

The Emerging Internet Storage Infrastructure Market



The HTRC Group, LLC

P.O. Box 2087

SAN ANDREAS, CA 95249

WWW.HTRCGROUP.COM

Table of Contents

Table of Contents	1
Executive Summary	3
Introduction	4
Internet Storage Infrastructure	5
Definition	5
The Storage Timeline	5
Storage Architectures	6
Legacy Storage Models	6
Network Attached Storage	6
Storage Area Networks	6
Storage Service Providers	6
Cold Storage	7
ISI	7
Why ISI Services?	8
High Availability and Reliability	8
Scalability	8
Cost	9
Global access	9
Security	9
Time to market	9
Flexibility	10
Support	10
Performance Strategies	10
ISI Service Requirements	11
The Business Case for ISI Services	12
Benefits	12
In-House Storage Cost Model	12
Outsourcing Storage Cost Model	13
Internet Storage Infrastructure Service Cost Model	13
Summary of Investments and Returns	14
ISI Services Forecast	14
Market Overview	14
Methodology	14
Assumptions	15
Forecast	15
Conclusion	16

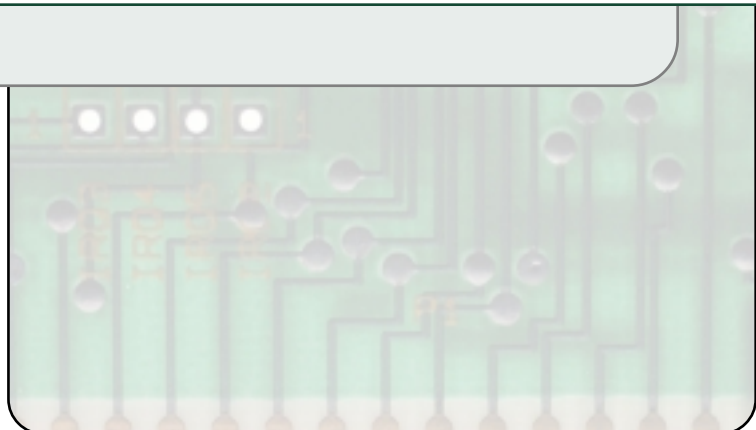
Executive Summary

With increasingly broad adoption of the Internet, it has become a legitimate entertainment and communications medium. Web sites are responding to growing user expectations with dramatically increased use of rich-media. Rich-media content consisting of audio, video, and images has helped create greater user impact and a more immersive Internet experience. Helping drive the use of rich-media is the rapid adoption of broadband access technologies that enable applications such as movies-on-demand and video conference calling.

Rich-media adoption has created new challenges for Web site owners. Because rich-media files are much larger than static Web objects, they tax both the storage and network infrastructure. Web sites have addressed storage requirements via the use of enterprise oriented storage solutions such as Network Attached Storage (NAS), Storage Area Networks (SAN), or outsourcers called Storage Service Providers (SSPs). None of these solutions address the specialized needs of the rich-media content distributor who requires scalability, flexibility, high availability, attractive economics, and close integration with new Internet content delivery methodologies.

A new class of service offering called Internet Storage Infrastructure (ISI) meets the challenges of rich-media hosting infrastructure by using a ground-up approach to development of a new type of wide area network (WAN) based storage infrastructure. By using distributed object technology and avoiding the use of expensive legacy storage technologies, ISI provides improved reliability, flexibility, and economics while enabling the scalability necessary for the next generation Internet. Furthermore, ISI vendors will be able to offer enhanced features such as geographic mirroring, load balancing, and a global file-system that enable new IT models for Internet hosts. Their fully managed service offering helps alleviate IT staff burdens, improve time-to-market, and reduce capital investment.

The HTRC group estimates that subscribers to ISI services will spend \$7 million in 2000, growing to \$2.7 billion in 2004. This forecast only includes storage services, and not the dollars spent on bandwidth necessary to deliver files to end-users.



Introduction

The Internet is becoming a more entertaining and compelling experience. Rich-media content, including video, audio, and images is changing the way the Internet is used and perceived. Some examples of Internet-only experiences are live events such as rock concerts and auto races, on-demand previews of movie trailers, sharing of personal home videos, and creation of personal music collections on a track-by-track basis.

Driving the shift towards a richer Internet experience are a number of technical, economic, and social factors. The most significant condition for widespread rich-media is the adoption of broadband access technologies that are necessary to experience rich-media content. The adoption of Broadband technologies such as DSL (Digital Subscriber Line), wireless, and cable modems are providing users with better Web site experiences.

