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ESG White Paper

Storage for Mid-Sized Enterprises

Focus on NetApp

By Tony Asaro
Senior Analyst

July 2007

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The Mid-Size Enterprise Storage Landscape

Enterprise Strategy Group (ESG) categorizes mid-size enterprise companies and organizations as entities that have between 100 and 1,000 employees. These companies represent perhaps the most diverse group in terms of data storage compared to any other segment. Many mid-size enterprise companies have incredibly sophisticated storage networks and disaster recovery implementations while others still predominantly use direct attached storage (DAS) and there are a whole range of variations in between. Although it may be difficult to characterize the mid-size enterprise end-user, it is certain that their storage and data management needs are escalating across the board.

For some mid-size enterprise end-users, implementing a storage network isn't requisite. It isn't like other technologies must-haves, such as desktop PCs, servers, e-mail, Internet access, firewalls and LANs. Many other mid-size enterprise companies that have implemented storage networking still often have not networked 100% of their data. In fact, ESG has found that it is quite common for the majority of data to not be networked ecumenically among end-users.

The value of networking is well known yet why isn't storage networking more pervasive? The pain of direct attached storage (DAS) must outweigh the cost and effort required for implementing a storage network. This pain in a DAS environment includes the complexity of management, risk of data loss, lack of flexibility, wasted physical assets, power and cooling issues and the inability to scale. The total effort required for storage networking includes the capital cost of the equipment, the time it takes to plan, evaluate and implement and the complexity and resource requirements for ongoing support and management.

ESG believes that mid-size enterprise companies will increasingly find themselves between the devil and the deep blue sea. The demands placed upon their businesses—and therefore their IT groups—will require further adoption of storage networking and on the other hand, these very same demands consume so much time and so many resources that implementing any new solution will put a strain on already overtaxed assets.

Storage networking is not as pervasive, in midsize enterprise, as other IT apparatus and yet the value of networking is well known. ESG has found that the reason for this is that the total cost of switching to storage networking has been too high and the value not glaringly apparent. However, ESG believes that this is rapidly changing. The balance is shifting, causing the drivers and enablers to clearly outweigh the inhibitors.

Storage Networking: Inhibitors, Drivers and Enablers

ESG believes that storage networking adoption for mid-size enterprise is at the point of acceleration, including at new entrants that are about to embark on their first implementation and veterans that are going to expand their environments. There are three macro elements that impact the adoption of storage networking: inhibitors, drivers and enablers. The balance of these three elements impact adoption, and we feel that the balance has shifted towards the drivers and enablers. It is important to understand these elements and what has changed in order to support our thesis that the majority of mid-size enterprise companies will embrace storage networking going forward.

