

# IP SAN

## Redefining the Storage Arena

By Peter Wang

ARE YOU CHALLENGED BY THE EVER-GROWING data storage needs of your organization and your resources are limited?

Most IT organizations today are confronted with moving their online and nearline data to offline tape backup and archive. The requirement for 24x7 application uptime dramatically shrinks the “backup window”. Yet the data volume on the multitude of servers, desktops and laptops continues to grow at a rapid rate. While tape arrays and incremental backup solutions help achieve shorter backup windows, they are often complex and costly both for backup and to restore. Many IT organizations cannot afford such solutions. As a result, much of the data in many enterprises is not backed up regularly, if at all.

### The Battle of IP SAN

The storage industry is going through an unprecedented flux, and the shift towards IP SAN is challenging the dominance of Fiber Channel (FC) SANs. Although the established FC players considered IP SAN to be no more than a passing fad in the high tech storage space, the threat now is quite real. They have adopted strategies meant to throw customers into uncertainty as to which is the correct approach to storage for their company.

Meanwhile, CxO's are now running into compliance

regulations based on the industry in which they are. They are mandated by law to comply with these federal and state regulations, therefore Business Continuity Planning and Disaster Recovery implementations must be dealt with immediately.

Some of the top vendors may be confusing the market space with interchangeable usage of iSCSI and IP SAN. It is essential to realize that iSCSI is a protocol, whereas IP SAN is a system technology that uses Ethernet as a transport/connectivity medium.

Dynamic storage vendors who have vision and no legacy implementations to support are racing ahead to establish a foothold in the “Large Scale IP SAN arena”.

### Top End User Pain points

Customers have a reasonably firm grasp when it comes to CPUs, Memory, and Networks, however many become frustrated when it comes to handling Storage.

Customers are demanding Cost Reduction, Scalability, High Availability, Storage Provisioning, Interoperability, Simplicity and Better Resource Utilization. These demands are not specialized, but are coming from a wide range of companies – from Fortune 500 and Forbes 2000 companies to the rapidly growing small and medium sized businesses.

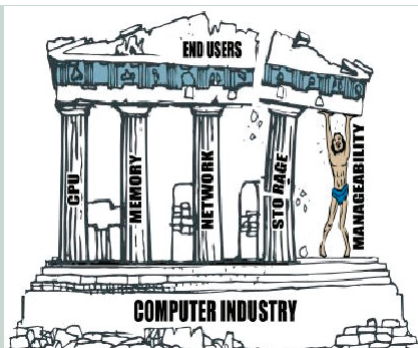
### What is IP SAN?

It is common to hear iSCSI mentioned along with IP SAN, because it is the major IETF-ratified block storage protocols for developing IP SAN solutions.

iSCSI is a block-level storage transport protocol defined by the Internet Engineering Task Force (IETF) that lets users create a storage network using TCP/IP networks. iSCSI encapsulates the Small Computer

- Total Cost of Ownership (TCO),
- Challenge of maintaining growth and meeting capacity,
- Inability to manage storage assets and infrastructure,
- Lack of integrated and/or interoperable solutions,
- Increasing complexity of storage infrastructure.

Courtesy: SNIA



## Did you know that...?

- 5 Exabytes of total new information were produced and stored in 2002 across print, film, magnetic and optical storage media (Five exabytes is almost equal to half a million new libraries the size of the Library of Congress print collections.) (Report by UC, Berkeley)
- 92% of new information is stored on magnetic media, primarily hard disks (Report by UC, Berkeley)
- 18 Exabytes of data were transmitted over the Internet through various media such as telephone, radio, cable, DSL, and TV broadcasting in 2002. (Report by UC, Berkeley)
- Information and storage requirements are doubling every 3 years, due to pervasive digital content such as MP3 files, rich streaming media content, digital photography, e-mail, MMS etc.
- 2 billion hard disks shipped were shipped and celebrated by the Storage Vision Conference in January, 2005
- There are more than 20,000 regulations worldwide to retain electronic information

Courtesy of SNIA

Systems Interface (SCSI) protocol, which enables host computer systems to perform block data input/output (I/O) operations with a variety of peripheral devices. iSCSI uses standard Ethernet and IP to transport data from servers to SANs, and thus does not suffer from the complexity and cost of Fibre Channel SANs. Because iSCSI uses TCP/IP, it does not have the distance limitations that encumber other storage protocols. This makes it ideal to link remote sites to the data center using already existing TCP/IP Internet connectivity. (Readers can get more information on iSCSI from RFC 3720 in the IETF website).

