



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?

We believe that this is not an iSCSI vs. FC question. There are appropriate places for both technologies depending upon performance requirements, management infrastructure, class of storage, and criticality of the data. We believe that customers will be developing a "tiered" model in deploying servers. Storage centric servers and storage devices will be connected in the data center using FC SAN. Smaller servers, with smaller storage demands, may use iSCSI technology. We will also see a lot of testing and development activity, including integration of iSCSI servers into the FC SAN utilizing iSCSI-FC gateways. This allows IT organizations to correctly benchmark iSCSI SAN capabilities against FC SAN capabilities, and evaluate the choices in the context of total cost of ownership in achieving desired end results; i.e, a proactively managed environment for their storage.

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?

The important point here is that the network must deliver the performance capabilities to accommodate total throughput required in the SAN. Today, FC is capable of more than 2x performance compared to iSCSI over Gigabit Ethernet, after overhead and latency are taken into account. As 4Gb Fibre Channel products reach the market in the near future, Fibre Channel will achieve a more than a 4x performance advantage. For mission critical, high performance servers, the throughput advantage offered by Fibre Channel is very important. This is a principle reason that iSCSI will typically be implemented in environments that do not require these levels of throughput, and where the performance characteristics of the Gigabit Ethernet network is not an issue.

How meaningful will it be next year with the introduction of 10 GB/s IP nets?

10Gb Ethernet is available today, and is not broadly deployed as of yet. However, following the broader introduction of 10Gb Ethernet into customers' IP networks over the next few years, speed will cease to be the central discussion point. The key consideration in designing storage solutions is much broader, and is about the overall efficiency and value of the entire solution. The formula should take into account not only up-front capital expenses, but also operational expenses for the life of the solution. This includes not only the transport and cost per bit transferred, but also the overall storage management model, and the integration of the applications and management tools into a complete system that adds business leverage to the Enterprise.

QUESTION 3

Related to the above, how important is interconnect speed to applications?

Again, this is about matching performance requirements to the underlying transport. Different applications have different requirements. For example, synchronous replication applications require much faster speed than asynchronous applications.

Haven't we made do with much slower storage interconnects in the recent past?

We have indeed had slower storage interconnects in the past, but as performance improvements are made possible through new technology, networks are able to perform better and accomplish more, enabling even higher value to leverage for the customers.

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?

There are pros and cons for architecting either model described above for the management (control) path and data path. Fibre Channel actually does not have to utilize a separate management (control) path network, although most customers implement this model. In fact, many IP networks also are designed with this concept of a separate control path, in order to provide the benefits of the "out of band" management network – such as isolation from data network, higher SLA of the management path, ease of addressing the management network, etc.

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?

The main point here, and this is a theme you will hear us repeat, is that the performance and manageability requirements of the storage networks will dictate the solution. Much of the classic SAN connectivity – mission critical, high performance applications – will require the optimized performance of FC. However, depending upon the particular needs or flexibility around performance requirements, there may be cases where iSCSI is a better fit.

Additionally, even though iSCSI leverages the same protocols commonly used in Enterprise Data networks today, such as TCP, we expect that for the foreseeable future, companies will run their iSCSI SANs on physically isolated networks. Therefore, the leverage of "existing investments" will

be the embedded skill set found in the organization, rather than the actual equipment costs. In the SME space, this may be very valuable, because the same department is likely to support both the storage and data networks. For Large Enterprises, which commonly have dedicated storage architects, it may actually be more valuable to leverage the existing investment in Fibre Channel to build out SANs beyond the data center.

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?

No answer provided.

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?

Interoperability is certainly a key consideration, but it is important to point out that the same interoperability issues that may exist at the SCSI level between initiators and targets are present regardless of whether the underlying transport is TCP or FCP.

Additionally, there is a set of decision criteria to be evaluated when choosing whether to utilize iSCSI-based technologies or FC technologies, or a combination of both. Interoperability is just one of those decision points, alongside performance, fault tolerance, latency, and manageability.

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

Our viewpoint is that iSCSI will be a useful technology for the Entry Market and for some departmental enterprise applications. We also believe that with the rapidly improving affordability of FC solutions combined with the maturity of these FC solutions for storage networking, many companies beyond the Fortune 500 will be adopt FC solutions. The emerging Entry segment of the SAN market is an important growth area, and Brocade’s strategy is to provide products that enable customers to make choices that best fit their overall requirements and objectives.

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?

We do not directly participate in the TCP Offload Engine (TOE) market. However, our observation is that due to the cost of TOEs (comparable to FC HBAs) and the cost to install these TOEs , combined with the notion that the onboard GE is “free” and that it’s performance is “good enough”, this market is not especially compelling.

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?

This out-of-band, IP-based connection is logically isolated (if not physically isolated) from the corporate data network. Also, the management network is protected by security mechanisms.

- 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?

There is a broad-based, embedded knowledge of IP (to the point that even most homes have IP networks today) vs. the focused, specific knowledge of IT staff that administers SANs. An additional vulnerability with IP is the ubiquitous global connectivity through the Internet.

- Why have no FC switch vendors implemented the FCP security standards from ANSI in their products?

These are still emerging standards. Brocade's strategy is to implement standards as they mature.

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.)

Brocade supports interoperability with the Microsoft iSCSI initiator in our products. Regarding targets, we have an extensive Interoperability Lab in-house, and we do complete Q.A. testing in our own labs. Therefore, we have the ability to declare interoperability independent of particular vendor claims or assertions.

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?

Brocade switch products forward frames via FCP, which is, by definition, SCSI encapsulated in an FC header.

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?

This is not a simple "yes" or "no" answer. Consumers will always make choices based upon multiple factors. For the price-sensitive customer, cost may indeed be the key buying criteria. There is a false assumption that FS is not cost competitive. It is important to consider all factors related to cost of ownership and operations,

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?

Brocade views iSCSI as more of an "edge" technology. What we see in our customer base is that they have data centers with high performance requirements running mission critical applications for their businesses, and they are firmly committed to maintaining and growing their FC infrastructure. In the "edge", iSCSI can indeed be useful to fan into workgroup and departmental servers, utilizing centralized storage for further consolidation. However, it is interesting to note that some of these larger customers are also evaluating the total cost of ownership associated with running two disparate transports in their overall storage infrastructure, and some are finding that the OPEX associated with this may cause them to reconsider implementing a homogeneous FC network and leveraging emerging lower cost FC solutions.

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?

No. While it is true that these are useful protocols, it is unclear how closely they will map into the special needs of storage networking and be readily implemented. iSCSI itself has been in development for several years, and is just now being ratified.

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?

Brocade is not “dumbing down” products. We have released management tools that allow quicker and simpler setup for a novice user. However, the underlying Brocade technology and management tools are still available to an end user as they gain familiarity and comfort with the product. This is part of an ongoing strategy to optimize the Brocade product line for different market segments, including SMB.

QUESTION 17

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

No.

QUESTION 18

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

Right now, Brocade is shipping an iSCSI to FC Gateway product based upon our the Brocade Multiprotocol Router platform (the Silkworm AP 7420).

QUESTION 19

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

We won't comment on pricing.

Regarding capabilities – our iSCSI solutions are integrated into the overall Brocade solution, and are managed with the same “look and feel” as our Fibre Channel solutions. We view this as a key benefit for our customers, so that they can leverage their existing tools, methodologies, and skills base.

QUESTION 20

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

No.