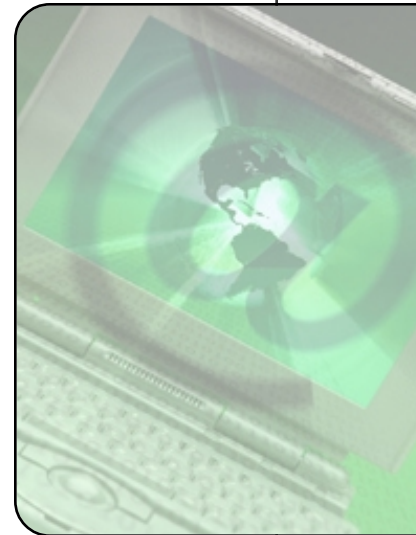
Also driving the proliferation of rich-media is the increasing acceptance of the Internet as a channel for entertainment. Broadband portals as well as major network broadcasting companies now post news and entertainment content on their Web sites. The repurposing of legacy content (e.g. a TV news story) in fact represents a huge source of Internet rich-media content. Although new media Web sites are the largest adopters of rich-media, traditional Web sites are using rich-media to enrich users experience. In an ongoing battle for market share and customer loyalty, Web site operators are adopting rich-media at faster rates.

Unfortunately, rich-adoption comes at a cost to Web sites. Due to large file sizes, storage requirements have been increasing at near exponential rates, and server and network infrastructure must scale in capacity to support higher bandwidth. Hosting these types of media creates a significant IT burden. Not only is the capital cost of large storage and server systems high, but it is increasingly difficult to find and retain talented IT development and operations staff.

Furthermore, many rich-media oriented Web sites are unable to forecast future demand with certainty. Forecasting variables include competition, broadband adoption, and uncertain product acceptance. When IT managers overbuild capacity in anticipation of best-case demand, they are frequently forced to consider buffer capacity of 100% or more. On the other hand, if IT managers under-provision their infrastructure, they are creating a strategic business risk. Without the capacity to scale Web site infrastructure with success, businesses risk failure.

This white paper identifies Internet Storage Infrastructure (ISI) as a possible solution to the enormous rich-media storage challenge.

ISI is an outsourced service that uses networks of storage and server clusters to store rich-media objects, by providing a scalable, economic solution that is complementary to existing Web host architectures. ISI offers a pay-as-you-go model of storage that mitigates problems associated with demand uncertainty. Included is a detailed description of ISI, its benefits, and the projected forecast for this emerging market.



Internet Storage Infrastructure

Definition

ISI is an emerging layer of Internet infrastructure which provides distributed file storage and content origin service to owners and distributors of Internet oriented content. ISI in particular addresses the inflexibility, poor scalability, and high cost of enterprise storage solutions for rich-media applications. The distributed nature of ISI also enables load-balanced content serving, that complements existing Web site architectures.

ISI is the future of online storage, and is unique in its adoption of a global file system that enables users to access data from any point on the Internet. In a Global File System, authorized customers will see an identical file image (directory tree) from any access point on the Internet. Web sites with multiple data centers can now use a centralized repository for content and eliminates the need for unnecessary data replication. High reliability and availability is achieved through fault tolerant architecture and mirroring of critical data.

The Storage Timeline

The popularity of the Internet started with small computer systems consisting of Unix workstations with local disk drives. As the Internet grew, so did the requirements for data storage. Web sites soon outgrew their environment, requiring better performance and consistent uptime in order to support emerging Internet revenue models. Web servers began using Redundant Array of Independent Disks (RAID), the use of two or more hard disks in order to increase the reliability and performance.

The Internet has grown significantly from its inception. BrightPlanet, LLC estimates that large Web sites alone currently account for 7.44 Petabytes, and demand for storage is growing fast. Competition among Web sites has fostered continuing innovations in site performance. Web sites have grown into a complicated array of redundant and mirrored servers placed in geographically dispersed locations that best serve content to Web users. Large sites now use off the shelf hardware and software for aggregating RAID into huge expensive clusters of hundreds of servers.

Businesses continue to use more information; connecting employees, partners, and customers to corporate data enables faster, better-informed decisions, which ultimately benefits the company. The growing wealth of information is driving the need for better performing storage products with greater capacity.

Two storage technologies that have emerged to fill enterprise storage needs are Network Attached Storage (NAS) and Storage Area Networks (SAN). Both NAS and SAN products externalize storage from the server in order to free up server resources. These evolving technologies were created to solve the growing storage demand for the enterprise market segment.

