa Valley and the Outaouais with hosted clinics in Cornwall, Pembroke, Renfrew, Perth and Hawkesbury community hospitals. The Centre provides high precision radiotherapy treatment and chemotherapy as well as information and resources that allow people to be active participants in their care by making informed choices.

The growing use of digital technology within this field has prompted ORCC to adopt a SAN solution. Xiotech supplied the Centre with a modern SAN storage solution that addressed current and future primary storage needs. The next step was to integrate a software solution that would protect the data assets of the Centre and accommodate newly defined business continuance practices. The Centre's data resides on Windows file systems, Exchange and Microsoft SQL Databases for which easy, granular, point-in-time recovery was a critical factor.

Through an evaluation process the Centre determined that CommVault's Galaxy was the most comprehensive solution. An enterprise class data and storage management software solution, Galaxy delivers unified and scalable data management for global resources, instant access to application-specific data and seamless integration with current and future networking environments for heterogeneous networks. "In addition to superior technology, CommVault provided creative and flexible licensing models that fit the operational environment of the Centre", said Sean O'Brien, ORCC's Manager of Information Systems. With policy based storage management through its single web based GUI, Galaxy offers an unprecedented level of simplicity.

Combining the new storage solution with the completely scalable enterprise class features of Galaxy will provide the Ottawa Regional Cancer Centre with expanded efficiency and data protection to meet their needs now and well into the future.

**Customer Profile:**

Located in Ottawa and the Ottawa Valley, the ORCC is an outpatient cancer treatment & research facility. The Centre's data resides on Windows File systems and Exchange and Microsoft SQL Databases.

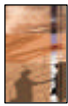
**Business Challenge**

To meet the increased demands of their SAN implementation and address the newly defined business continuance practices a new software solution needed to be integrated while remaining within strict budget guidelines.

**Solution**

CommVault Galaxy:  
An enterprise class solution that delivers unified and scalable data management and unsurpassed granularity all for a price that came in well under budget.





## HIGH-TECH UK FIRM USES DATACORE SOFTWARE TO DRASTICALLY REDUCE BUSINESS DISRUPTIONS

7 GLOBAL™ is a UK-based Business Services Aggregator that integrates best-of-breed business services from multiple Application Service Providers (ASPs). One of 7 GLOBAL's key services is CoreStore™, a storage service that encompasses a range of on-and-off-site storage solutions and comprehensive Storage Consulting Services. Critical to the success of CoreStore is its ability to provide reliable, available access to critical business information.

Graham Crich, Senior Vice President of Strategic Alliances at 7 GLOBAL, said, "Our customers demand continuous data availability, security, replication, backup and recovery, and that's why they turn to 7 GLOBAL. Disruptions of any sort are unacceptable. It doesn't matter whether it's planned maintenance or unplanned failure - to our customers it is still downtime that costs them countless business opportunities."

Crich concurs with analyst estimates that planned storage changes account for as much as 30% of downtime in web-based businesses. "We knew from the outset we could not tolerate that amount of downtime, even if it was planned and we could prepare for it, and that there had to be a way to control it." 7 GLOBAL, together with storage partners IBM and Hitachi Data Systems, set about finding a solution that would solve these issues.

"Our rollout of DataCore's SANsymphony software, with its comprehensive management tools and advanced storage control features eliminate storage-related interruptions, keeping CoreStore constantly running at full potential. Combined with a robust high availability architecture that ensures no single point of failure, and multiple disaster recovery options including Asynchronous IP Mirroring, these non-disruptive storage management capabilities give 7 GLOBAL a competitive edge in storage services."

For more information about 7 GLOBAL's use of DataCore products and their CoreStore architecture, download the "Business Solution" document available in the *eLiterature* section of [www.datacore.com](http://www.datacore.com).

### Customer Profile:

7 GLOBAL is the UK's first 'Business Services Aggregator', enabling businesses to remain focused on their core competencies rather than managing complex IT systems.

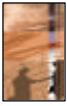
### Business Challenge

Needed a single management interface from which to control allocation of multi-vendor storage to heterogeneous operating system platforms. Must be able to adapt to changing technologies, infrastructures and trends. Required high levels of data availability.

### Solution

7 GLOBAL chose DataCore's SANsymphony software for its ability to provide a consolidated open storage networking platform and deliver multiple high availability options.





