



iSCSI Questionnaire

Coming on the heels of the release of last year's SCSI over IP (iSCSI) standard from the Internet Engineering Task Force, 2004 is seeing a modest increase in the number of iSCSI products entering the market. Questions abound over the fit for this protocol and for storage topologies based on it.

The following questions are intended to identify your company's view of the market for iSCSI technology.

QUESTION 1

In its early development years, iSCSI had several prominent champions within the vendor community, including IBM and Cisco Systems. The early position of iSCSI advocates was that it would replace Fibre Channel as an interconnect for building storage area networks. With the delays in standards development, the party line seemed to change: FC would be used to build "core" fabrics, while iSCSI would be used to connect outlying servers to FC fabrics.

What is your position on the technical fit for the burgeoning technology?

iSCSI rivals Fibre Channel technology in its ability to enable both low-cost and mission-critical SANs in the enterprise, and iSCSI is now emerging from its technology validation phase to support business applications such as consolidation and backup. Many of the uncertainties around iSCSI's maturity, performance, application support, and Microsoft support for the technology have been resolved and a number of large organizations have deployed iSCSI SANs for their cost-effectiveness and ease of use. Existing Fibre Channel SAN customers are heavily invested in the technology, so many of these organizations won't be making any wholesale shifts to iSCSI SANs anytime soon. However, as iSCSI matures, it promises to be much more widely used than fibre channel because of its clear total cost of ownership advantages.

QUESTION 2

As an IP-based protocol, iSCSI is limited in terms of speeds to available bandwidth less overhead, which is generally interpreted to mean that the technology is capable of delivering roughly 75 percent of the rated speed of the

TCP/IP network pipe in Mb/s or Gb/s. FC advocates have leveraged this as a major differentiator between FCP and iSCSI solutions.

How meaningful is this speed difference today? How meaningful will it be next year with the introduction of 10 GB/s IP nets?

It is a myth that iSCSI technology is capable of delivering only 75% of the rated speed of the TCP/IP network pipe. Bolstered by TCP/IP Offload technology, iSCSI can run at full line rate. TCP/IP Offload is a key component of Adaptec's iSCSI host bus adapter.

IT departments are just beginning to deploy 1 gigabit network solutions. 10 gigabit SANs will have a play in very high performance environments. It will be interesting to see if 10 gigabit SANS are deployed in any significant volume next year.

iSCSI does not compete with, but rather complements, Fibre Channel. Today, Fibre Channel delivers higher performance SAN solutions, though TCP/IP Offload engines and 10 gigabit iSCSI SANs will close the performance gap significantly. TCP/IP Offload is key to optimizing iSCSI performance today, and higher performance iSCSI storage arrays will be available later this year.

QUESTION 3

Related to the above, how important is interconnect speed to applications? Haven't we made do with much slower storage interconnects in the recent past?

Interconnect speed is of little importance to applications because the highest bandwidth is required in the network, not at the host, and gigabit networks are delivering the performance needed by most of today's business applications. However, multi-gigabit and 10 gigabit networks will be needed to meet the performance requirements of large server farms.

QUESTION 4

Both FC fabrics and iSCSI SANs utilize IP-based applications for management. In the case of iSCSI, management (or control path) is handled in the same network pipe as data and SCSI command traffic. In FCP, the control path and data path use different wires.

From the standpoint of scaling, simplified infrastructure, and design elegance, iSCSI would seem to have the advantage over Fibre Channel's "dual network" design. What do you think?

Fibre Channel was designed specifically for network storage, where as Ethernet evolved as a network to connect systems together. iSCSI leveraged the Ethernet infrastructure to move SCSI PDUs (Protocol Data Unit) and therefore is limited by the underlying transport protocol.

QUESTION 5

Both iSCSI and Fibre Channel use a serialization of SCSI, a channel protocol for storage I/O. The key technical difference is the transport used by each interconnect (TCP for iSCSI, FCP for FC fabrics).

If the two are more similar than dissimilar, why should a company field separate channel interconnect rather than use existing investments in networks to interconnect storage and servers?

QUESTION 6

FC SANs are increasingly seen behind NAS heads, which are said to act as gateways to SANs and provide hosting for SAN management utilities.

