

Used properly, a redundant array of independent disks (RAID) can be a dependable, and now affordable, part of your backup solution.

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Safe and sound

A REVIEW OF FOUR RAID SYSTEMS

Safeguarding your high-resolution image files takes tons of storage space. You could store them in additional hard drives, but hard drives fail. One dependable solution is finally becoming affordable enough for most photographers: redundant arrays of independent disks (RAID). In the last year or two, RAID prices have dropped significantly, with some 1TB (terabyte, or one million megabytes) RAID systems selling for around \$1,000.

A RAID consists of two or more hard drives that have been configured to redundantly store data in one of several different configurations called RAID levels. Levels 0, 1 and 5 are the most commonly used. Levels 2, 3, 4 and combinations of these levels are also available. Unlike other storage options, RAID storage includes several fault-tolerant hardware/software solutions that protect data during equipment failure. Under all but the most adverse circumstances, even if one of the hard drives should fail, the data will be safely stored in another drive.

RAID Level 0 isn't technically a true RAID, as there's no drive redundancy. Frequently used when fast throughput is essential, Level 0 storage schemes spread, or strip, data across all the drives in the array without providing data protection. Level 1 technology mirrors data in RAID systems with an even number of

drives. In a two-drive array, for example, the data on the drives is identical. Data mirroring is robust protection, but its storage capacity is limited. A 1TB Level 1 RAID, for example, has maximum storage capacity of about 500GB.

RAID Level 5 is robust and space effective. It provides excellent protection by stripping data and parity information across three or more drives. When one drive fails, the data is safe on another, and often the faulty drive can be replaced, or "hot swapped" in real time, without interrupting the workflow. A typical four-drive, 1TB Level 5 RAID has a maximum storage capacity of 700GB or about 70 percent

of the capacity of the drives combined.

There are basically two types of RAID systems. Direct Attached Storage (DAS) RAID systems connect to the host system through the computer's motherboard or its USB, FireWire or SCSI port. They're ideal for small businesses that use un-networked computers with no Ethernet capability. The Network Attached Storage (NAS) RAID is designed for a networked environment with Ethernet connectivity. It provides a common storage location for every computer connected to the Local Area Network (LAN). NAS RAID systems can also be used with stand-alone systems that have a broadband/Ethernet connection to the Internet.

There's also a Storage Area Network (SAN) technology RAID, used primarily in very large corporations. It works alongside existing computer networks to provide high-speed access to a variety of storage devices, including RAID systems.

At one point, RAID systems were secondary storage options that augmented internal hard drives. Newer systems can be used as primary storage. You drag-and-drop image files into them just like any other drive. They might be the best solution for image storage managed by digital asset management applications (DAM) like ACDSee Pro Photo Manager, iView Media Pro and Extensis Portfolio.

Installing or replacing hard drives is a snap with Infrant's ReadyNAS RAID technology.



We looked at four 1TB RAID systems for this review. Each RAID system was evaluated for ease of installation and use. One was connected to the Windows XP test system via FireWire port, and the others via Ethernet. With no connectivity settings to configure, setting up the FireWire RAID was simply plug-and-play. Configuring the computer to accept an Ethernet-based RAID required installing an Ethernet router, which, in turn, required reading the manuals about configuring Internet protocols and addresses. That might sound a little intimidating, but the installation required no real understanding of Ethernet technology. Virtually every Ethernet setting was automatically determined by Windows XP, the router or the RAID.

We also ran tests to see how fast the RAID systems could backup a 22GB folder of 6,789 image files. Ethernet-based RAID systems are also accessible via the Ethernet by UNIX/Linux and Macintosh computers. The FireWire/USB 2.0-based RAID supported Windows and Macintosh computers.

INFRANT TECHNOLOGIES READYNAS NV RAID ships with four 232GB drives already installed. The compact 8x5x9-inch, 10-pound unit includes an Ethernet cable, power cord, a guide and CD. For those who want to use their own drives, the eight-page guide goes through the process of installing the drives into the RAID and configuring them to work together. Then the guide briefly describes how to connect the RAID to a router. The remaining steps cover loading the RAIDar configuration software and the Genie backup program from the CD and configuring the RAID. That's all it takes to get the drive up and running.

