

The Network

Practical buying and strategic advice for IT managers and decision makers

Buyer's guide

NAS appliances 2025

Buy the right NAS drive and you can not only save on monthly storage subscription costs but roll out new features, too. **Dave Mitchell** explains what to look for

Many SMBs facing a storage crisis have turned to the cloud, but as the monthly bills keep rolling in some are finding these services are an increasingly expensive solution. Network-attached storage (NAS) appliances can be a far more cost-effective option as although their initial outlay will be much higher, ongoing costs are negligible.

NAS appliances can also be a much better choice than a purpose-built server. There's no need to worry about the additional costs of an operating system and client access licences as NAS systems are supplied with a business-class OS, can serve as many users as you want without paying extra – and come with free business apps including backup, replication and much more.

The benefits of NAS are manifold: they're easy to deploy, simple to manage and their storage capacity can be swiftly expanded in step with demand. Keeping primary storage on premises means it won't be impacted by cloud provider or internet outages, performance will be significantly faster than the cloud and data

security is easier to maintain as you have total control over all access.

The good news for SMBs is that there are plenty of NAS appliances to choose from, with capacities to match every demand and prices for every pocket. This month, we test business-class desktop and rack models from Qsan, Synology, TerraMaster and Ugreen and put them through their paces in the lab to help you choose the right one.

Shapes and sizes

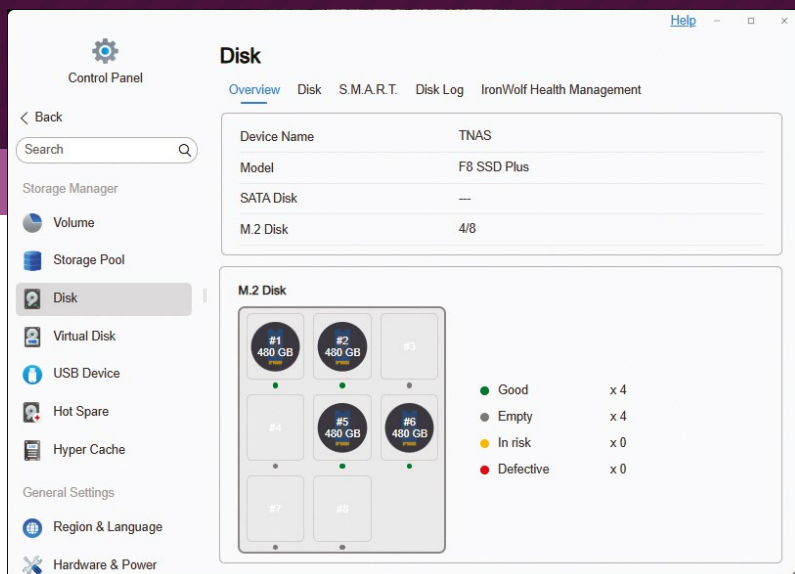
Your office setup and layout will determine whether a desktop or rack-mount NAS appliance is the best choice. In either case, it's important to select one that can satisfy your capacity requirements now and also well into the future. You'd be surprised at how quickly a NAS appliance can fill up with data, so you'll want one with a high capacity and plenty of expansion potential.

Choose an appliance that leaves you with some spare drive bays or one that has the option to connect external expansion units so you can add extra drives and incorporate them into existing RAID arrays. Most NAS appliances let you individually swap out hard disks with larger ones, but the money spent on the original drives will be wasted and RAID array rebuilds can take a very long time.

You can buy unpopulated NAS appliances and fit your own drives, but avoid cheap desktop models as they aren't aimed at NAS appliance use. Choose NAS-specific SATA drives such as Western Digital's Red and Seagate's IronWolf models:

BELOW Qsan included four high-performance U.3 NVMe SSDs with its NAS appliance

Slot	Status	Usage	Interface	Type	Encryption	Speed	Capacity
1	Online	Pool_01	-	NVMe SSD	NONE	8 GT/s x4	1.7 TB
2	Online	Pool_01	-	NVMe SSD	NONE	8 GT/s x2	1.7 TB
3	Online	Pool_01	-	NVMe SSD	NONE	8 GT/s x2	1.7 TB
4	Online	Pool_01	-	NVMe SSD	NONE	8 GT/s x4	1.7 TB



LEFT TerraMaster's palm-sized NAS supports up to eight fast M.2 NVMe SSDs

appliance brands. These processes can be bandwidth intensive and another option is block-level snapshot or volume replication where once the initial backup has completed, only changed blocks will be sent to the remote system.