Definitions

Storage area networks (SAN)

A SAN is the storage-dedicated LAN that uses high performance reliable technologies, such as Fibrechannel, to connect servers to storage resources.

Network attached storage (NAS)

NAS products use standard-based high speed network connections to connect data to applications. NAS uses standards based on network access methods, such as Ethernet, for front side LAN.

Expertise continues to be scarce in nearly all IT occupations, managing and maintenance of in-house SAN and NAS solutions are no exception. Storage Service Providers (SSPs) emerged on the market to provide customers with outsourced storage solutions. SSPs readily adopted familiar SAN and NAS technologies to provide solutions to enterprise and Internet market segments. ISI service providers are beginning to emerge and address the increasing demand for Internet-based storage. ISI service providers are offering large scale storage services with unique features and at costs significantly lower than traditional SSPs. ISI services will change the Internet economy by enabling organizations of all sizes to have low cost storage compatible with existing Web site architectures. ISI services can be used in addition to existing hosting, CDN, and caching services. ISI is also unique in its use of a global file system (GFS) to connect users to valued files, and is the next evolution for Internet-based storage solutions.

Storage Architectures

Legacy Storage Models

Network Attached Storage

NAS devices are dedicated file servers that sit on the enterprise LAN.

This provides easy access by both LAN users and application servers. NAS provides an easy way to improve enterprise server performance by offloading file server duties. NAS is easy to implement, but it becomes difficult to manage and scale for high storage levels. It is a workgroup and small enterprise storage solution.

Storage Area Networks

For larger enterprise organizations, SAN-based storage architectures are mandatory for managing the scale of large database operations. Furthermore, many Web site environments are adopting SAN solutions in order to keep pace with the growth of Web site content. SAN solutions are high performing centralized storage solutions connected to Web and application servers through a dedicated storage local area network (LAN). One example is an EMC Symmetrix storage system that connects to servers over a high-speed Fibrechannel network. Even though SAN solutions can scale to tens of terabytes (TB), they represent formidably expensive infrastructure for an enterprise to acquire, install, and manage.

Storage Service Providers

In an effort to reduce acquisition and administrative costs of large centralized storage systems, some enterprises have turned towards storage service providers (SSP). An SSP leverages the transmission properties of fiber optics to provide outsourced SAN services. Normally colocated at service providers such as Exodus, these vendors offer storage space rental while managing administration themselves. SSPs typically utilize enterprise-oriented storage systems such as those from EMC or Network Appliance. Thus, SSPs face the same scalability, economic, and reliability problems as traditional in-house solutions.



Today, roughly half of the large companies (500 or more employees) in the U.S. have multiple data centers housing complicated arrays of redundant Web servers, storage systems, and networking hardware. Because of the limitations of enterprise-based storage systems, content must frequently be replicated among these different locations. The corresponding data management challenge can be extremely difficult to control. When used in an Internet environment these storage solutions can also limit architectural options and business flexibility.

Cold Storage

Cold storage, typically magnetic tape handled manually or in automated libraries, provides moderate scalability and is lower in cost than other disk based storage solutions. However, mechanical latencies associated with cold storage make it unsuitable for Web hosting or other high-availability enterprise applications. These applications require hard disk drives that are always on, that are immediately accessible, and that do not require human intervention.