Getting the computer to recognize the drive is another story. Before anything will work, the computer's Internet Protocol (TCP/IP) settings must be configured to either use the RAID's

specific address (user input is required) or automatically obtain the address. For ease of use, select the automatic option. It eliminates the work of setting up any make of Ethernet-based RAID.

Once the computer automatically assigns an address (it takes only a second), you run the RAIDar application, which scans the Ethernet for the RAID, locates it, and reports its host name, IP address and drive status. At this point it's important to jot down the host name. You'll need it when you map the drive into the computer's file system.

To configure the RAID, select the Setup button to call up a browser-based application that lets you set the RAID clock, further configure Ethernet settings and specify security and sharing options. The program also lets you select the RAID level. ReadyNAS NV supports Levels 0, 1, and 5, as well as Infrant's X-RAID level, which automatically sets the level (RAID Level 5 reduced storage capacity to 676GB). Though the setup program presents numerous ways to configure the RAID, the default settings work very well if you're not inclined to learn Internet protocol. The last step is to get the computer's file system to recognize the RAID, a simple matter of selecting the Map Network Drive option in Windows Explorer and typing in the RAID's host name.

The accompanying application Genie Backup Manager Pro 6.0 Network software is relatively easy to use. It walks you through the various steps in backing up specific settings



The Sabio CM-4 RAID system's Discovery installation program virtually automates the entire setup process.

and folders. It also asks you to select the drive where the files will be stored and to choose a security password, among other options. That's all there is to it.

The Genie backup application took exactly one hour to backup the 22GB image folder to the ReadyNAS NV. The Windows XP backup application took 54 minutes to store the same folder to the RAID. The Infrant ReadyNAS NV has street price of about \$1,200. (www.infrant.com)

The **SABIO CM-4** 1TB RAID ships with four 250GB drives, which have to be installed by the end-user. It was physically the largest of the four RAID systems tested (10.2x6.8x11.4 inches), yet the 20-pound unit had the least fan and drive noise. In fact, it was hard to tell if it was working. Setup includes connecting the supplied Ethernet cable between the RAID and the router and running the accompanying Discovery program, which lets you configure the RAID, install your own drives (up to 2TB) if you bought a unit without preinstalled drives, or map the unit into the Windows XP file system.

The Discovery program quickly recognizes the RAID and calls up a browser-based application so you can set the RAID to Level 1 or 5. Discovery also has tools for configuring the security settings, changing the RAID's clock, and checking the drives' status. Network-literate photographers will have a field day tweaking settings, but Discovery is designed to configure everything automatically. No input is required, not even the RAID level, which is factory-set at 5. The application is so automatic, it even maps the RAID to the Windows XP file system, a big plus for someone who doesn't want to configure anything. The 1TB Sabio has 695GB capacity at Level 5.

The CM-4 ships with the Detto ReSet program to walk you through the process of selecting the folders to be backed up and designating where the data will be stored. We weren't able to fully test ReSet because of a compatibility problem with our Windows XP test system, but a company rep said a forthcoming updated version would solve that problem.

We used the Genie backup program to test the Sabio's throughput. It's not specifically designed for the CM-4, yet it copied the 22GB image folder

in 1:49. A simple drag-and-drop of the same 22GB folder took 1:22. The Sabio CM-4 has a street price of \$1,000. (www.sabioproducts.com)

The **ANTHOLOGY SOLUTIONS P400T YELLOW MACHINE** is one of the easiest to use, yet one of the most sophisticated RAIDs in the group. The yellow finish gives it the look of a consumer product, but don't be fooled. The 5.5x7.9x12.1-inch, 17-pound unit features all the Internet Protocol (IP) settings and diagnostics you would ever need.