## DISASTER STRIKES!

On May 12, 2001, AnexTEK Global Inc. experienced a major fire at its corporate headquarters, which destroyed their office and much of their computer equipment. The fire was reported to be one of the longest burning fires in the history of Taiwan and it destroyed major portions of the 26-story building that housed AnexTEK's headquarters.

A month prior to the fire, AnexTEK signed an agreement with FalconStor to integrate FalconStor's IPStor product into AnexTEK's storage solutions product line and offer it as a new product called, IPSNS, IP-based Storage Networking Solutions. After receiving a beta version of IPStor, AnexTEK's engineers began installing and testing the software.

One of IPStor's major features, remote replication, was used to replicate their data from their local site to a remote site, which proved to be a blessing. AnexTEK engineers replicated about 1 TB of data over a standard ADSL line. The replicated data included E-mail, accounting, and logistics information, as well as data from their web, FTP and file servers.

The day after the fire, AnexTEK held an emergency disaster recovery meeting to discuss how to recover from the fire. "At that time," said Alex Kuo, AnexTEK President, "we feared the worst."

AnexTEK's engineers began checking the data that they had replicated to the remote site and found the data to be intact. "Replacing office equipment and finding a new office wasn't that difficult. Had we lost all of our data, it would have been a nightmare," said Kuo.

Temporary offices were found, new computer equipment, which included new servers, storage devices and switches, arrived and was quickly installed and connected.

The whole procedure of installing the new equipment and storage devices that contained the IPStor-replicated data took only half a day. According to Alex Liu, Technical Team Director, "We were really surprised how easy it was to implement our old data using IPStor." The beta test environment using IPStor's software saved AnexTEK a great deal of money and time.

### Customer Profile:

AnexTEK Global Inc., a subsidiary of the Acer Group based in Taiwan, is a provider of IP-based storage networking solutions, as well as DAS, NAS and FC-SAN RAID storage products.

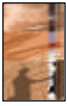
### Business Challenge

AnexTEK needed to bring their system back on-line after a major fire destroyed their offices and computer equipment.

### FalconStor Solution

AnexTEK gained first-hand experience in disaster recovery using FalconStor's IPStor network storage infrastructure software and its replication feature to recover from a fire that totally destroyed their headquarters.





## HEWLETT-PACKARD SOLVES STORAGE, AVAILABILITY PROBLEMS FOR CALIFORNIA SCHOOL DISTRICT

Teachers, students and parents in the Lemon Grove School District in Lemon Grove, California, depend on the “LemonLINK ” Intranet for access to school information, class instruction, office applications, and learning tools.

Noting an increase in users and a growing dependence on LemonLINK services by schools as well as various city agencies, the district came to Hewlett-Packard Company in search of a storage solution that could address three key issues:

- high availability and accessibility of stored data;
- scalability to grow the solution as students and teachers require more storage space and as the student population grows; and
- centralized management of storage resources for easier, faster recovery.

To address Lemon Grove ’s data storage needs, HP deployed a Storage Area Network (SAN) solution that provides easy access to stored data, as well as complete redundancy and centralized management – all in a scalable environment. Today, data that used to sit on hundreds of small, scattered disk drives now sits on less than 50 disk drives located in two racks in the Lemon Grove School District data center. Hot-swap spare hard disk drives keep the data stream flowing in the event of a disk failure, and tape libraries make it easy to restore users’ information using daily backups.

The new storage servers can be managed from a remote laptop, and storage can even be automatically allocated to a server if needed – all with no downtime. When growth and increased usage require more storage for the school district, Lemon Grove can also add additional storage capacity to the SAN with no service interruption.

“Hewlett-Packard ’s engineering team did an excellent job in delivering a robust storage design for our data network,” said Darryl LaGace, director of information services, Lemon Grove School District. “We have a lot of room to grow, we have a flexible growth strategy already in place, and the new solution has cut in half the amount of time I spend managing our storage.”

### Customer Profile:

The Lemon Grove School District, with eight schools that serve 4,600 students in grades K-8, supports a community of 30,000 residents located near San Diego.

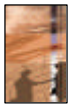
### Business Challenge

With more than 100 file servers located at the district’s data center, Lemon Grove’s disparate storage servers experienced an average 1.5 crashes per month. The schools’ instructional programs were impacted as service was interrupted to address the cause of each system crash.

