

NAS STORAGE SYSTEM

The NAS spectrum covers a wide range of products, from simple boxes with a fixed amount of storage that you can plug into your network (basically glorified hard drives) all the way up to full-fledged network storage appliances with features like hot-swappable RAID arrays, flexible and secure account management, remote FTP and HTTP access, print serving and more.



Definition: NAS allows files to be stored and retrieved across a computer network. A NAS includes a dedicated hardware device often called the *head* that connects to a local area network (usually via Ethernet). This NAS "server" authenticates clients and manages file operations in much the same manner as traditional file servers, through well-established network protocols like NFS and CIFS/SMB.

Like traditional file servers, NAS follows a client/server design. A single hardware device, often called the *NAS box* or *NAS head*, acts as the interface between the NAS and network clients. These NAS devices require no monitor, keyboard or mouse. They generally run an *embedded* operating system rather than a full-featured NOS. One or more disk (and possibly tape) drives can be attached to many NAS systems to increase total capacity. Clients always connect to the NAS head, however, rather than to the individual storage devices.

A NAS can store any data that appears in the form of files, such as email boxes, Web content, remote system backups, and so on. Overall, the uses of a NAS parallel those of traditional file servers.

NAS systems strive for reliable operation and easy administration. They often include built-in features such as disk space quotas, secure authentication, or the automatic sending of email alerts should an error be detected.

NAS Protocols

Communication with a NAS head occurs over [TCP/IP](#). More specifically, clients utilize any of several higher-level protocols (*application* or *layer seven* protocols in the [OSI model](#)) built on top of TCP/IP.

The two application protocols most commonly associated with NAS are Sun Network File System (NFS) and Common Internet File System (CIFS). Both NFS and CIFS operate in client/server fashion. Both predate the modern NAS by many years; original work on these protocols took place in the 1980s.

Almost every small business can benefit from some form of network-attached storage, or NAS. NAS drives are essentially intelligent hard drives that connect directly to your local area network, rather than to a PC or server. Common uses are central file storage, media streaming, print serving and backup for all the local drives on your network. You can even access most NAS drives from the Internet if desired.



NAS or Server?

Assuming you need centralized storage, whether to choose a NAS device or a file server will hinge on several factors:

- **Your Budget.** NAS devices are much cheaper than file servers, and also don't require their own monitors and keyboards since they are managed via a Web interface over your network.
- **IT Administration Resources.** NAS devices require far less administration than servers. After initial configuration and setup, you generally only need to make occasional user and account updates. File servers require active administration to keep system patches, virus definitions and application software up to date, among other things.
- **Application Demands.** The need to run applications like groupware or e-mail and Web servers--all of which require the horsepower of a file server.
- **The Number of Users.** File servers can usually be scaled up much higher than NAS devices, which typically accommodate a maximum of about 25 simultaneous users.
- **Performance.** While the raw determinants of network storage performance will be connection and hard drive speeds for either type of storage, the faster processors and optimized hardware in file servers give them an edge over NAS for mission-critical and real-time applications.

Many businesses use a mix of NAS and server hardware. They might have a NAS drive dedicated to backup and print serving, as well as a file server handling a central company database and other shared files. Backup is definitely the number one use of NAS by small businesses.



Features to Look For

So what should you look for in a NAS device? That depends on what you will be doing with it, and how secure it needs to be. Here's a rundown of features:

Drive Type and Configuration. The essence of any NAS is storage, and the first thing to figure out is how much disk space you need. For backup, add up the sizes of your employees' hard drives--and then factor in some extra capacity. While you'll typically only back up a fraction of that space, the extra overhead will allow room to grow, as well as leave plenty of room for multiple versions of files. For central document and media libraries, again, determine how large your data set is, and allow room to grow. If you expect your needs to increase dramatically over the life of the NAS (about three to five years), consider a user-replaceable, multidrive expandable solution, so you can add to it later as required. Drive prices drop dramatically over time, so this approach will also save you money.

How much capacity you'll want will depend in part on whether you want your NAS in a RAID configuration (which can require up to twice as much space). If you have a two-drive setup, you can use RAID 1, which simply mirrors one drive onto the other in real time (and reduces total storage capacity by half, so make sure the NAS offers double your basic capacity requirements).

For multi drive setups, we recommend RAID 5, which stripes data across a minimum of three drives (increasing performance), while at the same time allowing for complete recovery in the event of a single drive failure. Many multi drive NAS enclosures allow you to hot-swap drives: You can pop out and replace a failed drive without even turning off the NAS. For RAID 5, you'll need about 50 percent more capacity than you expect to back up (assuming a three-drive array), or about one-third more if you have a four-drive array. This translates into a less costly setup than with RAID 1. Another point to note: Multiple smaller drives are usually a cheaper route than buying one or two big drives.

Stay away from RAID 0; striping data across the capacity two drives may increase your performance, but it also increases the risk to your data should one of those drives fail.

(Note that while RAID can guard against individual drive failure, it can't protect against corruption that may spread to all drives; NAS system failure; or a catastrophe like a fire, flood, or earthquake that may destroy both your local computers and the NAS. We recommend you continue to perform regular backups onto removable media that can be taken offsite or to an online backup service.)

Finally, you'll want to ask if the drives in your NAS will be regular or "enterprise-class." Enterprise-class drives carry a much higher mean time between failures (MTBF) than do standard consumer drives, and as such are more reliable. You can often choose one or the other drive type. The price premium for enterprise-class hardware is small and can be well worth it for businesses. If you do have the chance to pick your drives, we recommend choosing 7200rpm or 10,000rpm enterprise-class drives over 7200rpm standard drives. You will likely be striping the drives in an array (which can double performance) at any rate, so we suggest going for reliability, which is generally a more important factor than pure drive speed for NAS.

Network Connections and Performance. Definitely look for gigabit Ethernet connections in any office NAS, and make sure you have gigabit routers and switches. Backups involve moving large amounts of data over the network, and can take hours and hours on slow connections (especially wireless ones). Also try to stagger user backups throughout the week, and perform them at night, so they don't affect your network operations during the business day.

Ease of Setup and Installation. Most NAS devices have Web-based configuration utilities that let you set up user and group accounts, create drive "shares" and public folders, allow remote Web access via FTP or HTTP, format the drive, update firmware, set your Workgroup name, and so on. Some have wizards that take you through the process, making it easy for a part-time system administrator to get started. Access-rights management will be the key ongoing administrative task. Make sure that you can assign secure private shares using passwords and/or encryption, and provide read-only access to specific shares and users if needed. Most units offer a built-in print server, and even have additional USB 2.0 ports for attaching a flash drive or hard drive.

Security. NAS devices in general are more secure than file servers that can run third-party software (and by extension, malware). However, you probably don't want to place trade secrets on any

shared storage drive, especially one that might be available on the Web. The most secure NAS devices will have strong access-rights management, with password-protected accounts, groups and shares, and division of rights by read, write and read/write access. They will also have clear instructions that help you set things up securely--most NAS security problems are created simply by bad rights setup. Grant read/write access only to share owners, and grant group access only to folders clearly labeled as such. For backup of personal drives onto a NAS, use software that allows you to encrypt the backup. That way, snoopers cannot read it even if they somehow gain access to it.