Storage Area Networks: The Superior Storage Solution

A Dot Hill Paper

Omar Barazza
Director, Disk & SAN Storage Solutions

Ted Uhler
Marketing Communications

October 2000

Table of Contents

EXECUTIVE SUMMARY

The traditional approach to collecting, storing and using data for strategic business purposes is no longer effective. For one thing, storage solutions based on traditional technologies are simply unable to handle the sheer volume of today's information explosion. And this data storage ***capacity*** problem is only part of several other storage-related challenges faced by companies that must compete in today's information economy.

The rapid growth of enterprise-wide applications, Internet transactions and other data-intensive business practices is also driving organizations to provide their customers with 24x7 data ***availability***. In addition, in order to keep impatient prospects and customers from seeking alternatives, businesses must provide high data throughput as well, i.e., ***performance***. These primary factors, together with such key storage issues as ***reliability***, ***scalability***, ***manageability*** and ***return-on-investment***, have led the storage industry to provide a better storage solution – one that offers proven, real-world business benefits.

That better approach – the superior data storage solution – is the storage area network, or SAN, over Fibre Channel. This paper discusses the critical factors that are driving the SAN revolution; compares traditional and SAN technologies; presents seven key SAN benefits and how they positively impact business operations; and concludes with an overview of why some of the most demanding customers in the world choose Dot Hill's world-class products, services and SAN solutions.

INTRODUCTION

One of the hottest topics in IT today is the storage area network (SAN). But what *is* a SAN? How can this technology benefit your business and customers? Is it important to define the "area" in "storage area network"? Is there a significant difference between "storage networking" and a SAN? And on and on the questions go: SCSI, Fibre Channel, IP, networking components, features/benefits, price/value, ROI, etc.

The truth is, it isn't that important whether you call it a "storage area network" or "storage networking," or whether you can define with precision the "area" in SAN, or even whether there is universal agreement over precise definitions, because, quite frankly, there probably never will be.

What's important is to gain a general understanding of the key concepts behind today's emerging storage technology. Why? Because the technology solves critical business challenges and provides tremendous customer benefits. What's also important is to know that these technologies are ever-changing and ever-evolving because they're based on meeting the ever-changing and ever-evolving demands of the marketplace.

Finally, and just as critically, it's important to develop an understanding of storage technologies because it will help you to become a more knowledgeable, discerning decision maker about storage products and services in general and, ***in particular, about the company that provides them – its reputation, track record and industry leadership.***

For this paper, we'll use the widely accepted storage industry acronym, SAN, since the term is so pervasive and is a short abbreviation. The key objectives of this paper are to discuss the following topics:

- The data explosion: Why a more effective storage solution is required.
- Traditional and SAN technologies: Key concepts and comparisons.
- The Dot Hill SAN advantage: Why Dot Hill offers the best SAN solutions.

THE INFORMATION EXPLOSION DRIVES THE NEED FOR BETTER STORAGE SOLUTIONS

Information – its tremendous growth ***and strategic use*** – is driving the need for new and better storage solutions. Whether we talk about the new economy or old, application service providers (ASPs) or brick-and-mortar operations, global enterprises or small start-ups – everyone in today's economy is creating, consuming and using data at ever-increasing rates.

This data – highly valued digital assets or business commodities – is becoming the currency of our interconnected global economy. To protect and grow your business, you need to protect and manage your digital assets.

So, data drives the need for better storage solutions. But what drives data creation, collection and use in the first place? It's simple: the need to conduct business and serve customers better, faster and more cost-effectively. Call it a desire to gain a competitive advantage. Call it a desire to do the right thing. Whatever the case, these efforts are very often accomplished through innovative computer and networking applications as well as Internet-based e-business practices, such as:

- Business-to-business and business-to-consumer e-commerce transactions.
- Corporate extranets, intranets and virtual private networks (VPN).
- Online trading and financial services.
- E-mail transactions and electronic faxing.
- Medical imaging, digital photo and streaming audio and video.
- Customer relationship management (CRM), enterprise resource planning (ERP) and similar large-scale application packages such as business intelligence (BI).
- Data warehouse and data mining systems.

The rapid growth of enterprise-wide applications and Internet-based online transaction processing is clearly responsible for the proliferation of what has grown to multi-terabyte databases within single organizations. The problem is many of the client/server LAN/WAN networks in use today, if based on the SCSI physical interface, simply can't handle the data storage load. But even more importantly, they are reaching their upper limits in providing effective data reliability, availability, scalability, performance and management.