### Solution

Lemon Grove installed HP servers, SCSI controllers, fiber optic switches and automated tape backup devices to create a storage solution with no single point of failure.





## ONE SHARK, TWO SHARKS

The British Columbia Institute of Technology (BCIT) is British Columbia's premier career-training institute. Since 1964, the Institute has earned a well-deserved reputation for producing job-ready graduates for B.C. business, industry and health care organizations.

The IT environment of the Institute is complex: four campuses, over 3,000 desktop computers, more than 30 Novell Servers, 5 NT servers, 8 RS/6000's, a Mainframe, a Mac server, and a robotic tape library. This environment was supported by over 10 Terabytes of "spinning usable disk", but analysis showed that only about 50% of it was actually being used, as each box was sized with disk for growth.

According to Neil McLagan, Manager of Technology & Network Services, scalability and management had become serious issues. "It wasn't possible to move disks from one system to another. We had no real way to manage the storage or monitor usage."

McLagan investigated storage networking technologies, to be able to expand storage for individual servers quickly and easily. After evaluating alternative products, the partnership relationship between BCIT and IBM as well as compelling pricing were significant elements in the decision making process.

The Shark installation went smoothly, and operation has been trouble free. In the first year the Shark was installed, there was only a single drive failure, which was automatically rebuilt on the hot spare.

One year later, another disk space forecast showed the need to add three terabytes to support new demands for storage. In addition, McLagan wanted to provide MIS staff with snapshots of production data they could use for testing. Following discussions with IBM, BCIT acquired a second Shark, and added FlashCopy to the original one.

Management of the subsystem has been easy and BCIT is frequently adding more disk space to a variety of different systems. McLagan is enthusiastic about the benefits of the Shark. "Management and expandability has been great. Reliability hasn't been an issue at all - it just runs! We have now had a total of four drive failures with no downtime", he said. "I feel we're well positioned for future growth, and have the flexibility to add additional shelves, and eventually expansion bays, to the Sharks as demand grows."

**Customer Profile:**

BCIT is well known for its ability to produce high quality graduates in technology, trades, business and health sciences. BCIT serves approximately 14,000 full time students and 24,000 part time students annually.

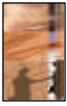
**Business Challenge**

Storage requirements were growing, yet existing storage resources were at only 50% utilization.

**Solution**

Initially, one IBM Shark was installed. Subsequent growth in storage requirements, led to the purchase of a second Shark.





## FIBRE CHANNEL DIRECTOR FROM INRANGE PUTS AUSTRIAN RAILWAYS ON FAST TRACK TO SMOOTH-RUNNING STORAGE AREA NETWORK

Significant storage growth began for Austrian Railways in 1998, when the company migrated from mainframe to client/server architecture. Coinciding with this change in direction was a substantial increase in the number of servers. This increase stemmed from a variety of broad new applications (SAP HR for human resources, data warehousing, archiving, and planning) as well as applications supporting such activities as rating, waybill management and billing, parcel service, railcar logistics, and fleet management.

From 10 UNIX and 7 NT servers in 1997 the numbers had mushroomed to 29 AIX and 35 NT servers just a year and a half later. Additionally, the servers were now processing almost eight times as much data and handling a smorgasbord of applications for 17,000 terminals.

It soon became clear that new ways of storing and managing data had to be found.

Up until this point, each business unit and each server had its own disks, but as servers and data volumes multiplied, Austrian Railways needed a way to switch flexibly between servers and storage systems in order to consolidate storage. Ensuring reliable transfer of the enormous data volumes between servers and storage subsystems required a high availability network with high bandwidth.

"This goal could be achieved best by a storage area network," explained Wolfgang Danzinger, IT Consultant at Austrian Railways. "So we decided to implement a Fibre Channel SAN with Fibre Channel hubs."

Austrian Railways relies on the high-availability design of the IN-VSN FC/9000 to help ensure connectivity between storage systems and more than 100 servers at its Vienna data center, supporting over 17,000 network terminals that require access to ticket vending, logistics, and other business-critical data on a 24x7x365 basis.

"The enormous data volumes being transferred made the infrastructure technology at the heart of our SAN vitally important," noted Danzinger. "The FC/9000 has enabled us to rein in runaway storage growth and its ability to scale to much larger port capacities using the same core architecture positions us well for future requirements."