NAS data needs to be protected from ransomware attacks, and a valuable ally is WORM (write once, read many). Look for features such as WriteOnce and HyperLock-WORM, which can turn selected NAS shares or

volumes into immutable storage where, once data has been written to them, it can't be modified or deleted until the retention period you set has expired. Some offer a Compliance mode that stops data from ever being deleted.

“Many NAS appliances feature dual internal M.2 NVMe SSD slots so you can cache in and save your main bays for general storage”

■ Speed demons

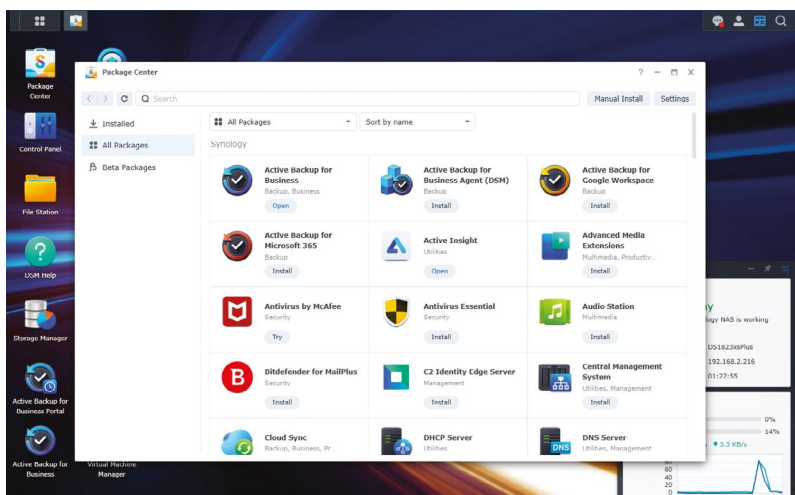
The latest business NAS appliances are equipped with fast, multicore CPUs that are quite capable of handling the demands of backup and file-sharing activities. A base system memory of 8GB will be enough for these tasks, but ensure you can upgrade this as many NAS features and apps will require more.

The range of apps available for NAS appliances makes them highly versatile, but the more you load on them the more your memory requirements will increase. Virtual machine (VM) manager apps are particularly resource-hungry, so if you plan on turning your NAS into a virtualisation host, factor the number of VMs you require into your CPU core and memory calculations.

Once you start serving up storage to multiple users and using the appliance as a backup destination, ensure that it has enough network bandwidth to cope. All business NAS appliances come with gigabit ports as standard, with many now including 2.5GbE multi-gigabit ports, but if your need for speed is greater, choose an appliance that has integral 10-gigabit (10GbE) ports or spare PCIe slots for additional 10GbE adapter cards.

Intense competition in the NAS market is keeping prices down while features keep getting better. The four appliances on review offer a wide range of features with performance to match, so read on to see which one suits your business best.

ABOVE Many vendors offer free mobile apps to monitor their appliances remotely



LEFT Synology offers an impressive range of free business apps

these are designed to work continuously in multi-drive NAS appliances and have built-in protection features such as vibration compensation technology. Note also that one vendor in this guide only permits its own brand of NAS drives to be used in its business appliances.

SATA SSDs are a popular addition to a NAS appliance. While capacities are much lower, they offer superior random write speeds to HDDs and can be added to an existing array as a performance-enhancing cache. For the latter, many NAS appliances feature dual internal M.2 NVMe SSD slots so you can cache in and save your main bays for general storage.