iSCSI based IP SAN overcomes the distance, scalability and availability restrictions of parallel SCSI implementations. By leveraging SCSI protocols over networked infrastructures, IP SANs enable flexible high-speed block data transfers for a variety of applications including disk-disk-tape backup, server clustering, storage consolidation, disaster recovery, databases and

email servers that require block-level storage. By utilizing Gigabit Ethernet technology as the underlying infrastructure, IP SANs enable IT managers to leverage existing IT infrastructure and expertise, taking much of the risk and cost out of implementing a SAN. IP networks also provide the utmost in manageability, interoperability, robustness and cost effectiveness.

### If you are facing the dilemma of how to address your storage needs, first clear the confusion:

For inexperienced storage buyers, the maze of solutions dished out in the name of IP SAN can be bewildering.

Some of the top vendors may be confusing the market with interchangeable usage of iSCSI and IP SAN. It is essential to realize that iSCSI is a protocol, whereas IP SAN is a system technology that uses Ethernet as a transport/connectivity medium. In reality, some vendors provide iSCSI protocol services using a FC SAN and not an IP SAN. They claim that they are offering an IP SAN solution, yet are merely providing iSCSI support to the controller/filer. Beyond that, they are still using FC.

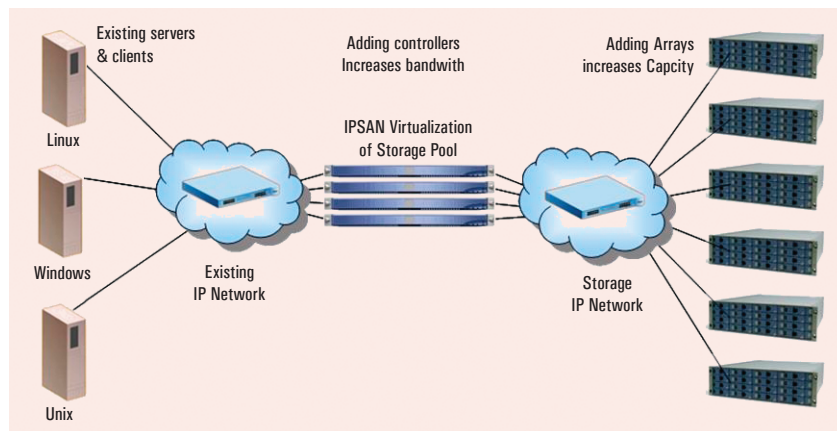
### How to look for Large Scale IP SAN or iSCSI arrays:

Once you have decided that IP SAN is the way to address your storage dilemma, you should look for a true IP SAN solution that delivers Ethernet connectivity end-to-end. This is a major differentiator, as it simplifies the storage network and enables you to deploy storage networks in the same way that you have been adding other client/server based services.

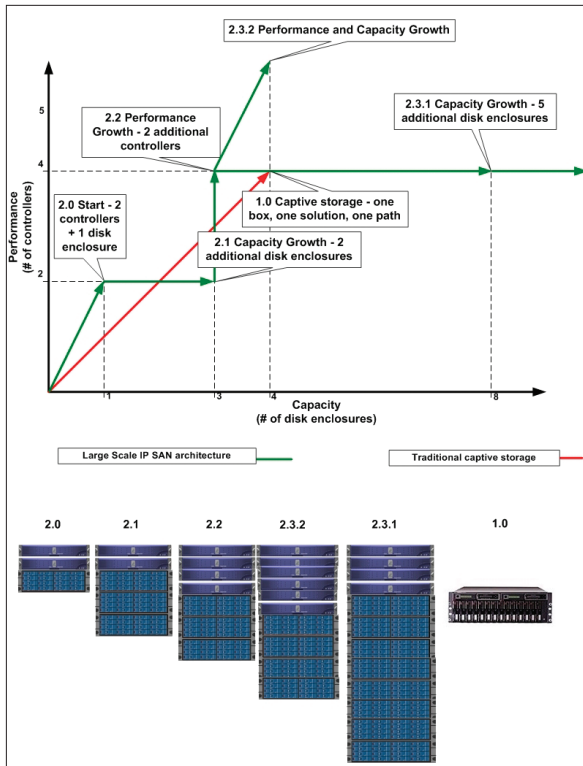
You should also account for at least a three-year growth factor and look for a Large Scale IP SAN, which is scalable on demand in terms of storage capacity, performance and host connectivity. Picture 2 shows the architecture of a large scale IP SAN that is independent in scaling in terms of performance and capacity.