Due to the FC/9000's simple, easy-to-use management features personnel costs could be reduced considerably. The same two employees who formerly managed 300 GB of mainframe data manage 5 TB of data today.

### Customer Profile

Headquartered in Vienna, Austrian Railways is one of the leading railroads in Europe. Employing more than 50,000 workers, Austrian Railways in 1999 reported traffic comprising of 180 million passengers and domestic and international transport of goods totaling in excess of 78 million tons.

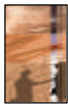
### Business Challenge

Runaway storage growth was compromising their ability to meet demanding uptime and performance requirements, and ultimately their ability to manage their storage network effectively.

### Solution

Scalable, Easy to Manage, Resilient SAN with the INRANGE IN-VSN™ FC/9000™ Fibre Channel Director at the Core





## LEGATO NETWORKER® 6 PROVIDES AUTOMATED, ROBUST SOLUTION FOR PROTECTING 32 TB DATA CENTER IN HETEROGENEOUS SAN

ONE, a leading telecommunications company headquartered in Vienna, Austria, has more than 1.5 million customers and is the only mobile communications provider with nationwide GSM 1800 quality in Austria. ONE has a network coverage of 97 percent and offers a variety of next-generation products, from its i-ONE Internet product and f-ONE landline network solution to its Take Two convergence product. ONE is the only mobile communications operator in the country to offer GPRS and ONE High Speed (HSCSD).

The company was founded in October 1988, and as the company grew, so did the amount of mission-critical data it must backup each day. "We have more than 32 terabytes of information," said Robert Ruisz, Technical Support Manager at ONE, "and that figure is increasing with each new customer. Because we operate in a 24x7 business environment, we needed a robust backup system that wouldn't impact daily operations."

From an IT perspective, ONE operates in a highly heterogeneous environment that includes Windows NT, Windows 2000, UNIX, Solaris, Tru64, HP-UX, and Irix platforms running Microsoft Exchange, Microsoft SQL, SAP R/3, and Ingres applications. In addition, ONE has many fast-growing Oracle databases that are in constant use. The need to free these databases from the performance impact caused by traditional backup methods also became a priority. "We have more than 1,600 employees using over 280 systems," noted Ruisz. "They're adding important financial, sales, and other data every day. We rely on that information to run the company, so data protection is one of my biggest priorities."

Besides being extremely labor and resource-intensive, ONE's data backup and storage procedures sometimes took so long to complete that it ran into business hours, locking users out of the system. "That type of downtime was unacceptable," continued Ruisz. "We began the search for a backup system that was high-performance, scalable, proven in the field, and easy to manage. After researching and testing other backup solutions, we chose Legato because NetWorker met all of our requirements."

### Customer Profile:

ONE is one of Austria's leading telecommunications companies. Their rapidly growing customer base is currently over 1.5 million clients. Their current online storage exceeds 32TB.

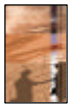
### Business Challenge

- Backup system was not keeping pace with storage growth and service level demands
- Data protection was taking too long and impacting business performance
- Backup process was labor and resource-intensive, not centrally managed

### Solution

A comprehensive implementation of Legato software gave ONE the ability to fully protect heterogeneous SAN environment and fulfill application service level requirements. The Legato NetWorker solution automates and centralizes backup operations, reducing overhead costs.





## AMERICA'S MOST RECOGNIZABLE HEALTHCARE INSURANCE PROVIDER ADDS FIBRE TO ITS STORAGE DIET

BlueCross BlueShield of Tennessee (BCBST) needed a way to consolidate its storage, connect multiple applications, and do so in a no-downtime, interoperable, cost-effective - yet easy-to-manage - solution. All the while data was growing at an explosive rate. BCBST also needed that solution to scale along with future growth, and allow for interoperability with multiple vendors. BCBST decided on a fibre channel storage area network (SAN).

By implementing a SAN with comprehensive SAN management software, BCBST has lowered overall IT costs, simplified the management and complexity of its storage infrastructure and has the highest reliability and access to its data and applications.

"Our organization increasingly benefits from our IT department, and our SAN is key to that transition," said Bob Venable, Enterprise Systems Manager, BCBST. "We've grown our business by 15 percent while at the same time improving corporate efficiency by 40 percent."

The amount of data traveling through BCBST's network has grown from 500 gigabytes to 46+ terabytes since 1995, while the manpower necessary to manage that data has not grown at all. The SAN solution already has saved BCBST a considerable amount of money and has never caused a bottleneck or network downtime.