That's why SANs have become the data storage solution of choice among today's leading-edge companies. SANs solve business challenges and serve customers better.

And research shows that the SAN market is growing rapidly:

- International Data Corp. (IDC) estimates that by 2003, almost half of all sales of externally attached disk arrays will be connected to a SAN, and total spending on storage solutions will grow to $53 billion.

- Forrester Research projects that over two-thirds of data administrators are considering SAN installations over the next 12 months.

- IBM predicts that by 2003, some 70 percent of all medium and large enterprises will install Fibre Channel SAN solutions.

- Dataquest forecasts a tenfold increase in terabytes shipped of RAID by 2003, compared to 1998; it also forecasts an increase of data management software sales from $4.2 billion in 1999 to $12.1 billion in 2003.

- According to Peripheral Concepts, more than 50 percent of today's shared storage will be reorganized into SANs by 2002.

THE TRADITIONAL APPROACH: SERVER-BASED STORAGE OVER SCSI

About twenty years ago, mainframe computing in the enterprise began to be replaced by the distributed, open systems client/server model we see today. Individual organizations throughout the world now have hundreds, perhaps thousands, of distributed servers and client systems in place to support ongoing business operations.

In addition, external storage is typically connected to servers through SCSI technology (discussed later). Disk arrays, either JBODs (just a bunch of disks) or different implementations of RAID (redundant array of independent disks) are ***directly attached to their particular, dedicated host servers***.

IT administrators commonly describe this as "host-attached" or "direct-attached storage," or DAS for short (see Figure 1).

Furthermore, servers, clients and external storage systems are interconnected on LANs and WANs, running various mission-critical applications. Because of this, most IT departments end up managing and maintaining a wide variety of different operating systems (NT, Linux, Solaris, NetWare, etc.), database software packages (Oracle, SQL, etc.) or other applications – and all on a variety of different hardware platforms (Sun, HP, Compaq, etc.).

Sound familiar?

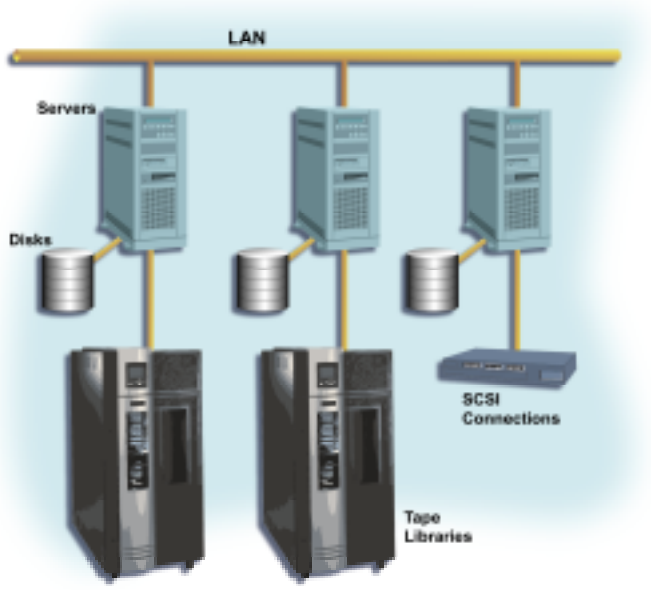

Figure 1: Direct-attached storage is the traditional approach

Effectively managing independent storage resources within this complex multi-operating system, multi-application and multi-platform network infrastructure has become unwieldy and costly. Here are just a few of the storage challenges that result:

- The costs of data and storage resource management escalate up to ***10 times the cost of managing centralized storage***, according to industry analysts.

- Other servers on the network cannot use disk or tape storage directly attached to a dedicated server, even when capacity is available and unused.

- Data stored on a DAS system can't readily and cost-effectively be made available to users through another server. To do so requires the creation of a duplicate copy and moving it to storage attached to another server, a process that degrades LAN/WAN performance.

- With data resources tied to multiple, heterogeneous operating systems and platforms, it is very difficult for an organization to coordinate and share the data for enterprise-wide applications or e-business opportunities.

- Normal application traffic and use of the LAN is severely impaired when backup and restore operations commence. LAN speeds slow to a crawl and server applications lag; a congested network can even become unusable. In any 24x7 business environment, this would be unacceptable.