Taking this design choice to the next level, what is your opinion about using NAS gateways to support both NFS/CIFS and iSCSI on the front end in order to aggregate storage traffic?

Today NAS gateways are supported by both Network Appliance and Snap Appliance. Leveraging Ethernet infrastructure drives the convergence of NAS and SAN.

QUESTION 7

iSCSI standards do not seem to have been “held hostage” to proprietary vendor interests the way that FCP standards have been at ANSI (it is an established fact that vendors can develop FC switches that fully comply with ANSI standards, yet fail to be compatible with one another).

From the consumer’s perspective, do you feel it’s smarter to go with iSCSI-based technologies because of product interoperability?

iSCSI vendors have drawn an important lesson from the huge mistake made by Fibre Channel vendors. Namely, iSCSI vendors have designed to specification and gone to great lengths to ensure industry-wide interoperability. For example, most iSCSI vendors have participated in multiple plugfests conducted by the University of New Hampshire (UNH) to ensure interoperability. Microsoft’s WHQL certification program for iSCSI products also has promoted solution interoperability.

QUESTION 8

At one point, vendors touted iSCSI as the foundational technology for building “SANs for the rest of us” – that is, companies that are not necessarily Fortune 500 status.

Do you embrace this view? And if so:

- What do “the rest of us” require a SAN for? What is the killer application for iSCSI SANs?

Today, the killer application for iSCSI SANs is low-cost storage consolidation for small workgroups. Storage consolidation, back-up/restore and management are also critical applications that will drive SANs even though the capacity points have increased.

- What is the advantage of iSCSI over burgeoning protocols for large-scale device interconnection like Serial Attached SCSI (SAS), which, with expanders, offers connectivity for up to 16,000 nodes?

Serial Attached SCSI is a disk drive interface for direct-attached storage and will be extremely useful in cluster configurations, whereas iSCSI is a fabric technology for networked storage.

- With burgeoning drive capacity improvements, already at 200 GB for SATA and SCSI, can arrays be built with adequate capacity to meet the needs of SMBs without resorting to SANs?

Though drive capacities continue to grow and many SMB customers could meet their storage capacity needs with DAS, DAS can not be easily reconfigured or redeployed. The benefit of SAN is if one server is almost out of capacity and another is, say, only 20% used, an IT manager can easily allocate storage from one server to the other. In the DAS environment, this is a forklift upgrade and major undertaking.

- With removable/exchangeable disk/tape hybrids, such as Spectra Logic's RXT platforms, can SMBs achieve capacity scaling requirements without deploying SANs at all?

QUESTION 9

What has happened to TCP Offload Engine (TOE) technology, once touted as a prerequisite for iSCSI SANs? Was it simply hype intended to keep Host Bus Adapter vendors from losing market share to vendors of simple NIC cards in an iSCSI world? Or, has TOE development proved more daunting than originally thought? Why aren't we hearing more about TOE?

iSCSI host bus adapters with TOE technology are available today. iSCSI HBAs provide boot functionality, non-disruptive LUN re-sizing and single management utility across multiple Operating Systems. In addition, TOEs are pre-requisite for RDMA. As a standalone technology, TOE needs support from operating systems vendors and today Microsoft has a new interface for TOE code-named Chimney. Chimney is to debut next year, and that will help increase TOE adoption.

QUESTION 10

FC fabric advocates claim that FC fabrics are more secure than iSCSI SANs. What do you think?

- How is an FC fabric any more secure than an IP-based iSCSI SAN if it uses an out-of-band, IP-based, connection for fabric management?
- How can FC advocates justify the claim that FCP remains a mystery to hackers, but also argue that the protocol is becoming more familiar and less of a training hurdle for customers?
- Why have no FC switch vendors implemented the FCP security standards from ANSI in their products?

- v Unlike iSCSI SANs, Fibre Channel SANs are a separate network. Also, lack of familiarity with the protocol offers some advantages. But, research data shows that disgruntled employees account for about 70% of the attacks. Employees have access to your storage whether it's on an Ethernet or FCP network.
- v Most of Fibre Channel vendors are currently looking at adding authentication and are also seriously considering security protocols.