After only a month running SANavigator™ SAN management software, BCBST saved more than \$120,000 using the comprehensive software's asset management features, and the SAN has experienced zero downtime.

"SANavigator helps us optimize our storage resources and gives us the ability to effectively manage 46+ terabytes of data and 4,000+ users with only four part-time administrators," Venable added.

BCBST understood that building a SAN with Director-class products at the core offered more stability and a much higher level of availability than one cobbled together with several departmental switches. McDATA® Corp.'s family of core-to-edge products also gives BCBST the ability to non-disruptively update its SAN.

### Customer Profile:

BlueCross BlueShield of Tennessee is Tennessee's leader in health care financing. Headquartered in Chattanooga, the company employs more than 4,300 people. In 2000 BCBST realized \$7.4 billion in revenue.

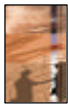
### Business Challenge

BCBST needed to consolidate a rapidly growing storage infrastructure, and do so with no downtime. Interoperability and high availability were crucial.

### Solution

McDATA Fibre Channel Storage Area Network and SAN management software. The county saved more than \$120,000 in the first month, reduced administration time, and experiences zero downtime.





## MANAGING INFORMATION IN THE INTERNET DATA CENTRE: AN AT&T CANADA CASE STUDY

Telecommunications companies and Internet service providers have strict uptime needs in terms of data. As data centre requirements continually increase, IT managers are looking for innovative ways to leverage scarce resources and provide users with reliable, high-performance access to information.

AT&T Canada's Brian Tao needed to ensure better backup and disaster recovery for customer data at Netcom Canada, a startup ISP company which has since merged with AT&T Canada. Tao, now Senior Manager of Internet Services and Infrastructure at AT&T Canada, decided to look into a NAS solution from Network Appliance.

Tao's first purchase from Network Appliance was an F220 Filer five years ago. Today, AT&T Canada has twenty-two Netapp Filers ranging from the departmental-class F740 to the enterprise-class F840. The majority of these Filers are clustered into highly-available redundant pairs, and provide the storage back-end for virtually all of AT&T Canada's Internet business, including Oracle databases, Microsoft Exchange, Apache web server content, HP OpenView installations, customer billing records and customer e-mail.

In terms of safeguarding customer data, Tao chose NetApp Filers because they have built-in RAID, which offers protection against data loss from disk failure, ensuring continuous access to data. Clustered failover and redundant components also furthered reliability.

Since the first NetApp purchase, AT&T Canada has been seamlessly adding NetApp Filers, which are easily installed and managed. Tao does not have to modify the network -- the appliances are easily integrated into the existing IP environment. NetApp Filers can be installed in 15 minutes and day-to-day administration requires only a few commands.

Moreover, scaling up has never been a problem. All Tao needs to do is add more Ethernet parts or Filers. To that end, AT&T Canada now services thousands of internal employees and hundreds of thousands of external customers on Network Appliance Filers.

### Customer Profile:

Toronto-based AT&T Canada's Internet and e-Business Solutions division provides email and Internet services for hundreds of thousands of Canadian business and residential customers.

### Business Challenge

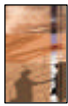
Telecommunications companies and Internet service providers have strict uptime needs in terms of data. AT&T needed to ensure better backup and disaster recovery for customer data.

### Solution

Clustered Netapp Filers, from Network Appliance: AT&T Canada has a highly available solution (>99.99% data availability) for consolidating data and simplifying data management.



NetworkAppliance®



## EDS CANADA GAINS COMPETITIVE EDGE WITH STORAGE TEK™ SAN SOLUTION

EDS Canada is Canada's foremost professional information technology (IT) services company. Recent success in winning web hosting for multiple clients meant that EDS needed to look at the way they were providing protection services to these customers.

Their current method of sharing backup devices required intervention at every host each time the server farm or the shared backup resources were changed. This in its self made management of this environment very difficult. Faced with a high rate of server deployment and the constant need to make changes to the storage environment to support this growth meant EDS needed to look for a solution that could accommodate this rapid growth without impacting current production systems. This system would also need to be robust enough to ensure service level agreements could be met with these individual customers.

The StorageTek solution consisted of one StorageNet 6000 (SN6000) Storage Domain Manager running the Virtual Transport Manager (VTM) software, an L700 Library with six 9840's, 3250 bridges and a 4116 switch.