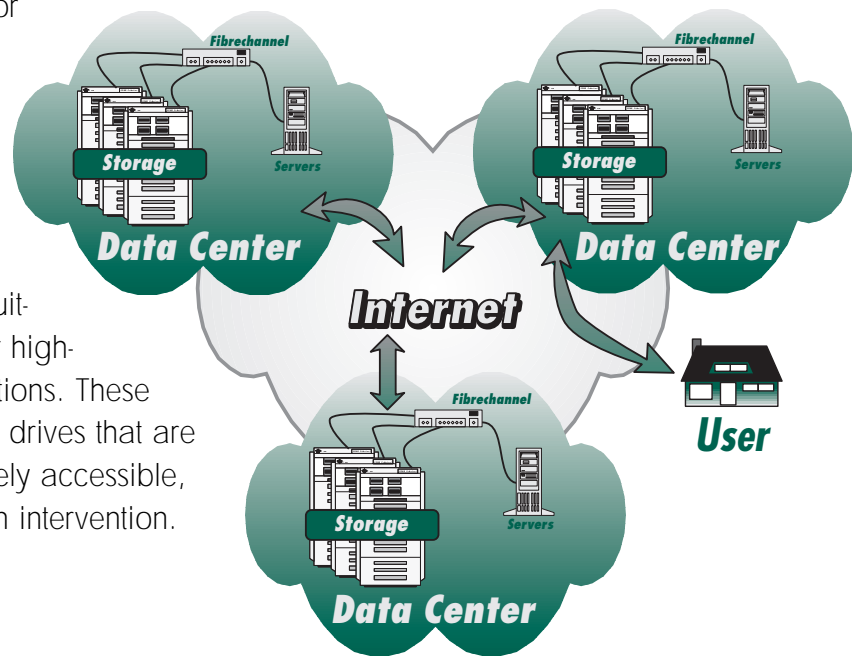
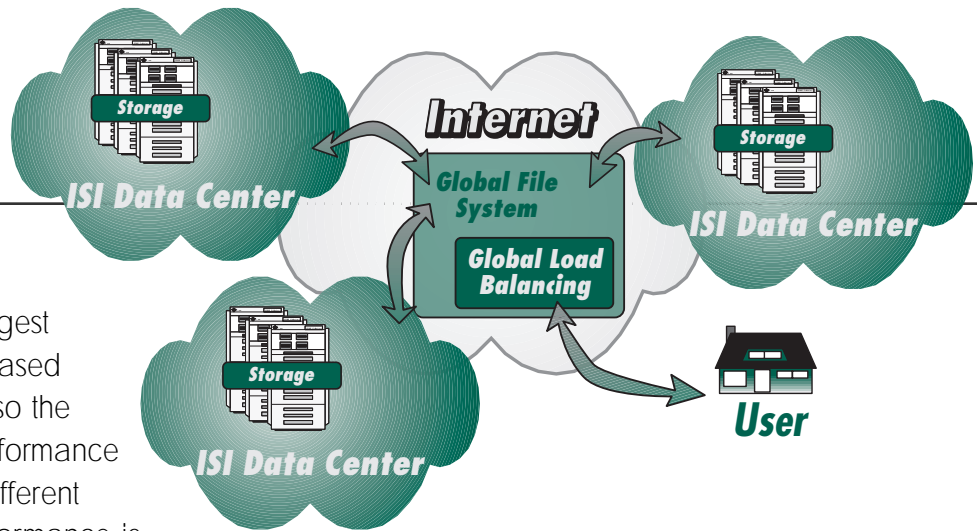


Figure 1:
SAN based Web environment

ISI

The emerging ISI solutions are optimized for the Internet with strategically placed data centers serving data from hot storage to intended recipients. Subscriber data is distributed—mirrored across data centers that serve information to users from the best performing location. According to The HTRC Group's "2000 Content Delivery Service Study," 56% of large companies have more than one data center and most use global load balancing products to increase the resiliency of their Web site environment. A key component of the emerging ISI architecture is the global load balancing technology used to direct users to the optimal global data center. Load balancing technology is further used to direct users to the optimal server cluster within that center. For Web sites that subscribe to ISI services, Web users may access data from the nearest ISI service data center or through the host's Web servers.

**Figure 2:
ISI based Web
environment**



Why ISI Services?

Performance is the largest differentiation for Internet-based services today, and it is also the hardest to accomplish. Performance can be defined in many different ways; for ISI services, performance is

defined by reliably delivering information online. ISI service providers place great emphasis on extremely high availability. Innovations in storage technology that led to the creation of the ISI market are providing the storage market with low cost, reliable services that minimize up front equipment costs and ease IT staff burdens.

IT Managers are increasingly concerned that lack of sufficient staffing options is creating a bottleneck for rollout and expansion plans, which is a tangible risk for high-growth companies. Furthermore, with increasing labor shortages looming, the increasing cost of IT maintenance and support is leading companies to evaluate outsourcing options such as ISI.

High Availability and Reliability

Expectations of reliability online continue to increase. Popular mega sites, such as Yahoo!, are changing user's expectations of online media by providing a consistent and reliable experience. These expectations can be met through use of ISI services. Mirroring, redundant hardware, and intelligent networks used by ISI providers allows them to guarantee high reliability (e.g. 99.99%) to customers in service level agreements (SLAs). Because data networking is a magnet for Murphy's Law, ISI providers must have solid disaster recovery systems. In the unlikely event of a natural disaster, data stored with ISI service providers must be protected from earthquakes, floods, tornadoes, and other disastrous events.