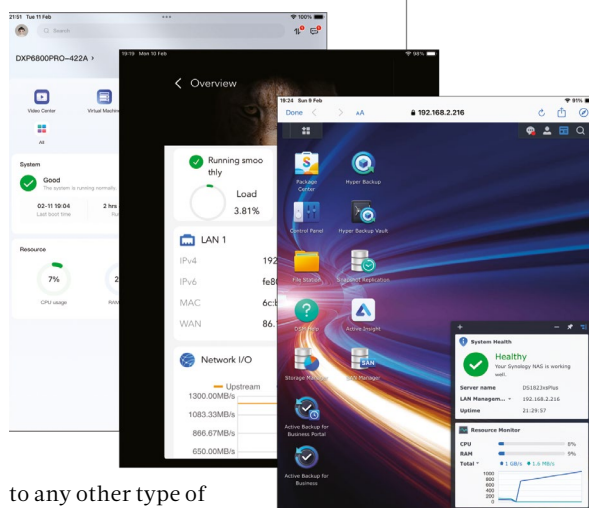
■ Data protection

Along with file-sharing services, many businesses will use a NAS as a destination for their server and workstation backups, but don't forget the NAS data itself will need protecting. RAID provides insurance against hard disk failures but it won't be a lot of use if your NAS dies, gets hacked or is stolen.

Apply the same protection strategy to your NAS as you would

to any other type of backup, so make sure its data is copied to an offsite location. Using cloud storage for NAS backups that could be many terabytes in size will be expensive, and a good alternative is to copy or replicate data to a remote appliance.

Many NAS vendors include free apps that run scheduled backups to remote systems, and built-in support for the industry-standard Rsync service allows you to transfer and synchronise data across different





Qsan XCubeNAS XN2204-4C

A low-profile hybrid storage appliance with excellent performance and impressive hardware at a great price

SCORE ★★★★★

PRICE As reviewed, £3,072 exc VAT (MSRP) from [servercase.com](https://www.servercase.com)

Qsan's XCubeNAS XN2204-4C is a hybrid appliance that aims to deliver affordable all-flash storage to SMBs. Don't be deceived by its modest dimensions; this 1U rack appliance is bursting with features.

Up front there are four universal LFF/SFF drive bays that support standard SATA HDDs or SSDs and NVMe SSDs. Qsan offers a tempting proposition when it comes to value, with the price we've shown including four 1.92TB U.3 NVMe SSDs.

The appliance also has two internal M.2 NVMe SSD slots, which can be used as a mirrored cache or standard storage pool. Networking options look good, too: it sports four 2.5GbE multi-gigabit ports and teams them up with quad 10GbE SFP+ fibre ports, and the spare PCIe expansion slot accepts Qsan's optional 10GbE and 25GbE cards.

A quad-core 2GHz Intel Xeon D-1712TR CPU sits in the driving seat and is partnered by 8GB of DDR4 memory, which is upgradable to a hefty 256GB. Power redundancy is present, with the price including dual 450W hot-plug supplies.



Another appealing feature is its insane expansion potential. Add Qsan's optional SAS3 PCIe card and you can daisy-chain a mix of Qsan's XD5300 external disk shelves for a total of 414 drives and a maximum raw capacity of nearly 9PB.

The XN2204-4C is physically identical to Qsan's XN8104R model, but there are big differences in the software department. Qsan advised us that the XN8104R will continue to use its QSM 3 operating system (OS) while the XN2204-4C runs the updated QSM 4 which is also employed by its XCubeNXT dual controller appliances.

Deployment is swift. We used the QSM 4 wizard to choose drives, create standard storage pools or ones with deduplication and compression applied, select thick or thin provisioning, and enable pool encryption if self-encrypting drives are installed. With only four drive bays available, RAID options are limited; we chose a RAID5 array as the storage overheads of RAID6 makes this type less appealing.

When creating volumes, you choose the block option for IP SAN presentation or file volumes for NAS shares. Along with local user accounts, access security can be applied by creating hosts that define the network ports on

ABOVE The modestly sized XN2204-4C offers huge potential for expansion



"Another appealing feature is its insane expansion potential. Add a PCIe card and you can daisy-chain a total of 414 drives"

BELOW QSM 4 makes appliance management easy and performance is outstanding

which iSCSI targets and NAS shares will be presented.

Snapshot protection can be applied to each volume and run manually or scheduled for as often as every five minutes. Essential ransomware protection is present as well; WORM (write once, ready many) can be applied to file volumes where you set a retention period in days, hours or minutes.