SCSI Technology Remains Viable

Traditional storage systems are based on the small computer systems interface (SCSI), a physical transport and bus architecture, originally designed for the small computer environment. SCSI uses dedicated, parallel cabling between servers and disk arrays, tape libraries or other storage devices.

SCSI is, and has been, a proven, reliable interface. It is easy to implement and is supported by readily available, low-priced components. Storage systems based on the SCSI interface provide a relatively simple but robust and cost-effective solution.

The technology has advanced from its original 5 MB/sec data transfer rate to today's 80 MB/sec rate, based on the latest Ultra SCSI implementation using low-voltage differential (LVD) technology. With proper configuration, RAID arrays can be removed and replaced (hot plugged) without data loss and while data remains available.

SCSI is not just a physical transport or interface (a bus). It is also a protocol, which specifies a set of rules, commands and controls for sending blocks of data among servers and attached storage devices. It's important to know that SCSI protocol is, and has been, deeply embedded in the way popular network operating systems, especially Windows NT, handle read/write operations and user requests for data. The protocol is widely and effectively used, is an open systems international standard, and is anchored in IT environments throughout the world.

SCSI Has Limits

SCSI limitations, presented below, are based on characteristics of its physical parallel bus architecture, not on its protocol characteristics:

- Data throughput rates can bottleneck under high-volume, large data file or multimedia information transfers. Plus, if the SCSI bus is shared, actual transfer rates can slow to less than half the rated bus speed.

- The number of devices than can be attached to the SCSI bus is theoretically 15. However, in practice, usually no more than four or five storage devices can be attached to a server on a single SCSI bus. This limits total data storage capacity and therefore the ability to scale up to meet ever-expanding data growth.

- The distance between server and storage is restricted to 25 meters or less using LVD. As a result, all storage devices in the enterprise must remain in close proximity to their dedicated servers. Storage can't be centrally pooled, apart from the servers and applications they support. Plus, the ability to do remote data mirroring or vaulting is highly limited.

- SCSI cables and connections are bulky and somewhat prone to failure. In addition, every unused port on a parallel SCSI bus must be properly terminated. A fault anywhere in the SCSI chain can result in transaction errors, failures or a loss in data availability.

In sum, SCSI's architecture has some limitations in terms of speed, distance and data availability.

If the organization still uses direct-attached storage (DAS) based on the SCSI interface; and if it also has a complex multi-operating system, multi-application and multi-platform network infrastructure; then a new and better storage solution is needed so that the organization's digital assets are more effectively collected, stored, used, managed and protected. That new approach is the storage area network over Fibre Channel.

THE NEW APPROACH: STORAGE AREA NETWORKS OVER FIBRE CHANNEL

SANs over Fibre Channel represent a major departure, a true paradigm shift, from traditional distributed computing networks where storage is directly attached to their dedicated servers using SCSI's parallel bus interface technology. The SAN, a high-speed, high-performance network, permits multi-platform servers with heterogeneous operating systems to "talk" to multi-vendor storage devices as equals. The data in storage is liberated and can now be used far more effectively and flexibly for strategic business purposes. With a SAN, a ***data-centric*** model replaces the ***server-centric*** model of traditional IT infrastructure. Sometimes referred to as the "network behind the servers," the SAN allows "any to any" connectivity of servers to storage, using storage resource management software and interconnect components such as routers, gateways, hubs and switches. Multiple servers can access multiple storage systems through redundant paths, resulting in much higher data availability and speeds (see Figure 2).

