A New Route For Storage Networking

By **Chris Bucholtz**, *VARBusiness*

5:20 PM EST Fri., Oct. 19, 2001

All indicators suggest that storage area networks (SANs) will likely be the next big thing in storage management. But how this technology will ultimately be deployed is still a mystery.

Until recently, Fibre Channel was seen as the mode of transport that would make SANs a reality. The technology's high capacity and ability to address the mounting data needs of enterprise customers has helped it establish a foothold in large corporations. But because of its high cost and complexity, SANs have not been widely adopted outside of large enterprise customers.

Internet Protocol (IP) storage is creeping closer to becoming a viable alternative to Fibre Channel. In fact, 15.7 percent of integrators surveyed for VARBusiness' State of the Market study say they provide storage-over-IP services. According to some experts, a flood of IP storage products is not far off. One implementation in particular, Internet SCSI (iSCSI), is beginning to show promise. "The iSCSI standard will dominate, plain and simple," says Dan Tanner, analyst for Aberdeen Group. Once the standards for iSCSI are settled by the Internet Engineering Task Force (IETF)--"and they'll be ironed out quickly," Tanner says--SANs could become solutions for an entirely new market segment, and resellers could reap the benefits.

Such standards would provide a level playing field, industry experts say. "We need a common voice for IP storage," says Wayne Lam, the vice president of marketing at Melville, N.Y.-based FalconStor. "The one thing scaring off potential users and keeping them from lining up behind IP is the lack of a standard for iSCSI."

FalconStor has worked with various integrators to provide backup and disaster-recovery storage services to its customers via IP. Boca Raton, Fla.-based Storage Access, for example, a storage service provider that provides data protection, capacity-on-demand and disaster-recovery solutions, worked with FalconStor's IPStor solution to help it offer those services.

But what is IP storage, exactly? The term refers to a group of technologies that allows block-level storage data to be transmitted over an IP-based network. Block-level management is the cornerstone of SAN technology; it allows managers to view and use multiple, heterogeneous storage devices as a single pool of storage resources, maximizing investment in storage. If you're a smaller company, however, the investment in Fibre Channel infrastructure and a staff capable of managing it can offset those savings in a hurry.

IP storage uses protocols familiar to most networking professionals and can be used over existing IP networks. Due to IP's worldwide acceptance and ability to run on virtually any subnetworking technology, it has gained a critical mass that gives it advantages over other networking protocols, not the least of which is a vast number of engineers familiar with the technology.

"Your network administrator can manage both the messaging network and the storage network," Tanner says. "You don't have to hire that extra body."

Also helping the bottom line is IP's relatively low cost. Because it runs over commodity subnetworking technologies such as Ethernet, an IP network can cost significantly less than a Fibre Channel network. IP also allows storage over long distances, something that distance-limited Fibre Channel networks can't match. With business continuation a bigger concern now than ever before, this could be another key driver for the technology.

Technologies In Use Today

While analysts point to iSCSI as the standard that will break the market open for IP storage, there are other IP-based technologies for storage already in use today. Most are proprietary, but three types based on the following protocols are emerging as popular choices: iSCSI, Fibre Channel Over TCP/IP (FCIP), and Internet Fibre Channel Protocol (iFCP).

iSCSI provides for SCSI commands. iSCSI is designed to be a host-to-storage, end-to-end solution. When deployed, many solutions will use iSCSI-enabled hosts to communicate through IP switches to iSCSI-enabled storage arrays. the necessary mapping to make IP a transport for SCSI commands, just as Fibre Channel does

FCIP transports Fibre Channel frames over an IP infrastructure, providing the mechanisms to allow islands of Fibre Channel SANs to be interconnected over IP-based networks. The FCIP protocol establishes point-to-point tunnels that can be used to connect Fibre Channel SANs together using Ethernet to create a single, larger SAN.

iFCP, meanwhile, encapsulates Fibre Channel frames to be sent over the IP infrastructure. iFCP is a gateway-to-gateway protocol that combines Fibre Channel and IP addressing to allow the Fibre Channel frames to be routed to the appropriate destination.

Because IP does not guarantee delivery, all three protocols rely on TCP as the underlying transport to guarantee reliable, in-order delivery. IP packets may arrive out of order, so the TCP layer must deliver the data to the upper-layer protocol in the correct order. Since that upper-layer protocol is usually going to be SCSI, iSCSI has the best chance of emerging as the winner of this battle, some believe.