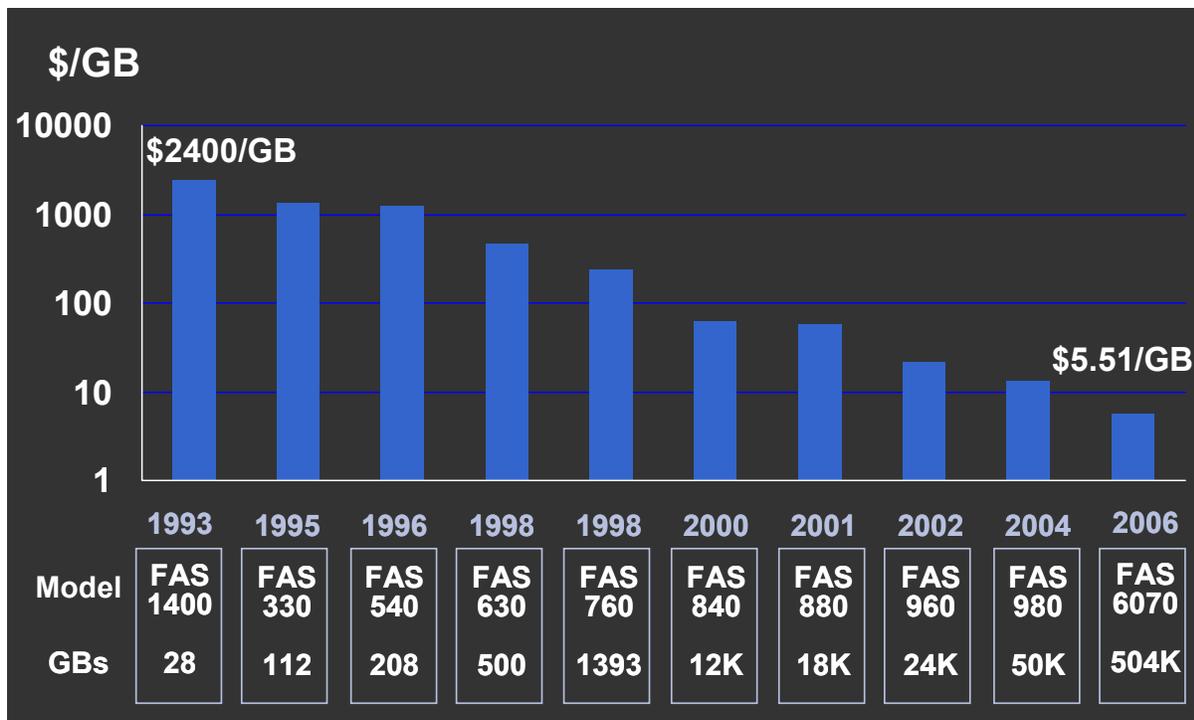
Storage Networking Inhibitors

For mid-size enterprise companies, there are a number of inhibitors. First, a new project as extensive as switching from direct attached storage to a storage network puts a strain on the organization. Mid-size enterprise companies have fewer IT resources and, therefore, have to be especially selective about the projects they prioritize.

Perceived High Cost

There is a lingering perception that storage is extremely expensive and to some people, it may still be. However, the capital cost of storage has declined dramatically, as shown in Figure Two. It is clear that the cost of NetApp storage has declined significantly over the years and these reductions are relatively commensurate with the rest of the industry. In 1993, the price of 1 GB of NetApp storage was \$2,400 and today is only \$5.51 per GB and dropping. NetApp storage has decreased 435 times in 14 years. However, since the cost of storage has declined so rapidly, many non-implementers may still hold to the stigma that acquiring networked storage is beyond their reach.

Figure Two: NetApp Price per GB Declination Over Time



Perceived Complexity

There are few IT organizations that shy away from complexity because they are intimidated by the technology. The problem is that they have little time to spend managing complex systems because of their workload. While there are certainly storage solutions that are extremely complex, many vendors in the storage industry are focused on making storage easier. Yet the stigma of complexity remains.

The Value Is Not Easily Apparent

For non-adopters, the value of storage networking is not necessarily obvious. Certainly, they have a high level understanding of the value, but often see it as a “nice to have” and not a necessity. Since non-adopters have never implemented a storage network, they may not truly understand the value. Their DAS systems may work well enough and as such, they may not be driven to make any changes. This recalls the adage—if it isn’t broke, don’t fix it. However, that philosophy doesn’t get us to excellence but at best only to a level of adequacy. One mid-size enterprise end-user that recently implemented their first storage network said that for years they have read about the value of storage networking, but didn’t really believe any of it. However, after implementing a storage network, this end-user finally gets it and wishes they had implemented networked storage years ago.

Storage Networking Inhibitors

- ☑ **The Process of Implementation**
- ☑ **Perceived High Cost**
- ☑ **Perceived Complexity**
- ☑ **The Value of Storage Networking is Not Apparent**

Storage Networking Drivers

The Cornerstone Drivers: Consolidation, Rapid Data Growth, Centralized Data Management, Faster Backup and Restores and Disaster Recovery

The cornerstone reasons for storage networking have been fairly constant over the years. These include storage consolidation, the continuous and rapid growth of data capacity, centralized data management, and disaster recovery. However, these cornerstone reasons in and of themselves have failed to drive universal adoption of network storage within mid-sized enterprise companies. While they remain important and have driven a great deal of adoption, new drivers are emerging that will further accelerate implementation.

Virtual Server Technology

ESG believes that virtual server technology will be the major driver of universal storage networking adoption. ESG has engaged in discussions with a number of mid-size enterprise company end-users and there is a broad consensus that virtual server technology will drive network storage adoption to a new level. Virtual server technology is a viral phenomenon that enables true consolidation at the server layer. Once multiple virtual servers are consolidated into a single physical server, it becomes impractical and imprudent to also utilize internal storage. The implementation of multiple virtual servers on a single physical platform creates risk, which can be completely mitigated by storing virtual server images and their corresponding applications and data on a reliable storage networking platform.

