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## Emerging Technology

THE STATE OF THE ART,  
NEW PRODUCTS,  
AND STAYING AHEAD  
OF THE CURVE

*Edited by Howard Baldwin*

### Storage Meets Networking

*Faster speeds  
are no surprise  
in storage, but  
this new  
technology  
eases data  
management  
too.*

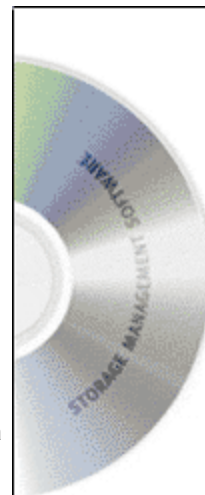
**BY JOHN WEBSTER**

**I**F YOU THINK YOUR NETWORK TAKES A POUNDING, CIO Glenn Bonner at Mirage Resorts Inc. would like to set you straight. The massive Mirage Casino and Hotel towering over the Las Vegas strip is a 24/7 rush of gambling and guests. Downtime is a foreign concept for the city as well as the computers. Every time a guest checks in or tries his luck on the slot machines, he generates a network transaction. And that data has to be stored somewhere. But like many CIOs whose data needs outgrow their networks, Bonner took advantage of an increasingly popular technology called a storage area network (SAN). Simply put, it's a set of dedicated storage devices that are linked into their own network and use the fibre-channel storage interface, which takes up where SCSI (small computer system interface) leaves off.

Because it comprises both storage and networking, SAN offers enough bandwidth and speed to eliminate network transaction slowdowns, a key asset when transactional data flows around the clock. "We already saw a conflict between storage needs and transaction needs," says Bonner. "Before implementing a SAN, backing up data took an incredible amount of time, and it impinged on overall network performance. Now we can separate the storage processing from the rest of the network and back up our data without interfering with our transaction needs."

GartnerGroup Inc. predicts that by

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2001 more than 80 percent of the Fortune 500 will have a SAN installed. Thanks to insatiable storage appetites, data intensive market segments such as digital video processing latched onto the storage networking idea first, says Robert Gray, research manager for storage systems at International Data Corp. in Framingham, Mass., a sister company to CIO Communications Inc. But he adds that users in virtually all industries are taking notice. In 1998, according to Gray, users spent about \$560 million on fibre-channel storage arrays for SAN environments. This year he expects that number to triple. IDC says that by 2002 fibre-channel storage arrays will be a \$9.2 billion business, and users will spend an additional \$2 billion to \$3 billion for SANs using other interfaces.

## Find It Online

### 3Com Corp.

(<http://www.3com.com/>)

### Academy for Educational Development (AED)

(<http://www.aed.org/>)

### Atrieva Corp.

(<http://www.atrivea.com/>)

### @Backup Corp.

(<http://backup.com/>)

### Connected Corp.

(<http://www.connected.com/>)

### Atto Technology Inc.

(<http://www.attotech.com/>)

### Chaparral

### The Ins and Outs of SANs

One of the most amazing upward curves in technology has been the increase in disk drive capacity. But at the same time, new technology was needed to transport data—frequently in much larger files than the network had contended with before—in and out of the devices. That's how SAN evolved. The fibre-channel data transfer technology supports up to a 100Mbps rate over distances of up to 10 kilometers (around six miles), both huge jumps over the maximum speeds and distances supported by the latest SCSI standards. About the name: Fibre-channel technology was originally designed for fiber-optic cabling, but when the International Standards Organization added copper cable support, it adopted the international spelling of fibre in an attempt to downplay its strict association with fiber-optics while maintaining the historical link. Fibre channel is now an American National Standards Institute (ANSI) standard.

Storage area networks can comprise any number of storage systems—RAID (redundant array of independent disks), tape backup, CD-ROM libraries or simply a bunch of magnetic disks—linked via fibre channel to one or more servers. Users can access devices over the network's high-speed connections, even simultaneously accessing the same disk at the same time (for different files, of course). By giving data storage its own highway, as it were, users don't have to battle the server for bandwidth.