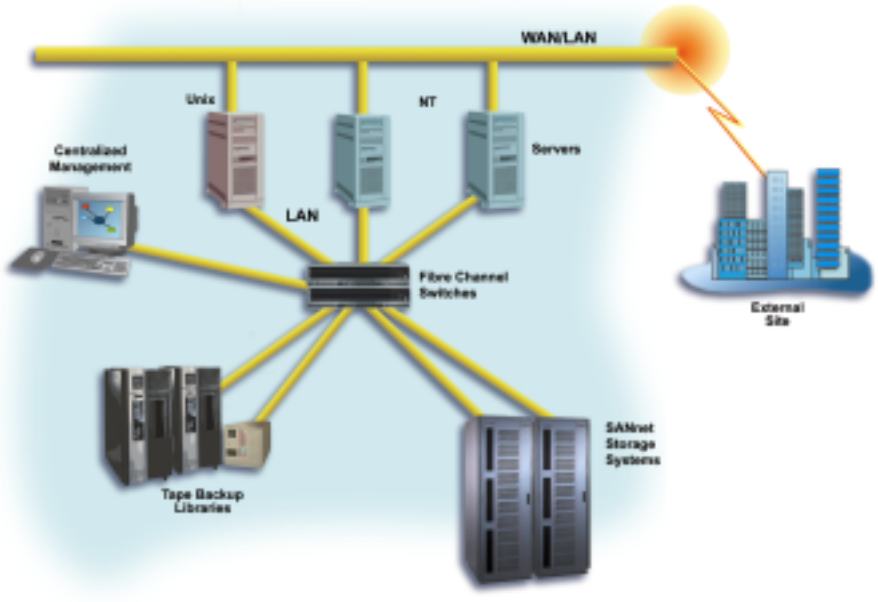

Figure 2: The SAN: the superior storage solution

All of the storage challenges listed earlier under "Server-Based Storage Over SCSI" are eliminated under the Fibre Channel SAN. For example:

- IT administration costs associated with storage are significantly reduced because storage is now centrally managed.

- Servers on the SAN can access available disk or tape drive space on other SAN-attached storage devices.

- Users can access data on any storage system on the SAN quickly and cost-effectively; the server no longer blocks access to the data.

- Organizations can effectively create, store, coordinate and share data for strategic, enterprise-wide applications or e-business opportunities and transactions.

- Because a SAN is a dedicated storage network, which is separate from the LAN/WAN, normal application traffic and use of the LAN/WAN is not impacted when backup and restore procedures are undertaken.

- Of utmost importance, a new device can be added to, or a failed device can be removed from, the SAN without interrupting normal operations, i.e., SAN components are "hot swappable" – practically eliminating downtime.

Fibre Channel/SCSI Interface Compared

Fibre Channel technology was specifically developed to address limitations (listed earlier) of the SCSI physical interface. Here's a brief summary and comparison:

- SCSI's current maximum data transfer rate is 80 MB/sec; Fibre Channel: 100 MB/sec.

- SCSI can support a maximum of 15 storage devices per connection. The two common Fibre Channel topologies in use today are arbitrated loop and switched fabric (a technical description is beyond the scope of this white paper). The maximum number of storage devices supported with arbitrated loop: 126; the maximum number with switched fabric: 16 million.

- The maximum distance between server and storage under SCSI is 25 meters, using LVD. With Fibre Channel, the media determines the distance between servers and storage devices; you choose the media based on your specific needs. The maximum distance between devices is 30 meters using copper cable, 500 meters using multimode optical fiber, and ***more than six miles*** using single mode optical fiber.

- SCSI cables and connections are less fault tolerant than Fibre Channel. Plus, with Fibre Channel there are fewer connection points and no terminations to worry about. Downtime is significantly reduced and data availability remains high (see Figure 3).

	Fibre Channel (arbitrated loop)	SCSI Interface
Transfer speed	100 MB/sec	80 MB/sec
# of devices	126	15
Distance covered	6 miles (with fiber optics)	25 meters
Fault tolerance of wiring	More	Less

Figure 3: Fibre Channel vs. SCSI

Fibre Channel is an open systems technical standard and interface. It supports multiple protocols, including the popular SCSI protocol discussed earlier. The Fibre Channel SAN offers a very high degree of availability, reliability, performance, scalability, flexibility and cost-effective manageability. The technology is broadly supported by vendors and widely accepted by users throughout the IT industry and business community.

KEY BUSINESS BENEFITS OF THE FIBRE CHANNEL SAN

Here's a summary of the key benefits of Fibre Channel SANs presented so far, including a few others not yet discussed – all from the perspective of how they positively impact business:

Storage Consolidation Lowers Overall Costs – SANs enable storage devices to be consolidated or "pooled" (both physically or logically) by separating storage from servers. In traditional client/server models, a great deal of available disk space went unused. Consolidation can also be achieved when storage is connected to servers at greater distances.

Storage or Servers Can be Easily Added to Accommodate Growth Without Disruption – Under the old approach, only a limited amount of disk storage could be physically connected to its dedicated server. With a SAN, disk storage can be added independently of the server; the amount of storage that can be scaled up is virtually unlimited, accommodating even today's explosive data growth. Storage capacity can be added "on the fly," allowing information to remain accessible while operations continue. Plus you can change your storage configuration on a regular basis to meet competitive or business challenges. Servers can be added to the SAN, permitting applications to run faster; plus, servers can be added online without disrupting data access (see Figure 4).