Maintenance tasks, such as physical server upgrades, the addition of new online applications and the ability to transparently move virtual servers to other platforms based on performance needs, are greatly simplified and provide a leap in efficiency. Virtual servers create other value, including reduced floor space, reduction in power and cooling, and the ability to implement cost-effective and simplified disaster recovery. The benefits are far reaching. End-users are consolidating their servers, which will drive the need to consolidate storage. Server consolidation drives storage consolidation.

Increased Retention Periods

End-users are retaining data on disk storage for longer periods of time than ever before. These retention periods can span from years to forever, conceptually. ESG recently spoke to a 300 person

architectural firm that is doing just this: keeping their drawings, designs and corresponding documents and notes permanently online. It becomes difficult and imprudent to use individual DAS systems to store data for extended periods of time. DAS storage doesn't scale and is not centrally accessed or managed.

Power and Cooling

ESG has found that power and cooling issues are emerging drivers that are somewhat binary to end-users in that they are either very important or not important at all. Companies in regions with denser populations are more likely candidates for whom power and cooling can become a real issue. All of the disk drives within an organization's internal storage servers are constantly powered on and spinning. When considering the power and cooling requirements of dozens or hundreds of servers, all with disk drives spinning, the potential impact is substantial. Moving all of the data from internal DAS to a single storage system will enable users to significantly reduce power consumption just by shutting down all of the drives in those servers. There is no doubt that a great deal of capacity that goes unused in internal disk drives and the resulting consolidation will yield cost and consumption savings. Additionally, NetApp has optimized their FAS storage solutions to be more energy efficient through innovative technologies like SnapShots, FlexVol, A-SIS and FlexClone help to drive down power consumption.

Storage Networking Drivers

- ☑ **Storage Consolidation**
- ☑ **Continuous and Rapid Growth of Data**
- ☑ **Fast Disk based Backup and Restore**
- ☑ **Advanced Disaster Recovery**
- ☑ **Extended Retention of Data**
- ☑ **Power, Cooling and Floor Space Issues**
- ☑ **Server Virtualization**

Storage Networking Enablers

Various enablers make implementing a storage network easier and more practical than ever before. These enablers depend on the actual storage system and vendor the user is working with. This report is focused on NetApp and will cover the advantages and capabilities NetApp brings to the table. Additionally, there are two important industry macro-enablers that are important to discuss.

Reduced Cost and Complexity

The cost of storage is in a perpetual decline. Disk drives keep getting denser and as a result, the cost per GB is regularly reduced. These reductions are then realized within network storage systems. The price of other components, including processors and memory, also decreases. Storage networking infrastructure—including FC HBAs and switches—are much less expensive today than ever before. The leading FC vendors have reduced cost on all their products. Additionally, iSCSI SAN and NAS solutions use commodity Ethernet LAN infrastructure, which is inherently less expensive than FC.

The storage system market is highly competitive, which inevitably drives cost down. Fortunately, competition also results in innovation. In many cases, innovative software leads to the need for less capacity and an increase in the utilization of the storage. The more the hardware is commoditized, the more important it is to add value through the intelligence within that system. This is beneficial for end-user and vendor alike.

Storage Networking Enablers

Reduced Cost and Complexity

- ☑ **Disk Drive Densities and Reduced Cost**
- ☑ **Networking Cost Declination**
- ☑ **Highly Competitive**
- ☑ **Capacity Efficient Technologies**
- ☑ **Internal Storage Virtualization**
- ☑ **Intuitive Management Software**
- ☑ **Integration with Application and OS Tools**

An example of this intelligence is the variety of capacity efficient technologies that drive down the capital cost of storage. These include dynamic provisioning, thin provisioning, logical snapshots, writable snapshots, and data de-duplication. End-users can significantly reduce their capacity requirements by leveraging these various technologies.

Another major enabler for storage systems is that they are becoming easier to use and manage. Compelling ease of use technologies include storage virtualization, intuitive management software and integration with application and operating system tools. The next section will discuss how NetApp specifically provides features and capabilities that make it easy to use and manage their storage system within an ecosystem of IT infrastructure and applications.

NetApp for the Mid-size Enterprise

The Power of Storage Virtualization

ESG defines storage virtualization as logical view and control of physical storage infrastructure. The goal is to provide greater utilization, optimization and simplification of storage.