It sounds simple, but because it borrows so much terminology from networking, the product array can be confusing. From vendors such as 3Com Corp., EMC Corp., Hewlett-Packard Co., Storage Technology Corp., Transoft Networks Inc., Xiotech Corp. and others, you can get chassis with multiple drive bays, switches (which increase bandwidth and add communication paths between servers) and hubs (which route data to multiple users and/or devices). For CIOs like Bonner, SANs solve the connectivity, data access and bandwidth problems associated with SCSI-based server-attached storage while providing dedicated connections between storage

**Technologies Inc.**

(<http://www.chaparral.net/>)

**Crossroads**

**Systems Inc.**

(<http://www.crossroads.com/>)

**EMC Corp.**

(<http://www.emc.com/>)

**GartnerGroup Inc.**

(<http://gartner.gartnerweb.com/>)

**GTE**

**Internetworking**

(<http://www.bbn.com/>)

**Hewlett-Packard  
Co.**

(<http://www.hp.com/>)

**Hilgraeve Inc.**

(<http://www.hilgraeve.com/>)

**International Data  
Corp.**

(<http://www.idc.com/>)

**Mirage Resorts Inc.**

(<http://www.mirage.com/>)

**Online Computer  
Library Center Inc.**

(<http://www.oclc.org/>)

**Storage Technology  
Corp.**

([http://www.storage  
tek.com/](http://www.storage<br/>tek.com/))

**Transoft Networks  
Inc. .**

(<http://www.transoft.com/>)

devices and applications residing on servers.

The networking analogies are appropriate, because SANs share storage data the same way server application data can be shared across an internetworked enterprise. Glenn Strachan, vice president and chief information officer at the nonprofit Academy for Educational Development (AED), in Washington, D.C., describes his SAN as a wheel. A Xiotech fibre channel storage array sits at the hub of the wheel, while "spokes" of fibre-channel cabling radiate out to his servers, each dedicated to a specific process. "We can put all our user files and project data on one server and use another server for e-mail, for instance, instead of using a departmental server for both data storage and e-mail," says Strachan. "This way, we don't need to load multiple processes onto one server. This simplifies management because if we want to update an application, we can update one central server instead of eight different servers."

**Data Management Takes Center Stage**

If you measure your enterprise data storage in terabytes, chances are you're having a hard time keeping track of it all. As your data continues to grow, the question becomes not only where do you store it all, but how do you distribute, manage and back it up, especially without affecting overall network performance? That brings up a nice surprise about SANs: While software to manage a new technology usually shows up as an afterthought, it's already available for most SAN products, handling network file control, mounting and unmounting of drives, basic security and cross-platform use of shared storage on the network. You can also view data stored on multiple devices as if it were centralized.

This simplified data management (which is generally supplied by the specific vendor) is as much a draw as the technology's speed, says Keith Thibodeaux, vice president of network services at Baton Rouge, La.-based United Companies Financial Corp. "The bigger draw is the ease of adding and removing storage on individual servers" with just a few mouse-clicks; Xiotech's software, he says, lets him dynamically allocate storage.

**Simpler Backup**

SANs offer another advantage. Among your biggest enterprise data management headaches is backup. The process usually causes network service interruptions while information gets moved from local disks on a server to offline drives for safe keeping. But SANs can remedy this painful procedure. Instead of relegating time-consuming data backups to the dead of night or weekends, when network traffic is at a minimum, the speed of fibre-channel-connected storage networks, coupled with SAN management software's capabilities, lets IT personnel back up data almost on the fly,


**Xiotech Corp.**  
(<http://www.xiotech.com/>)

according to the AED's Strachan. The Xiotech software permits him to create an image of any volume or disk and backs it up in real-time, not just after hours. "Because the volume is going over a fibre-channel connection, and not the Ethernet LAN, we don't have to worry about bandwidth contention," he says.

Even when a server fails, a SAN can drastically reduce the time it takes to make the data available. Because you can dynamically allocate a server's storage space in an array of disks, a quick switch to another drive keeps your users up and running almost without a hitch. United Financial's Thibodeaux says time savings can be measured in hours. "Once when we had a corruption on our Microsoft Exchange server, we didn't want to take time for the traditional backup-and-restore procedure. So we allocated 50GB in the storage array to cover ourselves by creating a new volume and copied the database there. Then we fixed the corruptions and copied it back." Overall, he saved several hours by not having to recover the data from tape and restore it.