QSM 4 offers a modest selection of business apps. QReplica manages block level replication of SAN volumes to local storage or remote Qsan appliances, while the Rsync service supports client and server modes. Cloud backup services can

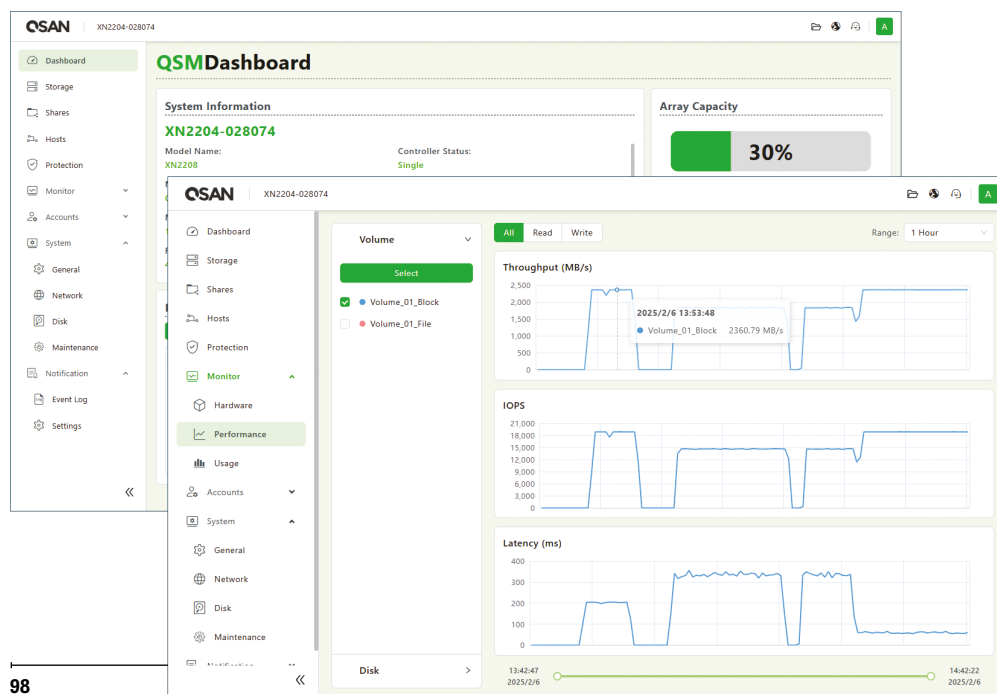
currently use S3-compatible storage, with Amazon S3 and Microsoft Azure options under development, as is the integral Microsoft 365 email backup feature.

The XN2204-4C posted some big numbers in our 10GbE performance tests. A share mapped to a Dell PowerEdge R760xs Windows Server 2022 host returned 9.1Gbits/sec and 9.2Gbits/sec for Iometer sequential reads and writes, while random operations delivered 8.9Gbits/sec and 9.3Gbits/sec. IP SAN speeds are excellent, with a 1TB iSCSI target recording 9.2Gbits/sec across the board for sequential and random reads and writes. Ramping up the pressure with a dual 10GbE MPIO link to the target saw sequential reads and writes leap to 18.5Gbits/sec and 17.7Gbits/sec, while random operations mustered 18.4Gbits/sec and 14.4Gbits/sec.

The XCubeNAS XN2204-4C offers an incredible specification for the price, which includes a full house of U.3 NVMe SSDs. Business-focused apps are minimal, but it delivers impressive 10GbE performance together with a monumental storage expansion potential.

SPECIFICATIONS

4-core 2GHz Intel Xeon D-1712TR processor • 8GB DDR4 RAM (max 256GB) • 4x LFF/SFF SATA/NVMe hot-swap bays • 2x M.2 NVMe slots • 4x 1.92TB U.3 NVMe SSDs • 4x 2.5GbE • 4x 10GbE SFP+ • PCIe Gen4 x8 slot • 2x 450W hot-plug PSUs • 3yr hardware warranty



Synology DiskStation DS1823xs+

A powerful desktop NAS with a high capacity, great data protection features and top 10GbE performance

SCORE ★★★★★

PRICE Diskless, £1,397 exc VAT
from broadbandbuyer.com

The DiskStation DS1823xs+ may have been launched a couple of years ago but it still stands tall as one of Synology's flagship high-performance desktop models. Reasons are manifold: this 8-bay model is driven by a powerful quad-core 3.35GHz AMD Ryzen V1780B CPU, and its base 8GB of DDR4 ECC memory can be boosted to 32GB.