The biggest problem with managing storage environments is the complexity of individual storage systems. Most leading storage systems are complicated machines that require deep expertise and ongoing manual administration to maintain operational excellence. This complexity exists because many storage systems do not provide virtualization capabilities.

The more virtualized the storage system, the easier it is to manage and maintain operational excellence. When manual functions are required, regardless of expertise or experience, the process decreases efficiency and the chance of error significantly increases. Therefore, it is important that end-users understand the various virtualization technologies supported by a storage system.

NetApp Internal Storage Virtualization Capabilities:

The NetApp FAS family of storage systems is one of the most highly virtualized solutions in the market. The following is an overview of the various NetApp FAS storage virtualization capabilities:

Fast Data Protection and Restores: NetApp is a pioneer in logical snapshot technology and offers one of the best implementations of it. End-users can utilize read-only snapshot copies to protect their data with the ability to create a large number of snapshot copies in order to achieve a high level of data integrity. NetApp Snapshot technology is compelling because it is easy to use, capacity efficient and requires very little overhead, ensuring that primary application performance isn't impacted. End-users often rely heavily on NetApp Snapshots instead of tape, which is slow and unreliable, to recover data. NetApp Snapshot significantly improves the speed, ease and reliability of data recoveries.

Space Efficient Copies: This is a powerful and valuable internal storage virtualization technology and NetApp is one of the few storage vendors that support it. End-users make copies of primary data to run testing, perform data mining and to facilitate data sharing. However, making copies of primary data can consume a great deal of storage capacity. When copying 10 TB of primary data, a single full copy of that data will result in an additional 10 TB of capacity. ESG is aware of companies that create six or more copies of primary data, meaning that 10 TB of primary data will consume an additional 60 TB of capacity. That is an astounding amount of additional capacity just for copies of primary data.

NetApp FlexClone software solves this problem. FlexClone creates new logical volumes or file systems with read/write attributes that share the same source data as the primary volume. NetApp FlexClone essentially creates writable snapshots that have the same advantages as read-only NetApp Snapshots, including near instantaneous creation and space efficiency, as described previously. As with read-only snapshots, at creation, FlexClone writable snapshot copies require no additional capacity and will only consume disk space when new data is created. Therefore, users can create lots of writable copies without consuming a great deal of capacity or taxing the storage system processors, memory or bandwidth. This can result in huge capacity savings and, perhaps more importantly, enable you to make any number of copies of your primary data as necessary without slowing down the production storage system, impacting other applications or consuming all of the system's capacity.

Efficient Storage Utilization: One of the biggest problems with any storage system, whether it is DAS, NAS or SAN, is allocated but unused storage capacity—also known as stranded storage. ESG has found that this is actually a pretty big problem. ESG conducted a survey in 2006 and found that the majority of participating end-users had 30% to 50% of all their capacity allocated but unused. With a 10 TB storage system, this results in 3 to 5 TB that is wasted.

Stranded storage exists as a result of the inefficiency of traditional storage provisioning technologies. For example, when creating a 2 TB volume with traditional provisioning, the storage system allocates the entire 2 TB even when 200 GB of actual data is stored. The other 1.8 TB is not available for other volumes.

NetApp FlexVol provides a technology referred to as thin provisioning. With FlexVol, you can still create a 2 TB volume, but if a user only needs to store 200 GB of data, then that is all the volume will consume. The other 1.8 TB is put into a storage pool that can be allocated to other volumes. This is another major capacity saver. FlexVol essentially eliminates the stranded storage problem.

Easy Provisioning: In addition to eliminating stranded storage, FlexVol also makes it easier to manage the storage system. We've found that IT departments spend little time managing storage provisioning tasks when using thin provisioning technologies. This is valuable over the life of a storage system, especially as you add new applications or require more capacity for existing ones. FlexVol thin provisioning provides the following benefits:

- Less storage is required initially when purchasing a new storage system.
- Since there will be no stranded storage capacity, less storage is required over the life of the storage system.
- Additional storage systems will not be required because of stranded storage.
- More applications/servers are available per storage system.
- Greater levels of consolidation are made possible.
- The time and resources required to perform storage provisioning tasks is reduced.
- Thin provisioning "aware" local and remote volume copy services consume less capacity.
- The number of storage system software licenses required is reduced, based on capacity.
- Power and cooling cost and consumption are reduced since end-users can use less capacity.