QUESTION 11

Microsoft's iSCSI initiator seems to be winning mindshare among vendors (Cisco recently opted to use the Microsoft initiator in place of its own in Windows shops).

Do you support the Microsoft iSCSI initiator with your products? Does a target device also need to utilize Microsoft target definitions to work with a Microsoft initiator? (Microsoft says it does, some target vendors say it doesn't.)

Adaptec's iSCSI host bus adapter, the Adaptec 7211, is Microsoft WHQL Certified. We are also shipping our iSCSI storage system, the Adaptec iSA1500 Storage Array, which supports Microsoft software initiator.

QUESTION 12

Some vendors seem to be suggesting that Fibre Channel is superior to iSCSI because of its end-to-end support of "native Fibre Channel drives."

Is there such a thing as a "native Fibre Channel drive" or are we really talking about SCSI drives with integral Fibre Channel to SCSI bridges in the electronics of the controller or disk?

Vendors are talking about FCAL protocol supported as part of the back-end in storage systems interfacing to Fibre Channel ports on the disk drives. The argument is suspect because there is a market that is shifting to Serial ATA drives. Also, in most storage devices there is a controller between back-end drives and front-end input interface (iSCSI or Fibre Channel) performing RAID and virtualization functions that conceal the characteristics of the drive type.

QUESTION 13

Fibre Channel fabrics do not seem to respond to Metcalfe's Law of networks, which states that the value of a network should increase and cost per node should decrease as more nodes are deployed. Fibre Channel fabrics seem, in fact, to become more difficult to manage as they scale (in many cases eliminating many of the value gains promised by vendors) and, in general, remain the most expensive platform for data storage. FC fabric per port costs have been extremely slow to decline.

By contrast, per port costs of GigE switches and GigE NICs have fallen dramatically in only a two to three year time frame. 10GbE is expected to follow this pattern as well.

From a cost standpoint, does iSCSI have a better story to tell than Fibre Channel to price-sensitive consumers?

Absolutely. iSCSI acquisition costs and management costs are much lower than those for Fibre Channel. Also, iSCSI is deployed on existing networks, which, unlike Fibre Channel, leverages existing IT skill sets and knowledge.

QUESTION 14

The industry has given mixed messages about the fit for iSCSI: Is it a data center technology because that is where the big switches are located, or is it an “edge technology” because workgroups and departments do not require the speeds and feeds of data centers? What is your take?

iSCSI is now being deployed at the edges primarily because it is a new technology. Before long, customers will see NAS and SAN converge. At that point, iSCSI will enter the data center.

QUESTION 15

With Simple Network Management Protocol (SNMP), Dynamic Host Communications Protocol (DHCP), and other established protocols in the IP world, it would seem that iSCSI will hit the ground running with services that were missing altogether from FCP. Is this an advantage in your opinion?

It definitely helps. Feature additions become much easier because of TCP algorithms.

QUESTION 16

Some vendors are “dumbing down” their Fibre Channel products to facilitate their deployment in SMBs. Is this your strategy and what do you see as the benefits and drawbacks of such an effort?

Fibre Channel vendors are threatened by iSCSI technology because of the advantages of Ethernet infrastructure. It would be difficult for Fibre Channel to replace Ethernet by reducing product cost alone. However, in the near term, both technologies will co-exist. Blade server technology and 10 gigabit technology will usher in a whole new paradigm.

QUESTION 17

Does iSCSI offer anything that FC fabrics do not to facilitate storage virtualization?

QUESTION 18

Describe the products that your company is developing that support iSCSI.

Adaptec is currently shipping an iSCSI host bus adapter with full TCP/IP Offload and a 1-terabyte iSCSI storage system.

QUESTION 19

Compare key pricing and capability differences for your iSCSI solutions versus comparable FC solutions.

QUESTION 20

Does iSCSI contribute to data protection in a networked storage world? If so what?

iSCSI offers better data protection at three levels. iSCSI leverages the data protection available in the TCP/IP and the SCSI protocol. In addition, iSCSI has its own header and data digest to improve data protection. For the highest level of security, iSCSI supports the IPSec protocol for network security.