Scalability

There are two dimensions of scalability that ISI service providers offer, the total amount of storage and number of simultaneous users. Storage requirements, particularly for Internet rich-media businesses, are very difficult to predict, forcing difficult design decisions for online organizations. For example, both shutterfly.com and Zing.com store photos for online users, and are intent on growing market share to achieve economies of scale. The popularity of these sites will likely increase over time as more consumers purchase and use digital cameras. However, storage requirements for digital photo services are driven by subscriber usage, which is very difficult to predict, but will likely increase significantly over time. These types of content aggregators can benefit from ISI service providers' capacity to deliver storage on demand because ISI presents no risk of capacity limitations and it improves flexibility over traditional enterprise storage.

Cost

Organizations can leverage a terabyte-on-demand, pay-as-you-go format, with little incremental investment and little financial risk. ISI services offer a viable and attractive alternative to internal IT initiatives that are capital and resource intensive. Small and medium organizations who previously could not afford extensive internal IT departments or high-end outsourcing, now gain access to scaleable low cost storage services. Although the monthly cost per megabyte of disk space always declines over time, legacy storage solutions are consuming a larger fraction of IT Department budgets.

ISI services are less expensive due to innovations in storage technology which takes advantage of economies of scale, and unique and innovative architectures which enable new price points. Furthermore ISI fully managed services relieve the burden and significant cost of IT support infrastructure.

Global access

Providers of ISI services maintain redundant data centers to ensure data availability. Network architectures include upstream connections to multiple providers in order to offer a high level of performance and reliability. Maintaining redundant connections to the global Internet ensures access to data from any Internet access point in the world.

ISI is uniquely defined by the use of a global file system, providing users with global access to data from any point in the Internet. This feature provides a critical economic advantage to large Web properties (those with multiple hosting locations) because it eliminates the need for redundant storage systems.

Security

The Internet is an eclectic environment that includes varying security requirements for different types of content. The information shared between the ISI service network and the subscriber for account management and data uploading must be secured to protect data integrity. Subscribers of ISI services should examine security guarantees to ensure that content is accessed only by authorized users.

Time to market

Building or increasing storage capacity within an organization is time consuming and expensive. ISI services enable organizations to set up scaleable storage services in a matter of days without outrageous IT staff expenditures. Internet products and services are being developed and deployed so quickly that product cycles are referenced in Internet years—short periods of time a fraction of the normal calendar year. Partnering with an ISI service provider enables organizations with a unique time to market advantage: terabytes-on-demand. Subscribers can grow to terabytes within hours, as fast as they can upload information to the ISI service provider.

Flexibility

Using traditional enterprise based storage, IT managers are forced to over-provision their hardware to accommodate their largest-case storage demand forecast. Using ISI services, subscribers only pay for what they use, instead of attempting to budget for projected storage requirements. For this reason, ISI services enable subscribers the ability to defer storage expenditures. Instead of building storage infrastructure in advance of needs, subscribers pay as they go. Storage growth requirements are uncertain, and this financial flexibility is a significant economic benefit for any organization online.

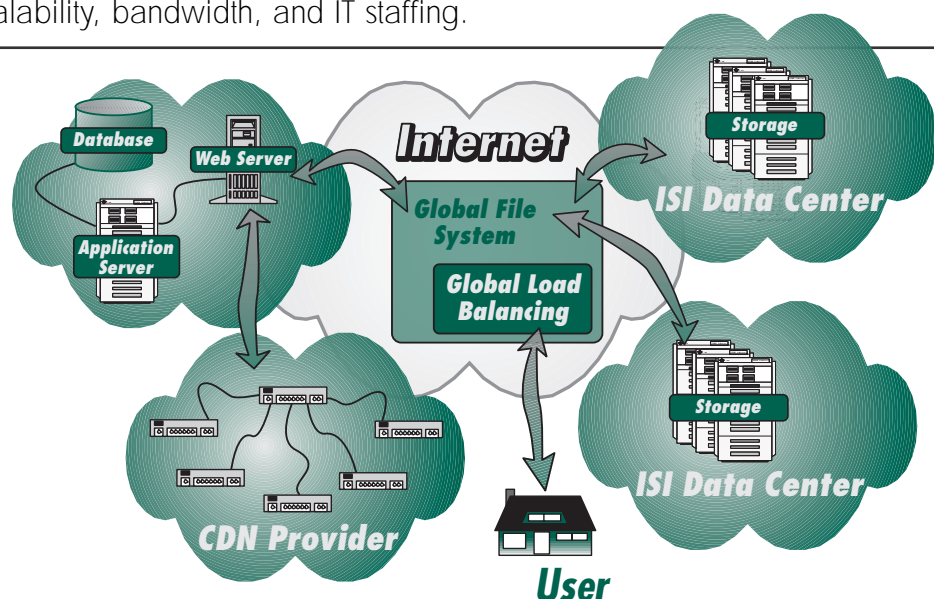
Support

Ninety-one percent of the Webmasters and Content Managers interviewed for The HTRC Group's "2000 Content Delivery Service Study" rated service and support a critical feature when choosing a provider. ISI vendors provide 24x7 support including live and online information resources. Operational and emergency procedures should be well documented to eliminate uncertainty if and when trouble arises.

