

## RAID Solution for the Small Shop

Contributed by David Hurd

It's hard to understand how important drive failure is unless you've had a drive fail during a project. If you were using a RAID configuration with redundancy, like RAID 4, 5 or 50, then you just had to wait and hope that the rebuild would be finished before your deadline. If you went for pure speed with a RAID 0, then everything on the RAID was gone, including your project. (I had that happen once with another manufacturer's drive, and the loss was devastating.) My old 1.5GB Seagate Cheetah 15K drives were kind of pricey, but they're still fast...

In my experience, you edit on a system that either helps you or fights you. To me, this business is stressful enough without having to constantly be bothered by a storage system that can't keep up with HD production.

A RAID system consists of three components: hard drives, a JBOD case and a RAID controller card. That old saying "You get what you pay for" is probably true when it comes to RAID storage. For over a year and a half, I have been pushing my eight Seagate SAS drives really hard with absolutely no problems, even when editing all day and rendering all night. This is possible because Seagate's Cheetah drives are designed to run constantly for 1.6 million hours before failure, and that's a lot of editing time.

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My old 1.5GB Seagate Cheetah 15K drives were kind of pricey, but they're still fast and have never let me down. When you have over 250 hours in a project, it means a lot to have solid drives, especially if you're editing without a backup. Yes, it's always good to have a backup, but with some of my HD projects running to over 500GB, backing up to an external HD took several hours, so under a deadline I sometimes edited with no backup at all. My 1.5GB Seagate Cheetahs worked so well that when I needed more storage space (and a bit more speed) I naturally chose the Seagate Cheetah 15K SAS drives again. This time I'm using 10 of their 450GB drives in a RAID 50 configuration. These new Seagate Cheetah SAS drives offer unprecedented performance, with a 28-percent increase in sustained data rate of up to 164MB/sec.

With video editing, sustained performance is everything. Some drives are rated at "burst rate," so they look like they should do the job. The problem is, after that initial burst, the drive's data transfer will drop, and as the data rate drops, you start dropping frames in your editing program. With dropped frames, video playback is jerky, and the process of digitizing footage into the computer stops altogether. With a sustained data rate of up to 164MB/sec per drive, connecting 10 of these drives together in a RAID makes one very big, very fast drive, which is perfect for editing HD video.

Not only are these drives fast, but Seagate's proprietary PowerTrim technology provides a 61 percent improvement in watts/GB at idle, so your electric bill will be lower, and you can feel good about going "green." These drives also do some other helpful things that you'll never see. Seagate's exclusive enhanced Error Correction Code better maintains performance throughout the life of the drive, reducing the probability of lost data, and the second-generation Background Media Scan proactively scans the media for potential defects during drive idle time, enabling incipient errors to be corrected before your data is lost. These features may operate in the background, but they're very useful.

Since these drives last so long, at some point you'll probably want to update their firmware, and the new quick and robust Download feature will load your new firmware in less than two seconds. It also has built-in protection that ensures that there will be no drive corruption in the event of a power failure during your firmware update. I chose the SAS option, but if you've already invested in Fibre Channel technology, it's not a problem — these drives are available in Fibre Channel as well.

The Seagate Cheetah 15K SAS drives are awesome, but they need to operate in a JBOD case. I chose the XJ100 SAS SATA/JBOD case from Advanced Industrial Computer (AIC), a solid company in California that offers a lot of bang for the buck. I like the XJ100 series case for its low cost and small size. It will hold all 10 of my Seagate SAS drives in pull-out, hot-swappable trays, and offers a high-performance 1200MB/s SAS link, all for about \$1,000. The case is light enough to lift with the 10 drives loaded, and small enough to sit on top of my Apple Mac Pro Dual Quad core case, allowing it to stack nicely in my edit station. It's also an ideal solution for HD video storage for new users because they can start with low-cost SATA drives and then upgrade to high-performance Serial Attached SCSI (SAS) drives as they get the business to pay for them.

The AIC JBOD case offers two miniSAS 4X connectors, which brings us to our last component: the controller card. The controller card lives in a slot on your motherboard and controls all the data streaming back and forth between your computer and external JBOD case. The card is the brain of the RAID system, so having a two-channel controller card is like having two brains working at once.

Not all brands of controller cards are great for editing video. Some do a good job with server data, but are slower when faced with the challenge of editing HD video. For the last year and a half, I've been using ATTO's R380 SAS controller card with my last set of eight Seagate 1.5GB SAS drives, with zero problems. And, after doing a little research, I found that it was still the best controller card for my needs, so I just updated the firmware and kept it in my system.

The ATTO R380 is a dual-channel card, which works great for editing HD video. I just plugged the two miniSAS 4X cables from the card into my AIC JBOD case, and set up the RAID. Above all, I wanted to keep my data safe, so I chose to use a RAID 50 configuration. To do this, I used the ATTO software to turn my 10 Seagate SAS drives into two, five-drive RAID 5s. This would allow one drive in each RAID 5 to fail without losing data. Since each of the Seagate drives is so fast, I can have this protection from data loss without losing too much speed. Also, since the Seagate Cheetah drives were designed to last 1.6 million hours without failure, this is a very reliable system indeed. After configuring both of the RAID 5s, I used the RAID software in the Mac OS to stripe the two RAID 5s into one RAID 0. My computer now sees just one big drive. If you have no RAID software in your OS, ATTO has some available for about \$100.

According to the speed benchmark program that came with my AJA card, my new RAID system writes data at about 530MB/sec, and reads data at 650MB/sec. These speeds will allow me to edit several streams of SD, or DVCPro HD, and at least two streams of full-raster uncompressed HD or 8bit 2K footage.

So there you have it, a bulletproof RAID system that works great for a small shop. Trust me, the cost will be outweighed by the performance and your peace of mind.

Prices and Contact Info:

Seagate Cheetah Drives

Street Price: under \$600

[www.seagate.com](http://www.seagate.com)

AIC XJ100 JBOD RAID Case

Street Price: under \$1,000

[www.aicpc.com](http://www.aicpc.com)

ATTO R380 SAS Controller Card

Street Price: under \$900

[www.attotech.com](http://www.attotech.com)

Apple

[www.apple.com](http://www.apple.com)