

REPRINTED FROM NOVEMBER 14, 2001

### **News**

## **RAIDs Getting Bigger, Smarter**

# Latest Disk Arrays Boost Performance, Capacity and Security for Broadcasters

#### by Robert Brilliant

#### SAN FRANCISCO

**R**AID, a catchy acronym for Redundant Array of Independent (or Inexpensive) Disks, is a technology rapidly moving from peripheral to "peer" status in the broadcast and streaming media world. Once considered add-on hardware, RAID systems are now essential to many on-air video servers, providing broadcasters with expandable program storage through low-cost disk drive arrays and record/playback protection through disk redundancy.

And now RAID manufacturers are designing their new products with the software and controller smarts that will provide even better performance, wider applications and lower costs to an industry that craves all three.

#### **RAID IN A NUTSHELL**

RAIDs consist of groups of off-the-shelf magnetic disk drives assembled within a chassis and running in parallel. Redundancy is achieved through the use of "parity" data, often stored on a dedicated drive, that can reconstruct data from any drive in the event a drive fails. Even if one drive is physically removed from the chassis, the remaining drives and the parity drive can retrieve all the missing data, often on the fly with no apparent performance degradation.

Depending upon need and configuration, a data file can be striped (written across several

disks so that all disks can perform read and write functions simultaneously) or mirrored (in which a redundant file copy is created). Most RAID systems are managed with a controller component that sits "in front" of the disks and communicates with the disks and the server.

Different RAID architectures, such as RAID 3 and RAID 5, vary the distribution of content and parity data across the disk array to meet particular performance requirements.

#### PERFORMANCE AND SECURITY

RAIDs provide broadcasters with two important commodities: performance and security. Performance relates to a RAID's ability to record large data files and then play those files back with millisecond recall. Security relates to the fact that these operations can run flawlessly, even in the face of drive failure.

"Performance and security in a RAID are linked together," said Jason Mancebo, senior technology manager of the Media Industries Division at SGI, a leading server and RAID manufacturer. "Even a one frame data loss is unacceptable in an on-air playback because that's a blank screen at home, while a framelong failure during file writing can make an entire feed useless."

The current line of SGI RAID products, the TP 9100 and TP 9400 storage arrays, are available with disk drives of up to 73 GB capacity with a 181 GB drive shipping soon. "Broadcast-



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SGI's TP9400 will soon ship with an expanded 181 GB drive.

ers typically aren't interested in 'gigabytes' as a spec," said Mancebo. "Hours of storage is the spec they care about. So when we tell them that the 73 GB drive costs 20 percent more than the 36 GB but delivers twice as many hours of playback, they're sold on the 73 GB."

Performance and security are also the RAID watchwords at Minnesota-based Ciprico, which is designing its next-generation RAID products for "isochronous performance." This term refers to a performance standard in which error-free data are consistently delivered at precise times.

"In broadcast applications it's extremely important that RAIDs respond to requests within milliseconds," explained Ciprico CTO Tom Ruwart. "RAID systems are often built with sheer bandwidth in mind, but not necessarily with the idea of delivering data precisely when it's needed. Isochronous performance is under intense scrutiny within the broadcast industry and we're incorporating it into our new products."

#### ENHANCED REDUNDANCY

SeaChange International, Inc. has taken RAID redundancy to a higher level by protecting not only the data within a single RAID chassis, but the data within a cluster of RAID chassis.

SeaChange's patented RAID<sup>2</sup> technology achieves this two-level RAID protection by creating parity backup for any RAID chassis among all the chassis configured within the company's Broadcast MediaCluster product line.

The MediaCluster and RAID<sup>2</sup> have just earned SeaChange its first NATAS Emmy award for outstanding technical achievement.

John Pittas, vice president of broadcast products and engineering at SeaChange, points out that the MediaCluster brings cost-effective "single-point fault resiliency" to broadcast RAID applications, meaning that no single point of failure can shut down an on-line system.

"Before RAID<sup>2</sup> you had to buy two of everything with a primary and secondary server to achieve single point fault resiliency. That got expensive," Pittas said. "But by adding a parity chassis to our Broadcast MediaCluster we can provide that resiliency at the cost of one additional chassis as opposed to the cost of buying an entire backup RAID system. It's a huge price advantage for us over the competition."

Higher redundancy at lower cost is also the

value proposition for Medea, a Westlake Village, Calif.-based RAID manufacturer that recently merged with Storage Concepts, a company with a long RAID track record for critical medical diagnostic imaging.

"The focus of our company is to get RAID systems available at a price that's not significantly different from standard storage," said Medea President Martin Bock. "With more intelligence in the controller and software, standard IDE and ATA type drives can equal or exceed the performance of expensive drives using SCSI or fiber channels. Our approach is to take lower cost components and add the controller intelligence that adapts them to higher performance applications." through high speed fiber. This can support processes like direct server editing of video content," said Crain. The transition to 2-Gb fiber channel technology supporting 200 MBps throughput will also be important to new RAID products, she noted.

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Future Ciprico RAIDs will likely be objectbased storage devices (OSDs) in which software automatically performs functions such as downloading playlist files into solid-state cache memory and transcoding files into the format needed for a specific application, such as Web streaming.

"OSD will be many times more effective in the broadcast environment than today's RAIDs," said Ciprico's Ruwart. "By building intelligence into

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Examples of this approach are found in Medea's StreamRAID, a server-class RAID designed for large scale video streaming applications and developed with fiber channel interfacing and built-in hub technology for 12 to 48 IDE drives. The VideoRAID RTR features 160 MBps throughput speed on a SCSI bus and the VideoRAID FCR is a fiber channel version with one or two ports of 100 MBps fiber channel.

"Fail-safe redundancy is what RAID is all about, but we do more than that," said Bock. "We can completely lose a drive and error correct on the fly and still run at the same speed."

#### SMART FUTURE

As broadcast technologies converge toward media and digital totality, RAIDs are certain to play an ever-increasing role in television operations.

Sylvia Crain, product marketing manager at Complex Data Management at SGI, sees storage area networks (SANs) as an important part of RAID growth. A SAN consists of a series of servers and RAIDs connected so that all the data can be shared among an expanded user group.

"With a SAN you have direct connection between all the servers to each of the hosts the RAID, we're going to transform it from a 'dumb data warehouse' into a 'smart service center."

Martin Bock of Medea sees new RAID products being more closely geared to the end-use application. "This implies that there will be more controller intelligence to support the sustained data rates for applications in film exhibition, video playback and editing, or any digital media usage. And the trend towards higher performance with cheaper disk drives will continue," said Bock.

Through products leveraged off the Broadcast MediaCluster, SeaChange's John Pittas envisions petabyte-sized RAID storage capable of holding 200,000 to 300,000 hours of programming on-line, enough to accommodate vast film and video libraries. "One of our goals is to build RAIDs for very large media libraries with a lot of fault resiliency for high confidence playback. Our two-level RAID redundancy technology will make this possible and economically feasible," Pittas said.

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