The tape technology chosen was a combination of the L700 library and 9840 tape drives. The 9840's were the drive of choice for reliability and high speed to ensure EDS will be able to meet the Service level agreements (SLA's) for backup and restore.

By deploying the SN6000 Storage Domain Manager Solution, EDS Canada was able to realize savings by not having to put tape transports on each of the systems contracted to have their own "dedicated" backup solution. This consolidation also meant savings to storage management resources, as there was no need to manage multiple islands of storage (libraries).

The StorageTek solution gives EDS Canada a competitive edge because it allowed them to not only offer very fast and reliable backup and recovery services, but, it also gave them the ability to model these backup and recovery services so they could offer these services at a set rate even as the solution scales.

### **Customer Profile:**

EDS, the world leader in IT services, provides its customers with elements of strategic advice, applications and hosting that enable them to surmount the complexities of the digital economy. EDS Canada has 8,500 employees, and supports a diverse range of clients in both the public and private sector.

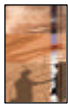
### **Business Challenge**

Success for EDS Canada has left them facing rapid growth of their complete IT infrastructure.

### **Solution**

EDS Canada achieved a cost effective, scalable backup and recovery solution for their enterprise, which is needed to keep them competitive in their market space.





## SUN MICROSYSTEMS HELPS DELIVER SUPERCOMPUTING POWER TO THE DESKTOPS OF CANADIAN RESEARCHERS

The High Performance Computing Virtual Laboratory (HPCVL) is a collaborative initiative between Carleton University, Queen's University, The Royal Military College of Canada, and The University of Ottawa that promises to enhance the opportunities for leading edge research and education.

The architects of the lab knew that to achieve maximum benefits from this collaborative venture, they needed access to highly reliable, available and scalable storage resources. They chose Sun, which offers researchers maximum flexibility and capability, for their secure virtual research environment.

The environment is comprised of 10 Sun Fire(TM) 6800 servers and more than 9 TB of Sun StorEdge(TM) T3 disk arrays. HPCVL's Sun(TM) environment is architected with 6.5 TB of storage capacity at its headquarters at Queens, and 2.6 TB distributed among the other universities.

At HPCVL headquarters, approximately 4 TB of Sun StorEdge T3 disk arrays are managed by one Sun Fire 6800 server. The StorEdge T3 disk arrays are connected to the server using a combination of direct attach and redundant fibre channel switches. This server acts as the master node in the HPC cluster and is the primary NFS file server for HPCVL's Sun HPC cluster.

Since HPCVL went operational in July 2001, the number of users have tripled as more students, faculty and researchers have access to the high performance computing resources. Throughout this growth phase, the Sun StorEdge T3 solution has performed and scaled effectively to meet the increased demand of users. At the current pace, demand is anticipated to double every 6 months.

The Sun hardware, software and storage technologies deployed within HPCVL represent key building blocks for HPCVL to architect a secure storage repository of data such as the research findings of current and future HPCVL members.

### Customer Profile:

The High Performance Computing Virtual Laboratory (HPCVL) was formed by a consortium of four universities in Eastern Ontario to provide researchers the High Performance Computing (HPC) resources they need to conduct innovative research in a broad spectrum of disciplines.

### Business Challenge

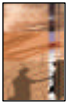
Researchers had substantial requirements for storage, and this storage needed to be shared between users and in a wide area network configuration for collaborative projects.

### Solution

Sun StorEdge T3, as part of a Sun hardware and software environment provided the scalability, reliability and redundancy required for supercomputing experiments.



take it to the n<sup>th</sup>



## SAN-NAS FUSION FOR GUANGDONG-TV

Guangdong-TV is a television station in China chosen as the official broadcaster of the 9<sup>th</sup> Chinese Sports Games. Like any broadcaster, time-to-air is critical to Guangdong-TV's business. In gearing up for the Sports Games, they discovered that with the eighty-five video-editing stations they had bought, a centralized storage system was the only thing that would get them on-air quickly.

Guangdong-TV needed a central pool of storage that would connect to nearly 100 computers. Each computer was used for creating and editing digital video, and each needed to access the shared pool to simultaneously to work on the same raw video files.