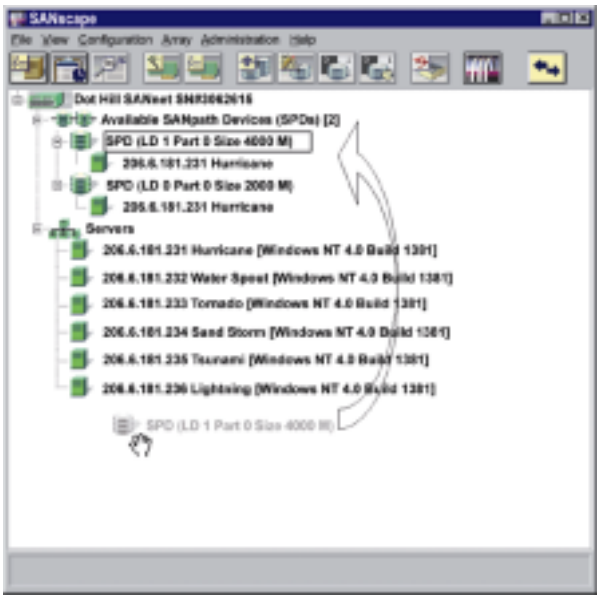

Figure 4: Make changes without disruption

Data is Backed Up and Restored Faster While the LAN Remains Operational and Business Continues – Under the traditional approach, data backup and restore functions usually prove very disruptive to the normal operations of the LAN. The backup takes too long while user and application access slows to a crawl. Customers are told that the network "is really slow" or "down." With a SAN, data backup and restore functions occur much more quickly and don't impact LAN operations. This new "LAN-free" approach involves streaming backup data to high-speed tape drives or other devices. Businesses that operate in multiple time zones, engage in e-commerce or operate 24x7, insist on this SAN benefit.

High Performance Interface Promotes Faster "Time to Market" in Today's Quick-Paced Business World – Fibre Channel technology allows the modern SAN to deliver data transfers at 100 MB/sec., far surpassing typical LAN data transfer speeds. Businesses keep better pace with rapid change and customers receive faster service. Speed rules, particularly in e-commerce situations, and Web customers especially are an impatient lot; they demand fast transactions or they move on.

Server Clustering is Enabled, Leading to More Reliable Operations & Higher Data Availability – A server cluster is a group of independent computers tied together as a single system to enhance reliability and scalability. The SCSI interface tends to limit clusters to no more than two servers. The fewer the servers, the more vulnerable the business is to network downtime if failures occur. With a SAN and software, you can add four, eight or more servers to the cluster "dynamically," meaning that your network is not disrupted and data remains available. With more servers, storage can be switched and shared among the servers. And, the SAN provides redundant pathing to the servers and better RAID protection too. Now, if something fails, the hardware, network and applications remain functional, data remains accessible and the business remains operational (see Figure 5).