Picture 3 shows the investment trade offs of Large Scale IP SAN vs iSCSI Arrays. Consider a scenario where you would want to scale up the performance without

adding additional disk capacity (e.g. HPC applications). On the other hand, you may need to only increase disk capacity without additional performance (e.g., email Archiving). iSCSI arrays do not have the answers, as they require you to buy another complete box. This is a waste of either disk capacity or performance resources, coupled with the headache of managing another storage island. This is where Large Scale IP SAN fits



perfectly, by allowing you to invest money solely depending on your business needs. In short, you save money while avoiding the complexity of additional SAN management.



**How the features of IP SAN compare to FC SAN?**

IP SANs are available with a variety of storage features at aggressive price points. IP SAN vendors are piggybacking on industry-backed technology; such as TCP/IP commodity technologies like ATA based disks and standard server hardware. Aligning with the industry hardware cost reduction roadmap; servers, IP Networks, and disk cost will be reduced so customers immediately save money.

**Some of the advanced features found in large scale IP SANs in the market are:**

Wizard based volume creation, Point-in-time Snapshot capability, Real-time alerts and performance monitoring tools, scalability in terms of capacity and performance, global hot sparing of hard disk drives, RAID flexibility, Volume Level Mirroring, Load Balancing for enhanced performance, high availability with no single point of failure, hot swappability of components.

Systems are available with various host Operating Systems support. OSs like Microsoft Windows 2000/XP/Server 2003, Sun Microsystems Solaris and RedHat Linux, HP UX and IBM AIX are all supported.

**Future Trends worth tracking**

Some of the future trends that will increase the acceleration of the IP SAN adoption -

- **Commoditization of 10 Gbps Ethernet**
- **S-ATA Disks**

Serial ATA and Parallel ATA disks were almost 50 – 50 in 2004. It is expected that by 2005 end, almost 85 % of ATA disks shipped will be S-ATA and by 2006 Parallel ATA disks likely to disappear.

- **Grid Computing**

Many worldwide grids are talking of a Multi-Petabyte storage infrastructure. IP SAN is strongly positioned as the underlying technology for a scalable and distributed foundation.

- **Vendor Consolidation on IP SAN based solutions:**

Users will start evaluating IP SAN vendors more from a storage solutions perspective rather than a storage capacity perspective. Vendors who leverage their software intelligence and offer solutions like Disk to Disk backup and Disaster Recovery will be the preferred choice from the buyer’s perspective.

- **iSCSI initiator in Motherboards :**

Almost all vendors are natively offering iSCSI initiators in their Operating Systems. It won’t be surprising if server vendors start offering embedded iSCSI initiators in the coming years. Just as Graphic cards, Audio cards and Network cards all found their way to the server’s motherboard, iSCSI Hardware adapters are expected to soon be integrated as part of our server as well.

- **SMI-S (Storage Management Initiative-Specifications)**

SNIA is working out in finalizing the profiles for iSCSI. This will help to create an Internet-scale network storage services infrastructure.

**The Time for IP SAN is now**

The benefits of IP SANs completely complement those of Fibre Channel SANs. Organizations that have steered clear of the hassles and expenses of Fibre Channel will no doubt be turning to iSCSI as their protocol of choice for SAN deployments. With 10 GigE clearly on the horizon, IP SANs are a viable storage option as organizations expand the corporate Internet, Intranet, and Extranet site applications. IP for networked storage is inevitable, and many organizations will turn to IP SANs as the only logical choice to integrate their network resources with their storage systems to provide universal availability.



Peter Wang is the Founder, CTO and Vice President of Engineering of Intransa. Wang holds a M.S. in Engineering Management from Stanford University, a M.S. in Electrical Engineering and Computer Science from the University of California, Berkeley, and a B.S. in Electrical Engineering from the University of Michigan. Headquartered in San Jose, California, Intransa offers enterprise-class, intelligent IP storage solutions.