The station implemented a SAN-NAS Fusion system with storage virtualization. On the client side there are eighty-five client computers, each with both a 100baseT Ethernet connection and an optical Fibre Channel connection. Each workstation runs Tivoli SANergy software. Two computers similarly configured and clustered together act as a file-server for the centralized storage.

To meet their storage requirements, they installed twenty-four RAID controllers fronting 144 disks with a total capacity of eleven terabytes (TB). A Storage Virtualizer from Store-Age makes all twenty-four RAID controllers and their associated disks appear as just one very high-bandwidth disk subsystem. The clustered file-servers defined the 11 TB of storage as just four LUNs, each formatted with NTFS. Because of Tivoli SANergy software, the file-servers are able to share these four LUNs out to all eighty-five video-editing workstations via the Fibre Channel SAN. The workstations digitize video files and edit them in place on the central storage. Aggregate bandwidth on the central storage and across the SAN to the workstations exceeds 550 Megabytes per second.

Because storage is centralized with a single copy of data files as soon as a "story" is complete, any other workstation can play the story back "to-air". This networked workflow relegates videotape for use as only a video acquisition medium. SAN-NAS Fusion centralized storage allows Guangdong-TV to create and edit many more video stories and get them to air many times faster than ever before.

**Customer Profile:**

Guangdong-TV is a large television broadcaster in China. Like any company in any industry they're always looking for ways to accomplish their business more efficiently.

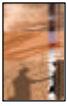
**Business Challenge**

With an upgrade to modern computer-based digital video editing systems, Guangdong-TV realized their old methods of sharing video material between multiple video editors would be too slow and inefficient.

**Solution**

A SAN-NAS Fusion connection between all their video workstations and centralized high-bandwidth digital data storage.





## VERITAS SOFTWARE INC. HELPS SANDIA NATIONAL LABS SOLVE STORAGE NETWORKING DILEMMA

How do you build a high-speed network, capable of transmitting large amounts of data, over long distances? This was the problem faced by Sandia National Labs as they design the next generation storage network for their Accelerated Strategic Computing Initiative.

Integrating a LAN, WAN, and SAN, is one of the most challenging problems facing Sandia. In addition to a high performance network, the infrastructure needed to be robust, providing automatic failover and the ability to provision additional storage without service disruptions. Quality of Service (QoS) and centralized management were also important features that needed to be addressed.

To address their storage networking needs, Sandia engaged VERITAS Software Inc., which recommended the use of two products from their broad suite of intelligent storage software. VERITAS, the world's largest storage software company, provides software solutions that give customers full command over their critical data, providing data access across diverse server, operating system, storage, and network environments. VERITAS Software provides customers with solutions that offer maximum performance, availability, and scalability.

To address the issues of online storage provisioning, automatic failover, QoS, and bridge the gap between SAN and LAN, VERITAS recommended its ServPoint Appliance Software for SAN. The ServPoint software transformed two Sun servers used in the project into a clustered pair of enterprise class storage servers that provisioned block level storage from a SAN and delivered it to the application using an early implementation of the iSCSI protocol. Utilizing core VERITAS technologies, ServPoint SAN exceeded the needs outlined by Sandia.

To address the issues of centralized management in a heterogeneous SAN environment, VERITAS recommended the use of its SANPoint Control software. SANPoint Control simplifies and centralizes the management of heterogeneous storage area networks (SANs) to enable control of all SAN resources, including logical volumes, fibre-channel adapters, switches, and storage devices.

With VERITAS, Sandia was able to successfully demonstrate their solution at the SuperComputing 2001 trade show in Denver, Colorado.

### **Customer Profile:**

Sandia is an engineering and science laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the US Department of Energy's National Nuclear Security Administration.

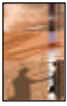
### **Business Challenge**

Integrating LAN, WAN and SAN, to meet Quality of Service objectives with centralized management.

### **Solution**

Veritas ServPoint for SAN to bridge the SAN and LAN, and Veritas SANPoint Control to allow centralized management of a heterogeneous SAN.





## Glossary

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These definitions are provided courtesy of the Storage Networking Industry Association (SNIA). For more information about SNIA's products and services, please visit their website at [www.snia.org](http://www.snia.org)

### **FC (Fibre Channel)**

A set of standards for a serial I/O bus capable of transferring data between two ports at up to 100 MBytes/second, with standards proposals to go to higher speeds. Fibre Channel supports point to point, arbitrated loop, and switched topologies. Fibre Channel was completely developed through industry cooperation.