The main drive bays support SATA HDDs and SSDs, while the two internal M.2 NVMe SSD slots can be used as a performance-enhancing cache or a standard storage pool. Bear in mind that all storage devices are restricted to Synology's own models; it will work with drives from other manufacturers but Synology won't provide support if you use them.

Networking options are plentiful, with the appliance offering a 10GbBase-T and two gigabit data ports, while management can be isolated on a separate gigabit port. The spare PCIe expansion slot offers plenty of upgrade options and supports Synology's own dual-port 10GbE and 25GbE cards.

Installation is a breeze. After loading four 4TB Synology HAT5300-4T HDDs, we used the quick-start wizard to deploy the latest DSM 7.2 software and create a RAID5 array.

With the appliance hooked up to

our 10GbE network, it delivered impressive performance.

A NAS share mapped to a Dell PowerEdge R760xs Windows Server 2022 host returned fast Iometer read and write speeds of 9.3Gbits/sec and 9.2Gbits/sec. Real-world numbers are good, with 25GB file copies between the server and appliance averaging read and write speeds both of 5.7Gbits/sec, while securing a 22.4GB test folder with 10,500 small files mustered 2.7Gbits/sec.

IP SAN performance is also impressive, with a 1TB iSCSI target mapped to the server delivering sequential read and write speeds of 9.3Gbits/sec and 9.1Gbits/sec. To test SSD caching, we fitted a couple of Synology's 800GB NVMe SSD sticks and assigned them as a mirrored read-write cache to our storage pool.

You won't see any significant improvements for sequential reads and writes, but they're a good investment if you have workloads generating a lot of random write operations. Without the cache we recorded Iometer random write speeds of 0.75Gbits/sec for our iSCSI target, which leapt to 6.1Gbits/sec with the cache assigned while IOPS went from 5,000 to 37,000.

DSM 7.2 is sharply focused on data security and ransomware protection:

ABOVE Synology's DS1823xs+ is powered by a quad-core AMD Ryzen V1780B CPU



"The DS1823xs+ may be an old-timer but it still cuts the mustard in the NAS stakes. Its powerful hardware delivers impeccable performance"

BELOW/LEFT As well as remote monitoring, Synology delivers lots of security features

along with full volume and share encryption, it provides WORM (write once, read many) policies for NAS folders on Btrfs volumes. Coined WriteOnce, you select it during shared folder creation and choose Enterprise or Compliance policies that apply customisable file lock periods, enforce retention periods in days, years or forever, set files as immutable and stop storage pools, volumes and shared folders from being deleted.

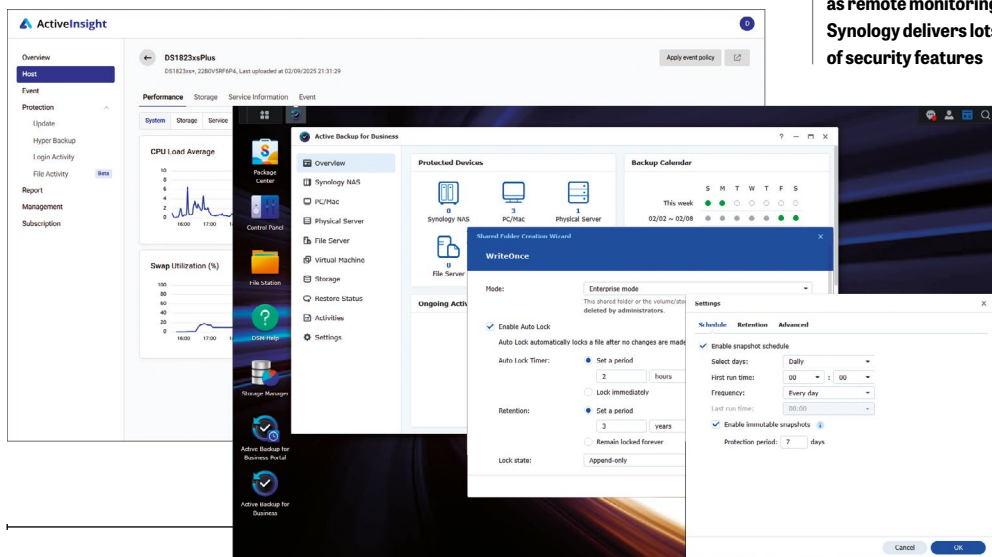
The Snapshot Replication app manages NAS and IP SAN snapshots and offers fast rollback services along with NAS share file and folder recovery using the File Station app. It can also create immutable snapshots that can't be deleted by any method until their retention period has expired.