Increased Performance: Another valuable capability that FlexVol brings to the table is the ability to stripe data across a large number of drives. This internal virtualization technology enables a large number of disk drives to be part of a single pool of capacity. Data can be striped equally across a large number of disk drives, providing a massively parallel configuration. This capability essentially eliminates the need for performance tuning and analysis, helping to ensure optimal performance at all times.

Virtual Storage Systems: There is rapid adoption of server virtualization since it provides a great deal of value for consolidation, greater utilization and more flexible management of physical infrastructure. The NetApp FAS storage system supports its own internal virtualization technology that allows you to create virtual FAS images or Vfilers using a software feature they call MultiStore. You can create up to 64 Vfilers within a dual controller FAS storage system. The value of NetApp Vfilers is similar as server virtualization applied to a storage system. You can achieve greater levels of consolidation; more easily manage application environments; ensure greater levels of security. MultiStore makes it easy to perform data migrations by enabling you to move Vfilers and all of its associated data to other NetApp FAS systems. This also makes system upgrades easy to perform. Vfiler images can be replicated to other NetApp FAS systems for disaster recovery purposes and load balancing.

Reduce Storage by Eliminating Duplicate Data: Applications and users often make lots of copies of files, database records and e-mails that are stored on the network storage system. Duplicate data can result in a huge increase in the amount of capacity consumed.

NetApp A-SIS Deduplication provides data de-duplication within NetApp's FAS and NearStore storage systems. Data de-duplication is the process of examining data to identify and then eliminate any duplicates. NetApp A-SIS de-duplication optimizes physical storage capacity and bandwidth by using less of each. Capacity reduction results in the ability to store the same effective amount of data on fewer disk drives. Additionally, less bandwidth is required to move and copy the same amount of effective data across the WAN.

It is extremely important to ensure that unique data is not mistaken as a duplicate copy. A-SIS verifies the uniqueness—or lack thereof—of all of the data, ensuring that only duplicates are removed. NetApp A-SIS de-duplicates any data that is stored on the NetApp FAS whether it is primary, secondary, backup or archival. The data can originate from database applications or e-mail. It can be file data or data stored by a backup application—A-SIS will perform data de-duplication on all of it.

The next question that invariably follows is: What are the data de-duplication ratios? As always, the answer is: It depends. Data de-duplication ratios can range from 2 to 1 to 50 to 1 or more, contingent on your environment. The expectations around data de-duplication ratios can sometimes muddy the value. If a vendor claims that 20 to 1 reduction is the average and the end-user is seeing only a 2 to 1 reduction, why is that bad? If you can free up half of your capacity by removing duplicates—especially on primary storage—that is a good thing. With that as the starting point, anything that further reduces the ratio is great.

High Availability and Disaster Recovery: One of the cornerstone reasons to implement a storage networks is for high availability. The NetApp FAS provides a number of technologies that are designed to ensure that applications and users access their data. The NetApp FAS has a dual controller configuration that will allow you to keep operations online if one of the two goes down. The NetApp FAS also supports a number of RAID options that are designed to protect data integrity even when a disk drive fails. Depending on which RAID option chosen you can survive a single or even dual drive failures.

NetApp also supports various software capabilities such as snapshots and remote mirroring. One of the perceived drawbacks of remote replication is the complexity associated with these solutions. Since NetApp can leverage iSCSI with SnapMirror, remote replication is simplified utilizing existing IP network infrastructure.

Consolidating File Service and Block Storage

NetApp supports a number of different storage protocols that can each be used individually or in combination with one another. These protocols include FC, iSCSI, CIFS and NFS. FC and iSCSI are SAN protocols and CIFS and NFS are NAS protocols. Often end-users will use FC and iSCSI for block data used by database applications and e-mail. FC and iSCSI are lower layer protocols that move data rapidly through the network for optimal performance. End-users typically use CIFS and NFS for file-based data including Word documents, Excel spreadsheets, PDF files, presentation files, video, graphic images, CAD designs, audio files, X-rays, code development and scanned images. CIFS and NFS protocols are “file aware” and are better at accessing and managing file-based data.