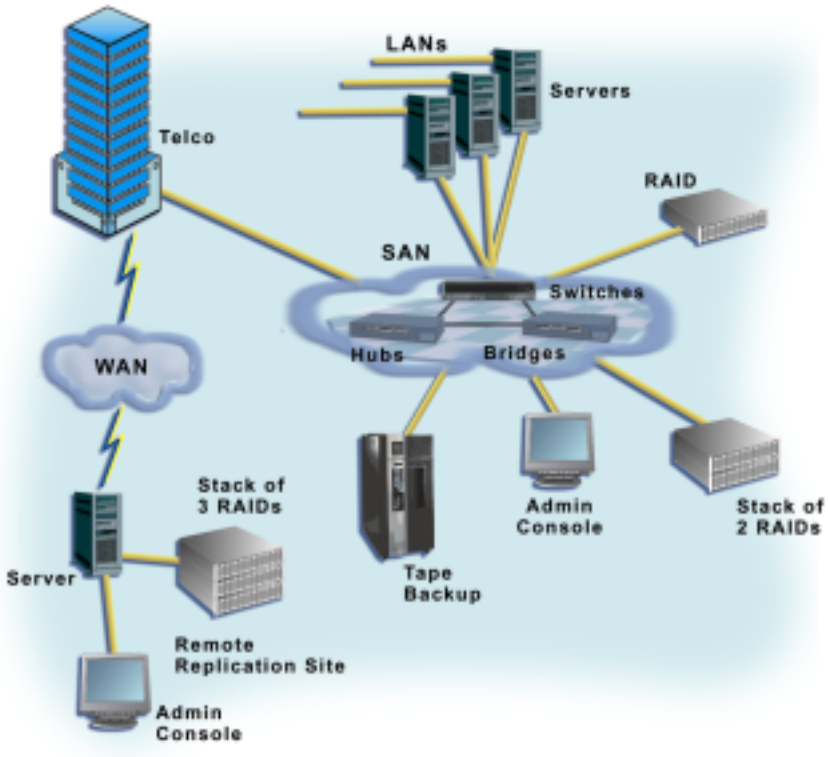

Figure 5: Clustered servers on the SAN

Disaster Tolerance & Recovery is Improved – Depending on your choice of media, a SAN allows you to physically separate servers from storage at much greater distances than SCSI technology. This permits ***significantly improved disaster recovery capabilities, which is one of the primary reasons organizations purchase SAN solutions***. For example, you can locate your primary data on a disk array miles away from your SAN servers, and you can locate another disk array, which mirrors your primary data, at a different distant location or even at a high-security co-location facility.

The Total Cost of Ownership is Reduced – A centralized storage pool can be managed far more cost-effectively than the traditional client/server model, where multiple administrators manage multiple but standalone servers and storage devices. With a SAN, all enterprise storage and related systems on the SAN can be monitored and managed from a single management console. Therefore you can redeploy your resources more efficiently while improving productivity. It is also far easier to conduct backup and restore procedures. Under the traditional approach, critical data stored on individual or departmental server/storage systems has to be independently and manually backed up by overburdened IT administrators; the process is time-consuming and costly. With a SAN, backups can be accomplished much faster, easier and at significantly reduced costs.

DOT HILL: FIVE STRATEGIC CUSTOMER ADVANTAGES

Dot Hill Systems Corp. is a leading provider of high-performance, open systems data storage and storage area network (SAN) solutions, serving cutting-edge enterprises and many of the world's foremost telecommunications companies, financial institutions, Internet and applications service providers (ISPs/ASPs), as well as key government agencies.

Dot Hill's products, solutions and services are among the best in the storage industry and are based on these five strategic customer advantages:

1. NEBS-certified, carrier-class, lab-tested products. Dot Hill's SANnet™ storage products are renowned for rigorous 99.9998 percent uptime reliability. These systems have been pre-tested in a controlled lab to meet the same reliability standards required by global telephone networks. This "carrier-class" standard, known as NEBS Level 3 (Network Equipment Building System), was developed by Bellcore and is required in telco central office operations. NEBS necessitates specific technological ruggedness – such as the ability to withstand earthquakes, dust storms and lightning strikes – to ensure that equipment remains operational even after a disaster.

With Dot Hill, your digital assets remain protected, secure and continuously available. If you have the need to protect or mirror your data off site, our NEBS-certified products are qualified for placement in the most secure co-location facilities.

Leading global corporations and dot-com enterprises running Internet-generation applications trust their businesses to Dot Hill's industry-leading storage systems.

We were ***one of the first companies in the world to offer a line of NEBS-compliant, carrier-class storage products and the only company to have its products certified by an independent testing agency***. Plus we're one of only a few storage companies in the world today that offers such products. We challenge you to find another storage company that can boast higher uptime reliability on its SAN product line.

2. Open systems storage solutions. Dot Hill committed to the open systems approach to storage since day one; now it's all the rage. We've advocated it since we began building top-of-the-line storage systems in the 1980s. We advocate it today and will continue to do so in the future. Our storage products are – and always have been – designed for open systems.

Our SANnet product line works in Unix, Windows, NetWare, Linux and other popular computing environments. We believe that companies get the best value for their money and protect their investments when they purchase non-proprietary, interoperable open-systems products and solutions.

Whom should you trust for your storage solution? You can choose from a list of companies that ***began advocating the open systems approach in the past few years*** (or just this year!). Or you can select a company like Dot Hill that has, since day one, made open systems a fundamental, strategic feature of its storage products and solutions. Dot Hill storage products have been developed on server technology right from the start. Our products have not been migrated from mainframe systems.

3. 24x7 global customer support. Dot Hill understands the importance of maintaining the continuity of your business. That's why Dot Hill operates one of the most advanced customer support network in the industry. Our worldwide team of technical support specialists and professional engineers are just a phone call away, everyday, anytime, from anywhere in the world. Now ***that's*** true peace of mind.