DSM 7.2 offers a wealth of business apps, a standout one being the Active Backup suite, which comprises three apps for securing servers, workstations, VMware and Hyper-V virtualised environments and remote Synology appliances, along with Google Workspace and Microsoft 365. The Hyper Backup app looks after local, remote, Rsync, cloud and iSCSI LUN backups while the Drive Server app provides sync services for file sharing and collaboration.

The DS1823xs+ may be an old-timer but it still cuts the mustard in the NAS stakes. Its powerful hardware delivers impeccable performance, it's packed to the gills with business apps and offers great data security measures.

SPECIFICATIONS

4-core 3.35GHz AMD Ryzen V1780B processor
● 8GB DDR4 ECC RAM (max 32GB) ● 8 x LFF/SFF hot-swap SATA drive bays ● 2 x M.2 NVMe SSD slots ● 3 x gigabit Ethernet (MGMT, 2 x LAN) ● 1 x 10GbBase-T ● 3 x USB-A 3.2 Gen 2 ● 2 x eSATA ● PCIe slot ● 250W internal PSU ● 343 x 243 x 166mm (WDH) ● 5yr hardware warranty





TerraMaster F8 SSD Plus

Pricey, but this innovative 8-bay all-flash NAS appliance delivers impressive 10GbE performance

SCORE ★★★★★

PRICE Diskless, £608 exc VAT
from [amazon.co.uk](https://www.amazon.co.uk)

TerraMaster has a fine reputation for delivering ultra-compact NAS appliances and it goes one step beyond with the F8 SSD Plus. Measuring a mere 61 x 140 x 178mm (WDH), this little plastic box is the first NAS we've seen to present eight internal M.2 NVMe slots.

There's plenty of power on tap, as the appliance employs an 8-core 1.8GHz Intel Core i3 N305 mobile CPU partnered by 16GB of fast DDR5 RAM, upgradable to 32GB. The F8 SSD Plus isn't cheap, but TerraMaster also offers an F8 SSD model with a 4-core 1.7GHz Intel N95 CPU with 8GB of DDR5 memory for around £70 less.

Network performance won't be held back as the F8 SSD Plus is equipped with a 10GbE-T port. You also get three 10Gbits/sec USB 3.2 Gen 2 ports and an HDMI port for CLI output, while cooling is handled by two 5cm diameter fans in the base, which are almost silent.

Installing NVMe SSDs is simple: a thumbscrew releases the internal chassis, which slides out for easy access. You have four slots on each side and the kit includes a full set of aluminium heatsinks and pads,

although we weren't impressed with the elastic bands provided to keep them in place.

TerraMaster's compatibility list offers a reasonable choice of devices from the likes of Samsung, Seagate and Western Digital, and although our Kingston Data Centre NVMe SSDs weren't listed, the appliance accepted them. Don't waste your money on costly PCIe 4 devices, though, as the N305 CPU only has PCIe 3 lanes.

Installation is deftly handled by a browser-based wizard, which downloaded and applied the latest TOS 6 operating system. Our Kingston SSDs were correctly identified and the wizard automatically created a RAID array, which uses all available devices regardless of their size without incurring any capacity overheads.

To test performance, we hooked the appliance up over 10GbE to a Dell PowerEdge R760xs Xeon Scalable server running Windows Server 2022.

ABOVE The tiny F8 SSD Plus comes with eight internal M.2 NVMe slots

"The F8 SSD Plus is equipped with a 10GbE-T port. You also get three 10Gbits/sec USB 3.2 ports and an HDMI port for CLI output"

BELOW FlowMon data can be fed into the WUG console while the Top 10 view shows devices that need attention

Sequential NAS speeds are great, with a mapped share returning Iometer read and write rates of 9.2Gbits/sec and 8.3Gbits/sec.