"The other ways of moving packets are not native," Tanner says. "You need a native protocol to support bootability, especially as the next generation of servers takes the form of blades. Blades don't have their own disks, so if you want multiple boot images, they'll have to be booted from the network."

Today, many companies rely on a mix of technologies to help inch closer toward building IP storage solutions. Some have been impressed by the results of one initiative, the Promontory Proj- ect, that demonstrates the flexibility and reliability of IP Storage. The Promontory Project is a demonstration of a coast-to-coast IP storage network that uses iSCSI and iFCP technologies built entirely of off-the-shelf products, according to Tom Clark, director of technical marketing at San Jose, Calif.-based Nishan Systems. The project includes a laundry list of products already on the market from Adaptec, Dell, Hitachi Data

Systems, IBM, Intel, Nishan Systems and QLogic. The project demonstrates the ability to perform backup functions between data centers in Newark, N.J., and Sunnyvale, Calif.

The efficiency gains IP storage promises are attractive, says Jim Tuckwell, who heads the iSCSI group at IBM. "It's also critical to emphasize the server and storage consolidation capabilities of IP. It provides a means to do this for customers with multiple locations across the country."

iSCSI and IP Storage Networking

Even companies that had thrown their full weight behind Fibre Channel are taking a new look at the future of storage networking as IP gains momentum.

"I think we'd be crazy to stick our heads in the sand and just assume that we're in a Fibre Channel-only world and that there wouldn't be protocol diversity," says Greg Reyes, CEO of Brocade. Brocade manufactures the SilkWorm 12000 Core Fabric Switch, available in 64-port and 128-port configurations, which expands the capabilities of existing Fibre Channel storage environments and can support both IP and emerging InfiniBand networks.

"What we believe will happen is that you won't just have a single protocol and a single flat network, as much as we might like that and as convenient to us as that might be," Reyes says. "More likely than not, there will be two or three networks and two, or maybe three, protocols."

The biggest opportunity for resellers may come in meshing existing storage infrastructures with IP storage technologies.

"There are going to be customers who want Fibre Channel support, even as they build storage networks with IP," FalconStor's Lam says. "Just like any other situation, you need to protect the investment the customer has already made." FalconStor's answer to this dilemma is version 2.0 of its SAN management software, which provides "any-to-any connectivity," including both IP and Fibre Channel.

But the reseller's biggest ally may be the inevitability of networked storage, Aberdeen's Tanner says. "Storage sounds simple,you have to hold, store, move and manage the data. But unless you can logically manage storage, it can suddenly become extremely complex as you add capacity. There has to be an answer, and IP storage is the closest, most economical technology for doing that."

What Is iSCSI And How Does It Work?

By Chris Bucholtz
VARBusiness
- 5:22 PM EST Fri., Oct. 19, 2001

If you know what the Small Computer System Interface (SCSI) standard is, then you've already got an idea of what iSCSI--or Internet SCSI--is all about.

SCSI (without the "i") refers to a set of evolving ANSI standards for electronic interfaces that allow computers to communicate with peripheral hardware, such as disk drives, tape drives, CD-ROM drives, printers and scanners, faster and more flexibly than previous interfaces. The present set of SCSI standards are parallel interfaces, an important trait for high-speed networking over low-cost equipment.

The iSCSI standard, currently under development by the Internet Engineering Task Force (IETF), will allow SCSI commands to be sent over IP networks. This means that data can be transmitted over LANs, WANs or the Internet, giving nearly every existing IP network--and many existing hardware products--the potential for storage networking.

Here's how it works: When an end user or application sends a request for data, the operating system creates the appropriate SCSI commands, which then go through encapsulation and, in some circumstances, encryption. A packet header is added to the resulting IP packets, and the data is transmitted, typically over an Ethernet connection. When a packet is received, it is decrypted and disassembled, separating the SCSI commands and the data request. The SCSI commands are sent on to the SCSI controller, and from there to the storage device. Because iSCSI is bi-directional, the protocol can also be used to return data in response to the original request.

IBM is already shipping a native iSCSI IP storage system, the IBM TotalStorage IP Storage 200i. Analysts say other companies will speed products to market later in 2001 or early in 2002, when the IETF is expected to formalize the standard.