Performance Strategies

For Web sites, performance is a fundamental differentiation for end users. Key performance metrics for any Web content delivery are latency, bandwidth, and quality of service. ISI infrastructure sits near the network core where high-performance connection arrangements insure low latency data transfer. Furthermore, the extensive network connecting ISI storage facilities provides ample bandwidth for most users. In some situations, edge delivery networks may still be required to meet performance expectations. Fortunately the distributed nature of ISI networks makes them highly complementary to existing content delivery networks (CDN). Sites hosting infrequently accessed content can utilize ISI services to store and deliver the masses of infrequently accessed data, and use the edge-cache network of a CDN service provider to distribute their highest demand content. By combining the strengths of ISI services and CDN services, Web sites can improve site performance, reduce costs, and offload the burdens of storage scalability, bandwidth, and IT staffing.

**Figure 3:
Performance
strategies**



ISI Service Requirements

Fault Tolerance

ISI services should include a fault tolerant network architecture in order to maintain global access to data. Storage architectures should include geographically dispersed backup solutions and redundant WAN access points to insure against loss of data.

SLAs

ISI services should include negotiable SLAs to guarantee performance for simultaneous users and availability performance metrics. Subscribers should also seek insurance policies for loss of data, in the event data is irreplaceable.

Management: Tools,Reporting

Management tools for ISI services should include an intuitive, secure, Web-based interface which lets users manipulate account options and access reporting features. Upload tools should also include a secure, easy to use interface which lets users quickly move data. Management tools and reporting will likely be the grounds for future differentiating features.

Security

The information shared between the ISI service network and the subscriber for account management and data uploading must be secured to protect data integrity.

Scalability

ISI services should scale with the total amount of storage as well as the number of simultaneous users. In essence, subscribers should be able to scale without risk.

Interoperability

Subscribing to ISI services should not require alteration of existing data systems. ISI access methods (in Web environments) must be compatible with Web site architecture including URL security key handling, and CDN interfaces. ISI services should be interoperable with existing systems.

Global Access

ISI service provider network architectures should include geographically dispersed redundant data centers with upstream connections to multiple providers in order to offer a high level of performance and reliability.

Service and Support

Subscribers should examine the service and support policies to ensure 24x7 coverage. Subscribers should be able to negotiate service and support SLAs for problem resolution times.

The Business Case for ISI Services

Benefits

The principal benefits of subscribing to ISI services are an increase of scalability and reliability, as well as a reduction in cost per megabyte. Data stored with ISI providers is mirrored across data centers providing built in backup services. Data requests are answered from the optimal data center depending on traffic demand and network conditions for optimal performance. Using an ISI provider to increase storage capacity requires few resources from a subscriber because the ISI provider, rather than the subscriber, stores and maintains data center capacity. ISI providers can reduce the financial risk to an online organization by increasing capacity as needed. Subscribers can cost-effectively ensure that unpredictable storage requirements don't restrict organizational growth and operations.

Subscribing to ISI services adds reliability—that is, the ability for hosts and clients to consistently access data online—from any point in the Internet using the global file system. For Web sites where low latency is an important differentiator, partnerships with CDN providers can guarantee speedy delivery of Web site objects to users.

We examined the costs for in-house storage, outsourcing storage, and subscribing to ISI services. For Web sites with multiple terabytes of data, ISI services provide the most cost-effective solution because the Web site doesn't need to purchase additional equipment or hire extra personnel to maintain large amounts of storage. Bandwidth used for transmitting data over the Internet was not included in our cost models.

The assumptions used in the creation of this model were the result of feedback from primary market research, service providers, public pricing information and an ISI provider, as well as extrapolations based on industry trends. These models are intended to be used as a guideline only. Actual costs will vary. For this paper we will only examine large storage requirements because they represent the needs of the earliest users of ISI services.

In-House Storage Cost Model

In our in-house storage cost model, storage capacity is operated and supported in-house by the organization. The organization owns and manages storage equipment, network operations and support, as well as forecasting and provisioning for additional storage capacity. The model identifies capital investments including storage equipment and cost of labor. Recurring costs include labor over a one-year period.