Swapping to random read and write operations saw sustained read and write speeds of 9.3Gbits/sec and a noticeably lower 4.7Gbits/sec. IP SAN performance was in the same ballpark, with a 500GB iSCSI target recording sequential read and write rates of 9.2Gbits/sec and 8.4Gbits/sec, while

random operations delivered 9.2Gbits/sec and 4.8Gbits/sec.

The TOS 6 web console is easy on the eye and has been redesigned with a ribbon menu across the top for quick access to the most common management functions. Apps are in abundance, with 51 now available for download from the App Center.

These include the Backup app, which provides a central location for quick access to all the suite's associated modules. Along with Rsync support, Btrfs file system,

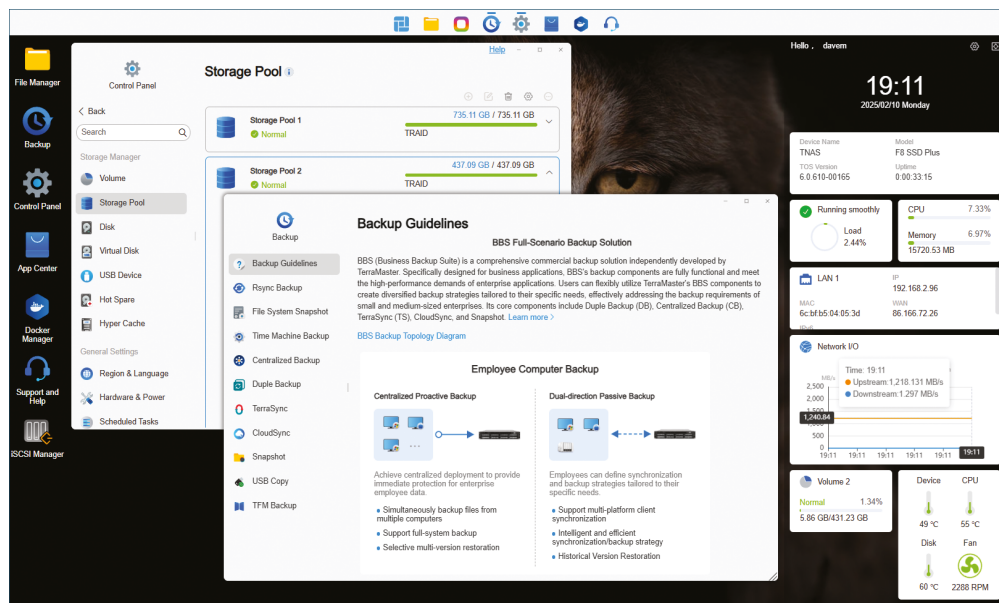
NAS share and iSCSI LUN snapshots can be run at regular intervals. TFM (TerraMaster folder mirror) handles local or remote copies of shared folders, and CloudSync supports 12 storage providers including Amazon S3, OneDrive and Dropbox.

The HyperLock-WORM feature is a valuable ransomware protection feature that allows you to assign custom retention periods to volumes during creation. The Enterprise mode allows data to be modified or deleted after the set period has expired, while the Compliance mode stops data from ever being changed.

The F8 SSD Plus is a small, quiet and powerful NAS appliance, although your initial outlay will be dwarfed by the cost of filling it with high-capacity NVMe SSDs. Even so, it's around £200 cheaper than Asustor's 6-slot FS6806X, delivers great 10GbE speeds and TerraMaster's TOS 6 offers plenty of useful apps.

SPECIFICATIONS

1.8GHz Intel Core i3 N305 processor • 16GB DDR5 SODIMM (max 32GB) • 8 x PCIe 3 M.2 2280 NVMe SSD slots • 10GbE • USB-C 3.2 Gen 2 • 2 x USB-A 3.2 Gen 2 • HDMI 2 • 61 x 140 x 178mm (WDH) • 72W external PSU • 2yr limited warranty



Ugreen NASync DXP6800 Pro

The OS is a work in progress, but this powerful business NAS packs an impressive hardware spec for the price

SCORE ★★★★★

PRICE Diskless, £980 exc VAT
from [sotel.de](https://www.sotel.de)

The SMB NAS market is about to get a lot more interesting as Ugreen steps up for a piece of the action. Many businesses will be familiar with Ugreen's high-quality PC accessories and power chargers and it makes its play for its share of the NAS market with a family of six desktop appliances.