Our Global Response Centers are strategically located throughout the world to provide continuous 24x7 phone support. If you need help with a technical or administrative issue, simply call our hotline and you're automatically and immediately connected to a support specialist at the nearest center to you.

4. Superior price/performance relationship. Dot Hill's SANnet product line represents one of the best values for your storage investment dollar. In terms of pure performance, our SAN storage products not only match – but also exceed – anything that the competition currently offers. But that's only half the story. Despite the fact that our products are usually superior on a feature-to-feature, benefit-to-benefit basis, they are also priced to be extremely competitive with other storage products. Your ROI begins the moment you do business with Dot Hill.

5. Blue-chip customer base. In addition to winning accolades for technical achievements and storage industry firsts, Dot Hill's products have already been tested – and proven – by some of the most demanding blue-chip customers in the world. The successes of our storage solutions have led to sustained, long-term relationships, repeat business and storage products that have performed extremely well even under the most rigorous "tests by the best."

We serve domestic and global customers, most of which are involved in data-intensive activities. Examples include Internet service providers (ISPs), telecommunications firms, dot-com enterprises, e-business/e-commerce initiatives, financial services, health care organizations, key government and defense agencies, and large academic institutions.

DOT HILL'S SPECIFIC STORAGE SOLUTIONS

We not only manufacture and market our industry-leading SANnet™ line of disk systems, we also offer "best-of-breed" SAN components, storage software, and backup and restore solutions. Here's a quick overview:

SANnet™ -- Advanced Disk Storage Products

Our SANnet systems are used throughout the world and lead the storage industry in quality, reliability, scalability, flexibility, serviceability and performance. All SANnet products provide outstanding data throughput speeds.

As stated earlier in this paper, SCSI interface technology is still viable, and under the right customer conditions, is a worthy storage solution. Indeed, under the right customer conditions, a direct-attached RAID array is a viable solution. Because of this, Dot Hill offer a storage solution for just about any customer situation, from direct-attached JBODs or RAID arrays (with SCSI host/SCSI disk attachments as well as Fibre/SCSI hybrids) to SAN solutions with full Fibre Channel technology, i.e., Fibre to the host and Fibre to the disks.

Many customers prefer the flexibility to choose their storage options, particularly when they have made heavy investments in SCSI-based storage devices. With Dot Hill's SANnet storage products, customers can take advantage of some SAN implementation benefits while simultaneously using – and protecting – their existing SCSI hard drive investments.

Some customers order full Fibre Channel SAN solutions, scrapping older storage systems, while others add SAN functionality over time, retaining some of their legacy hardware. In any case, Dot Hill has the solution to meet your needs.

Below are just a few of the features and benefits of our SANnet product series:

- ***Redundant, hot-swappable, field-replaceable components***. Upgrade or service your SANnet while your network remains operational and your data remains available to customers. Our systems feature dual components for maximum fault tolerance, including mirrored cache to controllers, power supplies, fans and more.

- ***Rigorous 99.9998% uptime availability backed by NEBS Level 3 certification***. Previously discussed, our lab-tested, tough-as-nails equipment protects your data during and after unexpected mishaps, from fires or lighting strikes to earthquakes or dust storms. (see Figure 7).