Unlike the other Ethernet-based RAIDs, the Yellow Machine includes a built-in Ethernet router and file transfer utility. That's a selling point if you don't want to purchase and install a router, or configure the RAID as a network drive. By default, the unit ships in RAID Level 5, with 681GB capacity. It can also be configured at Level 0 or 1 or with no RAID capability.

Set up was easy. The four-page read-me-first document has simple illustrations of how to connect the RAID to a router or directly to a computer, if there's no other Ethernet router present. After making the connection, you install the Yellow Machine

Appliance Control software, which configures the network settings and storage options, and upgrades firmware as required. The software's Explore option lets you transfer files to the RAID through Windows Explorer without mapping the drive into the computer's operating system file system—once the software has been installed and run, the RAID is ready to use.

For fine-tuning, the browser-based Yellow Machine Manager lets IT-competent users configure every aspect of the RAID, from network

protocols to file sharing and security settings. No setting is ignored. Fortunately, the default settings will work just fine for most users.

The Yellow Machine's 94-page user manual was the most complete of the four, with detailed directions for setting up, servicing and configuring the RAID. It shows you how to replace drives while giving an excellent explanation of the RAID Levels. The included EMC Dantz Retrospect 7.0 software provides three methods of backing up: backup; duplicate; and disaster recovery. We used the backup option, which archived the 22GB image folder in 1:44. The Yellow Machine lists for \$999. (www.yellowmachine.com)

The **MAXTOR ONETOUCH III TURBO** differs in several ways from the other RAID units we evaluated. Rather than connecting via the computer's Ethernet, the 5.8-pound (5.4x3.9x8.5 inches) 1TB RAID, a direct attached storage device (DAS), connects through the computer's USB 2.0 or FireWire 400/800 ports. And, as a DAS unit, it doesn't have to be mapped into the computer's file system.

The Maxtor has two non-removable 500GB hard drives, and supports only RAID Level 0 and 1. At Level 0, the unit appears to the computer as one 1TB drive, with no data protection. At Level 1, the data is mirrored on both drives. Level 1 doesn't provide the data protection of Level 5 with removable drives, but it's certainly better than having all data stored on a single drive. We set the Maxtor to Level 1, lowering the total storage capacity from 1TB to 500GB. Installation was straightforward. You load the included software, plug in the FireWire cable on the RAID and computer, and reboot the computer. When the computer recognizes the RAID, the installation software automatically directs Microsoft Windows PC users to reformat the drives into the



Anthology Solutions P400T Yellow Machine provides robust RAID protection.

Microsoft NTFS file system. (The OneTouch III Turbo ships with both drives formatted for Macintosh systems). Selecting the format command usually doesn't cause problems, but if another Maxtor OneTouch is connected to the computer, double-check which drive the software wants to format. During our tests, the installation software tried to format a 233GB Maxtor One Touch II drive that was connected to the computer, instead of the 1TB RAID. You can eliminate the problem by simply disconnecting the other devices beforehand.

The OneTouch Turbo III management software performs a number of tasks. It lets you configure the RAID for performance, RAID levels, security, and the OneTouch button on the front of the unit. It also activates the EMC Dantz Retrospect Express HD 1.1 backup software, in which you select one of several methods of backing up the entire

computer or only selected folders.

Most photographers will chose the duplicate method because it creates accessible copies of each image file on the RAID. The comprehensive method is faster, but it stores image files in multiple 615GB catalog files, which cannot be accessed by Windows Explorer. The third method provides disaster recovery. In addition to the Retrospect Express HD 1.1 software, the Maxtor ships with a disk diagnostic program.

With the retrospect duplicate method, the FireWire-based Maxtor OneTouch Turbo III took 50 minutes to backup the 22GB image folder; the comprehensive method took 32 minutes. In comparison, the Windows XP backup program took 27 minutes to backup the folder to the Maxtor. The Maxtor OneTouch Turbo III has a street



The Maxtor OneTouch III Turbo is easy to install and use.

price of about \$800. (www.maxtor.com)

There are other 1TB RAID units in the \$800 to \$1,200 price range. Now that affordable RAIDs are within reach of most professional photographers, there's really no excuse not to protect valuable images. ■