### **Keeping SCSI in the Storage Network**

Despite these benefits, you probably don't want to make a wholesale switch to the technology simply because you have too much money invested in existing SCSI storage products. However, SCSI-to-fibre-channel bridges from vendors such as Atto Technology Inc., Chaparral Technologies Inc. and Crossroads Systems Inc. will allow you to make SCSI tape libraries and disk arrays part of the SAN. The data center at Dublin, Ohio-based Online Computer Library Center Inc. houses Worldcat, the world's largest bibliographic database. The center stores 12 terabytes of data attached to an IBM S/390 mainframe and several Tandem systems as well as systems running Unix and Windows NT. "More than half of our recent growth has been on Unix and NT and we wondered how many new tape subsystems we would have to buy," says Jerry Lynch, OCLC's director of operations. "But instead of buying new drives, we can redeploy existing S/390 tape resources to the other platforms. Some are direct SCSI-connected and the rest are connected to a SAN using fibre channel and SCSI-to-fibre bridge technologies."

If you're having trouble managing your data and you're juggling storage devices from multiple vendors—and those devices are scattered around the enterprise—you may be ready for a SAN. Clearly, the centralized configuration, scalability and manageability make SAN technology worth considering, especially when your stored data breaches the multigigabyte level. At long last, say users, the storage portion of a network can be managed with the relative ease of managing a LAN. 

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MOBILE BACKUP

## Beat the Backup Blues

*Does your blood run cold every time you see a laptop leave the building?*

**THE BOUNDARIES OF WHAT** you're responsible for expand every time someone takes a laptop with mission-critical data on the road. As telecommuting and mobile workers become more common, you're being charged with a mission that you may not have had when you started in IT: maintaining the security and reliability of data on laptops (for more on this issue, see ["The Road Rage,"](#) CIO Section 1, Jan. 15, 1999).

Several companies have popped up to address the issue of backup for the road warriors in your company. Atrieva Corp., @Backup Corp. and Connected Corp. offer software that lets laptop users upload and download data via the Web. Don't want to outsource this one sliver of your backup responsibilities? Then consider this scenario: Your sales manager's hard drive crashes on a trip to Malaysia. To get her data back, she can wake up one of your staff in the middle of the night, or she can get another laptop equipped with a browser, use her password to get at her data sitting on one of the ABC group listed above and download her presentation without disturbing anyone's sleep.

The problem for a CIO is that PCs and mobile computers play a much bigger role than they did before, laments John L. Puckett, CIO for GTE Internetworking in Cambridge, Mass., and a user of

Connected's software internally (another option if you want users to dial into your servers rather than Connected's). Data is suddenly in the home, the hotel and on the road, "and yet the CIO is responsible for protecting it at all times."

The services provided by these firms are fairly simple. User data is compressed and backup can be done over the Internet using secure encryption. They automatically perform file synchronization and an IT shop can tailor default settings to accommodate different users' needs. Puckett notes that you can maintain multiple versions of information so that you can revert to an older version if necessary, and he suggests cutting a CD-ROM every year for offline backup.

From a cost standpoint, it's a cheap insurance policy. Atrieva charges \$9.99 per month for 100MB of data (\$119.88 for the year) or \$149.99 per year for up to 1GB of data. @Backup charges \$99 per year for 100MB of data, an emergency CD is \$39.95 and a quarterly backup CD is \$33. Connected charges \$20 per month (its server solution costs \$6,000 per server and \$140 per client).

Puckett says that it can even put IT into the position of heroes. When users can get back a file that they thought they lost, he says, "It turns them into our biggest fan.

—Howard Baldwin



**View Incoming Calls Via PC**

THE UNIVERSAL INBOX—IN WHICH phone, fax and e-mail are integrated—is one step closer. Tygart Technology Inc. in Fairmont, W.Va., has ambitiously added calendaring into this equation with its **Prism/Look** software. It integrates incoming phone calls, Microsoft Outlook contact management software and corporate databases so that users can know not only who's calling by looking at their PC but can get information in real-time about the callers' accounts and the company's relationship with them. After all, you don't want a new employee asking your biggest client who she is.