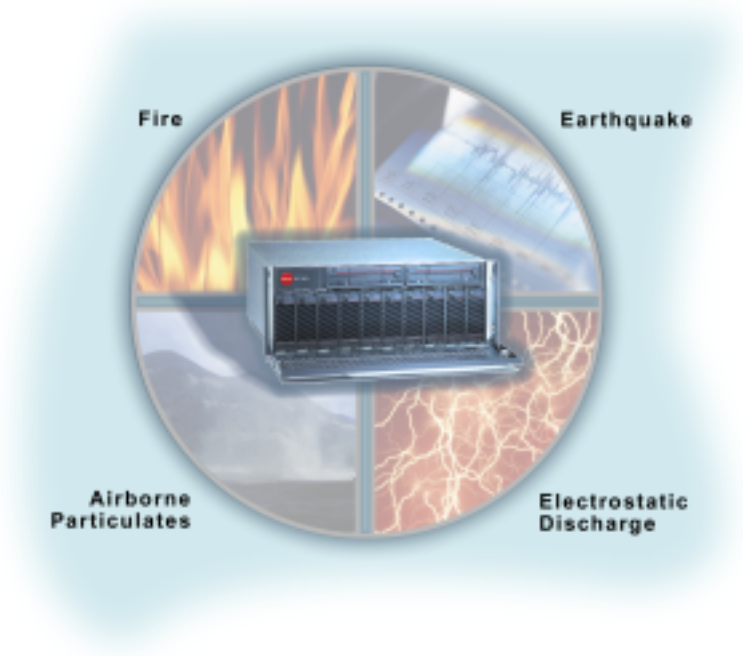

Figure 7: NEBS Level-3 Certification

- ***Unparalleled scalability***. The storage capacity of our disk systems can quickly and easily scale from gigabytes to terabytes. Our SANnet products are also mix-and-match, highly modular systems so that you can change your storage environment to meet changing needs while protecting your investments in existing hardware.

- ***Maximum flexibility***. SANnet solutions support single servers, or multiple heterogeneous servers simultaneously, and are compatible with today's popular open systems server platforms. This multi-platform capability allows you to standardize on a single storage system that can be reconfigured or redeployed as operating systems, platforms or open systems components change.

- ***Extremely compact rack enclosures***. Dot Hill's storage systems are dense, very dense – and that's a good thing. They are among the most space-efficient in the storage industry, maximizing your limited space and significantly reducing your overall costs.

Superior SAN Components

If you're interested in a high quality, high-performing Fibre Channel SAN solution, you'll not only want Dot Hill's exceptional disk arrays, but you'll need quality interconnection devices and components as well. To support our open systems SAN solutions, Dot Hill proudly provides ***only best-of-breed*** hubs, switches, routers, host bus adapters, etc. We offer a wide variety of devices, including advanced routers as well as switches and hubs from such world market leaders as ***Brocade, Gadzoox*** *and* ***Vixel.***

Exceptional SAN-Support Software and Backup/Restore Solutions

Dot Hill also offers the best SAN management software and backup and recovery solutions available. Dot Hill has developed excellent storage management software designed to integrate with our SANnet product line. The software suite, SANpath™ and SANscape™, enhances performance, simplifies data management and provides further redundancy for improved fault tolerance. Dot Hill has also ***partnered with the biggest and best names in storage software***. This allows us to offer our customers storage management software from such leading companies as ***Veritas, Tivoli*** *and* ***Legato***.

If you're interested in data backup and restore systems, either as part of a partial or full Fibre Channel SAN or as a LAN-based standalone solution, Dot Hill has the system for you. Marketed under Dot Hill's TANnet™ line of products, our experts work closely with you on the evaluation, design and implementation of an extremely cost-effective, high-capacity, high-performance backup/restore solution to serve your unique needs. We make this possible through our partnerships with ***industry-leading companies, StorageTek*** *and* ***Qualstar.*** Backup management software from Veritas or Legato makes the solution complete.

A FINAL WORD ABOUT YOUR SPONSOR

Dot Hill is a storage industry leader. Here are a few of our achievements:

- One of the first – and still one of the only – companies in the world to offer a line of NEBS Level 3-compliant, carrier-class storage products, and the only storage company to have its products officially certified as NEBS Level 3 compliant by an independent agency.

- First to offer a Fibre Channel-based storage system.
- One of the first to provide a turnkey SAN solution for the open systems market.
- The first to provide high performance storage systems for the Linux platform, and the only company that supports GFS dlocks within the RAID controller.
- First to offer a hot-swappable SCSI disk array and RAID storage system for the Unix market.
- One of the first companies officially recognized as a Sun Microsystems Original Equipment Manufacturer (OEM).
- One of only a handful of storage companies to receive the prestigious ISO 9002 certification for stringent quality control in the manufacture of carrier-class storage and SAN solutions.

CONTACT DOT HILL

For peace of mind, select Dot Hill for all your data storage and storage area network needs. We provide you with the competitive advantage – reliability, excellent ROI, maximum price/performance benefits, and an open systems solution that provides total flexibility and scalability. Whether market conditions are calm or volatile, smooth or unpredictable, with Dot Hill by your side, your data is effectively collected, accessed, stored, managed and protected so that you can focus your attention on what's critical – the growth and success of your business.

For a free, no-obligation consultation or storage needs assessment, please contact Dot Hill at 1-800-872-2783 and ask for our sales department; or you can e-mail us at websales@dothill.com. Please also visit the Dot Hill Web site at http://www.dothill.com.