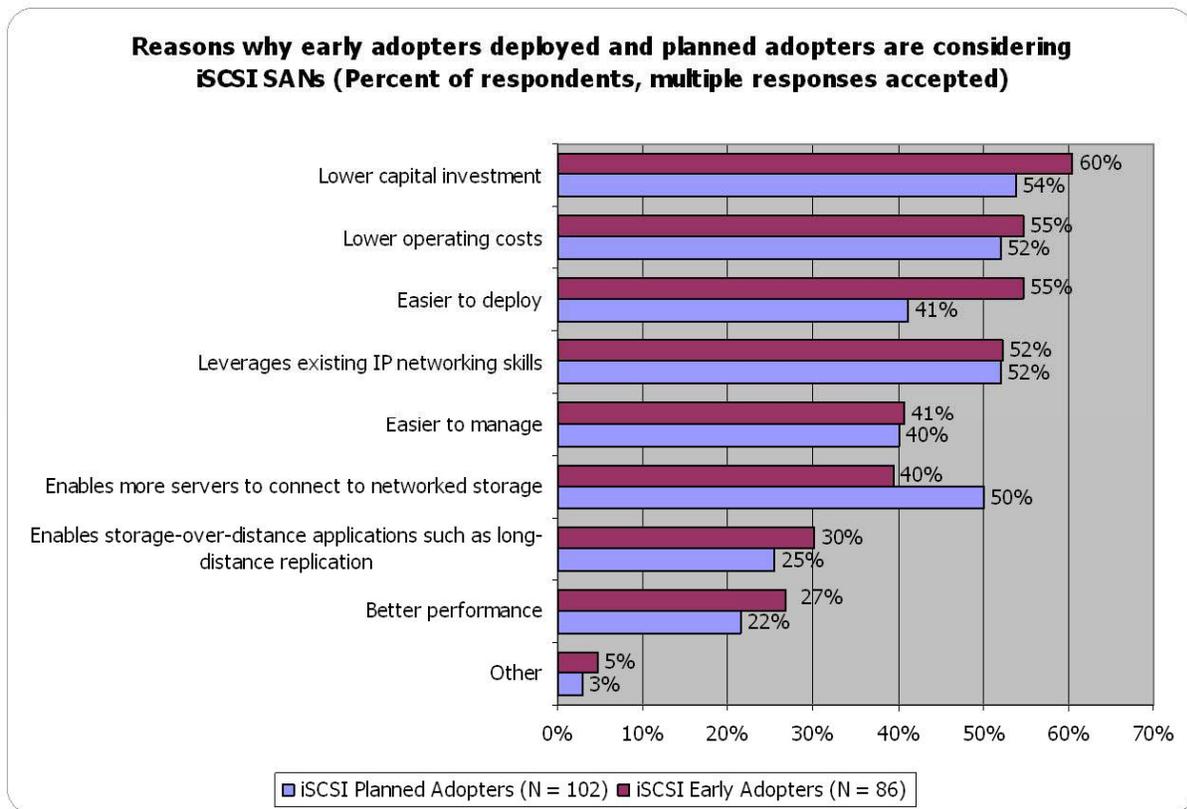
It is important to note that end-users can store databases on NAS and files on SAN. But using a combination of these protocols gives end-users the option to leverage the advantages inherent in SAN and NAS technologies for the appropriate applications and data types.

There is additional value in supporting SAN (block data) and NAS (file data) protocols in a single system, which allows further consolidation since separate systems for both are not required.

The iSCSI SAN Landscape

FC is the dominant SAN protocol today but a rapidly increasing number of end-users are embracing iSCSI SAN. ESG estimates that there are over 40,000 implementations of iSCSI SAN today and we believe that adoption will more than double in the next twelve months.