The software enables users to dial, answer and transfer calls as well as put callers on hold and set up conference calling. It links the user's desktop to a Microsoft Exchange server for access to corporate information. It runs on the Windows 95, 98 or NT operating systems and requires between 26MB to 46MB of hard disk space and a TAPI-compatible telephone system. Prism/Look costs \$199 per user; volume discounts are available. For more information, call 304 363-6855 or visit [www.tygart.com](http://www.tygart.com).

## File Delivery for Workflow

ONE OF THE PROBLEMS WITH workflow applications is that usually at some point in the process you have to ship information outside your company, which means it's no longer under the control of your network. E-mail and the Internet's file transfer protocol may not be the most reliable form of communication; yet if the workflow is mission-critical (and when isn't it?), that step of the process needs to be reliable too. Hilgraeve Inc.'s **DropChute Enterprise**, now shipping, is designed to integrate smoothly into your workflow applications. You can automate delivery so that users can simply drop files into a designated folder from which the files are transported via secure, encrypted real-time connections between two PCs. According to the Monroe, Mich.-based company, the process also avoids problems with large or corrupted files or garbled e-mail attachments.

DropChute Enterprise incorporates ways to automate what happens to files when they're put into the delivery box; for example, batch files can be executed or separate files can be launched to process the data. Users can exchange files, folders or even data on entire hard drives and ship that data to one or more users. There are

two kinds of client applications: DropChute Pro for internal users and DropChute Lite, which can be distributed to clients or external users so that they can exchange information with your company easily.

Prices start at \$1,995 for one DropChute Enterprise server and 10 DropChute Pro clients; site licenses are also available (DropChute Lite is free). The software runs on Windows 95, 98 and NT. For more information, call 734 243-0576 or visit [www.hilgraeve.com](http://www.hilgraeve.com).

## Cross-Platform Data Conversion

MOVING DATABASE INFORMATION between platforms, whether for Y2K testing or other work, is no picnic. Princeton, N.J.-based Princeton Softech Inc.'s **Move for Servers** lets users test the process of exchanging data between Oracle databases and IBM DB2 databases running on mainframes using OS/390 or other hardware platforms running the DB2 Universal Database. In subsequent versions, users will be able to test data being converted from Microsoft Corp. SQL Server and Sybase Inc. and Informix Software Inc. databases.

The software supports several conversion functions, including scheduling, loading and so-called relational deletes. For Y2K issues specifically, it handles semantic aging, date interpretation, target dating, global date advancement and other date-related needs. Users can also program it to skip dates and watch for windowing techniques. Server-based pricing starts at \$35,000. For more information, call 609 688-5000 or visit [www.moveforservers.com](http://www.moveforservers.com).

## Integrating Call Center Support

YOUR CUSTOMERS COME TO YOU LOOKING for support information from a multitude of places: the Web, your call center, e-mail and your interactive voice response (IVR) system. Good luck trying to integrate all this information so that they can find it quickly. To this end, though, Inference Corp. in Novato, Calif., has upgraded and renamed its CBR (case-based reasoning) software as **k-Commerce Support 4.0** so that customers can access information no matter how they're contacting you—even through call-center-based chat rooms. The product uses Inference's knowledge tools to determine from customer questions exactly what they're looking for.

It has five components. In each case, the knowledge base comes back with additional questions or recommend solutions. The desktop component lets customer service agents enter problems as the customer describes them in everyday language. The Web component lets customers type in requests or questions themselves. The e-mail component lets customers send their questions via e-mail. The IVR component works similarly, using speech recognition and touch-tone input. Finally, a chat-room component lets customers converse with customer service agents, who can access files from the database and route them to the customer.

K-Commerce Support 4.0 runs on Windows 95, 98 and NT and works with databases from Oracle Corp., Sybase Inc. and Informix Software Inc. as well as with Microsoft Corp.'s SQL Server, Raima Corp.'s Raima Database Manager and IBM Corp.'s DB2 databases. Pricing starts at \$1,495 per agent seat for assisted deployment and \$50,000 per server for 100 concurrent connections for self-service deployment. For more information, call 415 893-7200 or visit [www.inference.com](http://www.inference.com).

***The CIO Service Center***

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