The attention to detail is clearly evident, as the 6-bay NASync DXP6800 Pro on review is extremely well built. What lies beneath the sleek aluminium shell is even more interesting as it offers an incredible specification for the price.

It's powered by a 10-core Intel Core i5-1235U mobile CPU and comes with 8GB of DDR5 memory, upgradable to 64GB. Port choices are remarkable: it has pairs of 10GbE multi-gigabit ports, Thunderbolt 4, USB-A 3.2 and USB-A 2, an integral SD 4 card reader and an HDMI 2 port to pipe video from the CPU's integrated Iris Xe Graphics chip.

Telescopic tool-free carriers are used in the front bays, and a spring-loaded hatch underneath provides easy access to the two memory slots and a pair of M.2 NVMe SSD slots that can be used as a storage pool or cache. Two 9cm diameter cooling fans lurk behind the rear magnetic dust cover

and, during testing, we found the appliance to be whisper-quiet.

A PCIe expansion slot is also provided, but you'll need to carefully remove 11 screws to access it. The documentation shows you how, and the Broadcom dual-port 10GbE card we fitted worked fine.

For testing, we installed four 4TB WD Red Pro HDDs and loaded Ugreen's web portal to initialise the appliance. We used the UGOS Storage Manager app to create a RAID5 storage pool and added two Kingston M.2 NVMe SSDs to test caching.

When Ugreen launched the NASync family last year its UGOS software only offered 16 apps, but these have since been increased to a total of 24. They include the Virtual Machine hypervisor app, a Netdisk tool for OneDrive file syncing, an Online Document app for file-sharing and the Video Center and Music multimedia apps.

Much more capability needs to be implemented, though, as you can't encrypt storage pools, volumes or shares. Despite supporting the Btrfs file system, snapshots aren't currently available and IP SANs have yet to be implemented.

The Sync & Backup app secures local data to a remote Ugreen NAS

ABOVE The well-built NASync DXP6800 Pro offers an incredible spec for the price

"Port choices are remarkable: it has pairs of 10GbE multi-gigabit ports, Thunderbolt 4, USB-A 3.2 and USB-A 2, an integral SD 4 card reader and an HDMI 2 port"

BELOW The UGOS software provides a security scanner and data backup tools

and vice versa, and also supports Rsync servers. Load the Ugreen NAS Windows or macOS desktop app and you can create sync tasks that secure selected data to a shared folder and update it in real-time.

To test performance, we plugged the NAS into our 10GbE network and mapped a share to a Dell PowerEdge R760xs Windows Server 2022 host. NAS speeds are reasonable, with

Iometer reporting sequential read and write rates of 8.9Gbits/sec and 6Gbits/sec. These could have been higher but UGOS currently supports only 1,500-byte MTUs (maximum transfer units) and not Jumbo frames. Real-world large file copies between the appliance and server averaged around 2.3Gbits/sec and 2.2Gbits/sec, while securing a 22.4GB folder with 10,500 small files returned 1.2Gbits/sec. An SSD cache is worth the extra spend as sequential and random writes improved by 21% and 328%, read and write rates for large file copies increased by 47% and 61%, while our backup test saw a 39% speed boost.

The NASync DXP6800 Pro, is a powerful business NAS solution although there's work to be done on the UGOS software if Ugreen intends to compete with the established names. That said, if you want a superbly built NAS with dual Thunderbolt 4 ports, the DXP6800 Pro is top value as Qnap's 6-bay TVS-h674T costs over twice as much.

SPECIFICATIONS

10-core Intel Core i5-1235U processor ● 8GB DDR5 SODIMM (max 64GB) ● 6 x hot-swap SATA LFF/SFF drive bays ● 2 x M.2 NVMe SSD slots ● 2 x 10GbE multi-gigabit ports ● 2 x Thunderbolt 4 ● PCIe x4 slot ● 2 x USB-A 3.2 Gen 2 ● 2 x USB-A 2 ● HDMI 2 ● SD 4 card slot ● 250W internal PSU ● 3yr hardware warranty