- **Content sites generally increase storage capacity at a varied rate, ranging from 150% to 400% annually. For modeling purposes, we elected to use a conservative storage growth rate. The content site starts with 1 terabyte of storage capacity in Q1 and requires a total of 2.5 terabytes in Q4.**
- **Our assumptions include 2 full-time employees, each averaging \$68,000 annually and weighted with 20% overhead, to ensure Web storage and network operations are working properly and maintain server performance. Labor costs do not include hiring costs.**

- Over a one-year period, equipment costs were \$880,000, and labor costs were \$163,000.
- The total cumulative costs for an in-house storage solution over the one-year period were \$1,043,000.

Outsourcing Storage Cost Model

In the outsourcing storage cost model, data is hosted with a storage service provider, such as StoragePoint. The storage provider owns and manages storage equipment, network operations and support, while the organization is responsible for forecasting and provisioning additional storage capacity. The model identifies recurring monthly storage at a cost of \$44 per gigabyte of storage per month. Recurring costs do not include labor for forecasting and provisioning storage capacity.

- Content sites generally increase storage capacity at a varied rate, ranging from 150% to 400% annually. For modeling purposes, we elected to use a conservative storage growth rate. The content site starts with 1 terabyte of storage capacity in Q1 and requires a total of 2.5 terabytes in Q4.
- Our assumptions do not include the cost of employees, the management and maintenance of storage and network operations are the responsibility of the storage service provider.
- The total cumulative costs for an outsourced storage solution over the one-year period were \$928,000.

Internet Storage Infrastructure Service Cost Model

In the ISI storage cost model, data is hosted with an ISI service provider, such as Scale Eight. The ISI provider owns and manages the global file system, storage equipment, network operations and support, while the organization is responsible only for provisioning additional storage capacity. Subscribers of ISI services are not required to forecast storage needs, ISI services scale to meet terabytes-on-demand. The model identifies recurring monthly storage at a cost of \$20 per gigabyte of storage per month. Recurring costs do not include labor for forecasting and provisioning storage capacity.

- Content sites generally increase storage capacity at a varied rate, ranging from 150% to 400% annually. For modeling purposes, we elected to use a conservative storage growth rate. The content site starts with 1 terabyte of storage capacity in Q1 and requires a total of 2.5 terabytes in Q4.
- Our assumptions do not include the cost of employees. The management and maintenance of storage and network operations are the responsibility of the ISI service provider.
- The total cumulative costs for an ISI storage solution over the one-year period were \$420,000.

Summary of Investments and Returns

- The largest difference in storage costs between the three cost models are in terms of scalability in the number of simultaneous users and terabytes-on-demand for storage growth requirements.
- The ISI service solution provides subscribers with the largest growth capacity for the lowest cost at \$420,000.
- The outsourcing storage model offers a medium level of performance, and cost at \$928,000 annually.
- The in-house storage model offers the highest performance, however the greatest cost at \$1,043,000 annually, with costly incremental storage capacity increases.

ISI Services Forecast

Market Overview

Storage requirements for the Internet content nearly quadruple every year. We have just begun to assess needs for storing new audio, video and information files online. The emergence of new types of ISI service providers, such as Scale Eight, signify a new era of how files are stored on the Internet. ISI service providers are beginning to obtain key Web site accounts in the Internet, driving adoption rates with very large Web sites.

ISI services are immediately attractive to all Web sites with large storage requirements, spanning all online vertical segments. The primary types of interested Web sites include e-commerce, news, entertainment, business, and government. Many e-commerce B2B, and B2C sites are entirely Web-based and span many vertical markets; consequently the majority of their storage requirements are driven by content accessed online. News, entertainment, and government sites accumulate tremendous amounts of information available to online subscribers. The increasing use of rich-media content is also driving significant storage requirements.

Methodology

The ISI services forecast examines the opportunity for ISI service providers offering Web-based storage to the online market. This forecast is comprised of primary and secondary information sources and contains dollars spent on storage to ISI service providers; this forecast does not include dollars spent on the bandwidth when users access stored information. Bandwidth services are not unique to ISI service providers and are not addressed in this forecast. We used extrapolation techniques and market factors to estimate the market population size and growth rates.

We gathered important current and future Web site demographics through interviews with 100 randomly selected Internet Managers, Content Managers, and Webmasters. Information from "The 2000 Content Delivery Service Study" was also used for adoption rate and growth analysis. Using information gathered from supply-side sources, we identified the projected storage opportunity and adoption rates.