Figure Three: iSCSI SAN Inclusion Methods



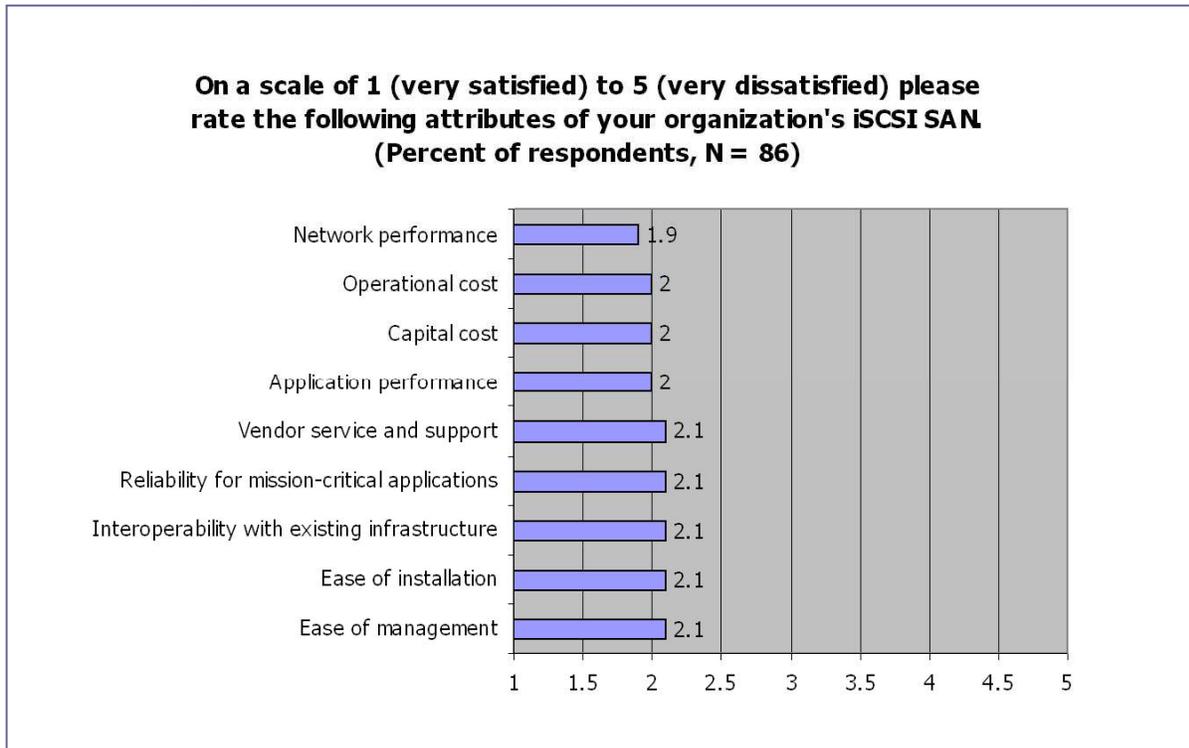
iSCSI SAN has reached a level of maturity that includes a robust ecosystem of products and tens of thousands of implementations. Essentially there is no risk using iSCSI today. The ease of use and cost benefits of iSCSI SAN drive its adoption. ESG Research¹ found that lower capital and operational costs are the major appeals of iSCSI, with the majority of early adopters reducing both capital and operational expenditures by 11% to 30%.

Our research also found that the abilities provided by iSCSI SAN to add more servers and deploy faster than FC are two key factors for adoption. iSCSI SAN can stretch over longer distances, use existing Ethernet connectivity and help users to avoid the complex worldwide naming issues or zoning parameters inherent with FC.

Many end-users still believe that iSCSI SAN is designed for the low end of the market. Often, iSCSI is believed to provide poorer performance than FC along with questionable reliability. However, these are not accurate assessments of iSCSI SAN. As Figure Four clearly illustrates, ESG Research has found that early iSCSI SAN adopters are extremely satisfied with their iSCSI SANs on all levels, including network and application performance. Additionally, these early adopters rate iSCSI's reliability for mission-critical applications as very satisfactory.

¹ ESG Research Report: *iSCSI Enters the Mainstream*, December, 2006.

Figure Four: ESG Research Early Adopter Satisfaction Levels with iSCSI



To further support this position, our research also found that 50% of iSCSI SAN early adopters use it for their mission-critical tier one storage. This provides strong validation of iSCSI SAN on all levels. It indicates that performance, functionality and reliability meet the needs of early adopters' mission-critical applications and environments.

There are still articles in the media claiming that iSCSI networks are not as reliable as FC. This is totally false. As seen in Figure Four, reliability was rated very high. Indeed, 50% of all iSCSI SAN early adopters we surveyed are using it for mission-critical applications. If iSCSI networks were inherently unreliable, they would not be used by organizations for their most important applications. Through our research, ESG has found that iSCSI SAN is reliable and provides excellent performance. Additionally, the entire ecosystem has matured, providing stabilization and minimizing risk. In the end, iSCSI is an efficient protocol that uses proven and commodity infrastructure. Consider the fact that IP networks are far more virtualized than legacy FC networks. A much wider set of tools and a larger group of IP experts support iSCSI. NetApp is a leader in iSCSI SAN and has been instrumental in driving its adoption. Several thousands of NetApp customers are using iSCSI SAN helping NetApp to remain the foremost experts on all of the nuances and best practices.