### **Five Nines**

99.999%; usually used as a measure of uptime. At this level a given resource is available for all but 6 minutes per year.

### **GB (Gigabyte)**

Shorthand for 1,000,000,000 ( $10^9$ ) bytes. i.e., 1000 MB

### **HBA (Host Bus Adapter):**

An I/O adapter that connects a host I/O bus to a computer's memory system. Host bus adapter is the preferred term in SCSI contexts. Adapter and NIC are the preferred terms in Fibre Channel contexts. The term NIC is used in networking contexts such as Ethernet and token ring.

### **iSCSI (Internet Small Computer Systems Interface)**

The iSCSI protocol unites storage and IP networking. iSCSI enables the transport of block-level storage traffic over IP networks. It builds on two widely used technologies — SCSI commands for storage and IP protocols for networking. iSCSI is an end-to-end protocol for transporting storage I/O block data over an IP network. iSCSI uses standard Ethernet switches and routers to move the data from server to storage. It also enables IP and Ethernet infrastructure to be used for expanding access to SAN storage and extending SAN connectivity across any distance.

### **LUN (logical unit number)**

The SCSI identifier of a logical unit within a target (The system component that receives a SCSI I/O command.)

### **NAS (Network Attached Storage)**

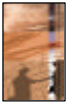
A term used to refer to storage elements that connect to a network and provide file access services to computer systems. A NAS Storage Element consists of an engine, which implements the file services, and one or more devices, on which data is stored. NAS elements may be attached to any type of network. When attached to SANs, NAS elements may be considered to be members of the SAS class of storage elements.

### **NFS (Network File System)**

A distributed file system and its associated network protocol originally developed by Sun Microsystems Computer Corporation and commonly implemented in UNIX systems, although most other computer systems have implemented NFS clients and/or servers.

### **Petabyte (PB)**

Shorthand for  $10^{15}$  bytes, i.e. 1 million gigabytes or 1 billion megabytes

**RAID (Redundant Array of Independent Disks)**

A family of techniques for managing multiple disks to deliver desirable cost, data availability, and performance characteristics to host environments.

**SAN (Storage Area Network):**

A network whose primary purpose is the transfer of data between computer systems and storage elements and among 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.

**SCSI (Small Computer Systems Interface)**

A collection of ANSI standards and proposed standards which define I/O buses primarily intended for connecting storage subsystems or devices to hosts through host bus adapters. Originally intended primarily for use with small (desktop and desk-side workstation) computers, SCSI has been extended to serve most computing needs, and is arguably the most widely implemented I/O bus in use today.

**Terabyte (TB)**

Shorthand for 1,000,000,000,000 ( $10^{12}$ ) bytes, i.e., 1000 GB or 1,000,000 MB

## S p o n s o r s

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Brocade (NASDAQ: BRCD) offers the industry's leading intelligent platform for networking storage. Using the Brocade SilkWorm® family of fabric switches and software, customers can connect servers

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Cisco Storage Networking is a comprehensive set of technologies, products, and partnerships that provides a networked storage infrastructure based on open architecture and industry standards. As an element of Cisco AVVID (Architecture for Voice, Video and Integrated Data), Cisco Storage Networking allows customers to adopt a strategy for accessing, managing, and protecting their growing information resources across a consolidated IP, Gigabit Ethernet, Fibre Channel, and optical network infrastructure.

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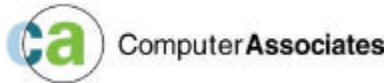
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CommVault® Systems provides enterprise data management solutions to ensure high performance data protection and universal availability. The company delivers simple, fast and scalable products that fit seamlessly into leading networking environments. The CommVault® Galaxy™ data protection product ensures speedy restoration of files, business-critical applications and databases in SAN, NAS or LAN-based infrastructures.

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FalconStor's award-winning product, IPStor, is a state-of-the-art storage networking infrastructure software suite, that utilizes off-the-shelf, industry standard components such as Fibre Channel, Gigabit Ethernet, iSCSI and SCSI devices to construct high performance FC and/or IP-based SANs in a very cost effective way. IPStor's "open architecture" allows enterprises to build customized, high performance, highly available, secure, easy to manage data storage environments (SAN and NAS) - independent of vendor, software platform, storage hardware or protocol.

[www.falconstor.com](http://www.falconstor.com)  
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