Anecdotal information regarding demographics of mega Web sites, such as Yahoo!, AOL, and eBay were used to weight storage requirement growth and adoption rates. Initially a very small percentage of the total Web sites have significant storage requirements; however, that percentage increases over time.

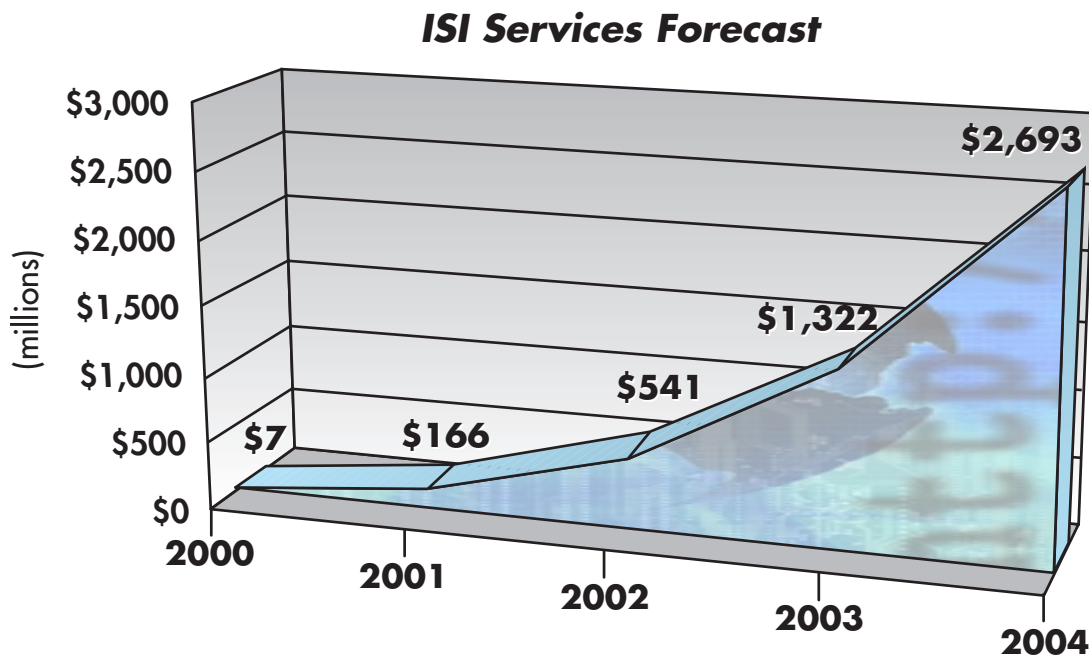
The largest factors influencing forecast growth are the increasing storage requirements due to an increase of rich-media stored on Web sites.

Assumptions

- Storage capacity requirements for Web sites nearly quadruples every year.
- Internet expertise does not scale with demand; sites will outsource more IT functions.
- New Internet access technology will drive more sophisticated high-bandwidth content.
- Broadband Internet access drives increased bandwidth demand.
- The growing number of online users will drive Web site owners to further differentiate with increasing rich-media content.
- The use of online storage services for personal and professional use will increase over time.
- Competition will decrease the cost of ISI services over time.
- The number of large Web sites will increase at a faster rate through 2004.

Forecast

The ISI service market starts off at \$7 million in 2000, growing to \$2.7 billion in 2004. The figure below shows the total opportunity for ISI services for 2000 through 2004. This forecast only includes storage services, and not the bandwidth necessary to deliver files to intended users.



Conclusion

The table below summarizes the key findings for Internet-based storage, and illustrates the tremendous gain, in terms of scalability, for ISI subscribers.

	<i>In-house Storage</i>	<i>Outsourced Storage (SSP)</i>	<i>ISI Services</i>
Scalability	Lowest	Medium	Highest
Performance	Very High	High	Medium
Cost	Very High	High	Low
Internet Compatibility	Low	Medium	High
Ubiquitous File System	None	None	Global File System
Financial Risk	High	Medium	Low
Flexibility	Low	Medium	High

ISI service subscribers will leverage storage capacity without restriction in a comfortable pay-as-you-go format, with little incremental investment. Subscribers can increase capacity as fast as they can upload the data. ISI services offer a viable and attractive outsourcing alternative to internal IT initiatives which are capital and resource intensive. Small and medium organizations, who previously could not afford an extensive internal IT solution or high-end outsourcing, now gain access to scaleable, low cost, storage services.