Application and OS Integration

NetApp has always been focused on application and operating system integration and has a strategy and vision to take this to even greater levels.

NetApp takes advantage of various Microsoft tools, including VDS, VSS and the Microsoft Management Console (MMC). Therefore, the Microsoft administrator will already have expertise in various administrative tasks with the NetApp FAS solution.

The NetApp SnapDrive plug-in is used to configure and manage NetApp devices. SnapDrive is a native Microsoft Management Console plug-in that can be launched with a right click from the My Computer "Manage" console, much like the Microsoft Disk Administrator and Disk Defragmenter utilities.

NetApp SnapDrive is used to define formatted virtual disks that can be presented to the Windows operating system as basic logical disks. Once created, the disks are managed with SnapDrive.

The NetApp SnapDrive interface is used to perform iSCSI and FC management and maintenance from a simple “single pane of glass” with a familiar Windows look and feel. A Windows expert is essentially a NetApp SnapDrive expert as well.

One of the other powerful aspects of NetApp is its deep integration with various applications and operating systems with its SnapManager functionality. Microsoft Exchange, SQL server, SharePoint, Oracle and SAP administrators can recover data themselves using application specific tools. This increases efficiency and leverages the end-users’ existing skill sets.

With SnapManager and SnapDrive, NetApp offers a compelling approach to storage management, leveraging tools within existing applications. The goal is to provide the application user with capabilities to manage their requirements including capacity requirements, performance and protection levels. The ultimate control is still in the hands of the IT/Systems/Storage Manager, who is empowered to set the values and best practices and then enable the application and system admins to invoke these elements as needed from their existing environments.

NetApp Value

- Minimizes stranded storage**
- Simplifies storage provisioning administration**
- Enables optimal application performance**
- Advanced, easy to use and cost-effective data protection features**
- High availability and simplified disaster recovery**
- Efficient copy capabilities for testing, development, data mining and data sharing**
- Capacity efficient data de-duplication technologies**
- Internal Vfiler virtualization technology**
- Integration with Application and OS Tools**

ESG's View

End-users must examine the value of the storage system in order to truly understand how it can improve their environments. Certainly, the cornerstone values of storage networking are valid, including consolidation, centralized management and advanced data protection. ESG believes it is essential that end-users also consider capacity optimization, which provides compelling and important value to the business. With greater capacity efficiency, there is an immediate reduction in capital cost, more applications can be supported with the same or less physical capacity, data can be kept online for longer periods of time and more copies of primary data can be made for data protection, data mining, test and development and data sharing. These abilities can change the way business is done by getting far more from the storage system than ever before.

Storage virtualization is essential to consider when evaluating a storage system. Storage virtualization provides a logical view and control of physical storage infrastructure that provides greater utilization, optimization and simplification. Secure virtual partitions for multiple user groups from a single storage system (MultiStore), Large logical pools of storage (FlexVol), logical snapshots, writable snapshots (FlexClone), thin provisioning (FlexVol) and data de-duplication (A-SIS) are all valuable storage virtualization technologies.

Multi-protocol support enables greater consolidation of storage services while providing flexibility to end-users to employ the protocol that best suits their needs. ESG has found that end-users leverage SAN and NAS together, getting the best of both worlds. Our research also shows that iSCSI SAN is being embraced as a lower cost and easier-to-use solution than FC. Early iSCSI SAN adopters are very satisfied with its performance and reliability.

NetApp brings all of this to the table. NetApp FAS is a highly virtualized solution that provides a wide range of capacity optimization technologies, and supports NAS and SAN. In addition, NetApp is one of the leaders in iSCSI SAN as well as storage, providing world-class support and service.

ESG believes that a change is occurring in the mindset of the mid-size enterprise market that will make storage networking pervasive. Certain elements are converging that offset the inhibitions: drivers that impel implementation and enablers that reduce the complete cost of storage networking. These conjoined elements will raise adoption to a new level, making storage networking a part of the circle of requisite and indispensable IT apparatus for mid-size enterprise companies.