



Datasheet

Disk Shelves, Storage Media, and Cabling for NetApp FAS Systems

Key Benefits

High Availability and Resiliency

Full redundancy, multipath connections, out-of-band management, and advanced analytics are standard.

Integrated Flash SSD Support

Choose full solid-state disk (SSD) configurations or mix SSD and HDD to combine the performance of flash with the capacity of hard disks.

Optical SAS Connectivity

Deliver high-performance, low-latency SAS connections across distances of up to 500m for enhanced flexibility and resilience.

Flexibility to Optimize Storage for a Variety of Needs

NetApp® FAS disk shelves and storage media give you flexibility to optimize for high performance or high capacity or to strike a balance.

Greater Simplicity

The same media and disk shelves work for all NetApp FAS systems, so you can upgrade controllers and keep shelves and media in place.

The Challenge

Provide reliability and flexibility to support a broad set of application needs

Addressing the performance, capacity, and density needs of different applications can be a tricky balancing act, especially in shared virtual infrastructures in which the supported workloads can change quickly.

Storage administrators must constantly think ahead. Their infrastructure must be highly available, contain the right mix of HDD and SSD storage, and deliver the necessary data security for the changing requirements of modern IT deployments—including the cloud.

Acquiring and supporting separate storage systems for each workload can quickly exhaust your available budget, staff, and resources. When you add the ever-present need to optimize power, cooling, and floor space utilization, it's clear that storage hardware must be more flexible than ever.

The Solution

Leading flexibility, performance, connectivity, and cross-platform leverage from NetApp

Designed for the most demanding environments, the NetApp FAS architecture offers a high degree of flexibility and choice in supported disk shelves and storage media. From high-capacity HDDs to high-performance SSDs to self-encrypting drives, NetApp delivers the right drive technology to meet your specific capacity, density, performance, and security needs.

Our selection of disk shelves helps you optimize for capacity, performance density, or versatility. You can attach different types of disk shelves to a single storage system to satisfy diverse requirements without having to deploy new storage systems. Your infrastructure is then more agile and more responsive to your business needs. For enhanced flexibility and resilience, optical SAS delivers high-performance, low-latency connectivity—between controllers and shelves—across extended data center distances.

NetApp is a proven leader in the use of flash technology to optimize storage cost and performance. NetApp Flash Pool™ intelligent caching technology combines HDD and SSD, caching “hot” data to SSDs in real time to accelerate performance. All-SSD shelves provide the highest performance for persistent storage.

The NetApp family of disk shelves delivers the enterprise-class resiliency and availability that you expect from the NetApp Data ONTAP® operating system.

Plus, the same drives and shelves work across all FAS platforms with nondisruptive controller upgrades for the utmost in flexibility. All shelves and media are supported in clustered Data ONTAP configurations.

Highly Resilient and Available

To improve overall system availability, NetApp disk shelves are deployed by using multipath high availability with storage controller pairs. In addition:

- Full redundancy, including fans and power supplies, is standard in disk shelf designs.
- Alternate control path provides out-of-band management connections to each disk shelf.
- NetApp RAID DP® technology offers superior data protection and performance over traditional RAID implementations.
- Maintenance Center performs proactive health monitoring of drives, and, based on drive diagnostics, it distinguishes between transient events and real underlying issues.

Optical SAS Connectivity

Designed to streamline deployment and give you more freedom in where you place storage, this NetApp solution is the first to deliver optical SAS connectivity. The easy-to-use, direct-connect solution can span distances of up to 500m for enhanced flexibility and resilience.

In busy data centers, finding free rack space where you need it can be a challenge. With optical SAS, you can add disk shelves to your existing NetApp storage with less concern for distance limitations. Now you can place expansion storage many aisles away or on another floor. Optical SAS also greatly simplifies the deployment of NetApp MetroCluster™ technology for separation distances within the 500m limit.

NetApp optical SAS cabling:

- Enables 4-lane 6Gb/s optical SAS connectivity
- Uses existing QSFP connectors and so requires no additional hardware
- Supports both multimode (OM4) and single-mode (OS1) optical fiber types
- Is compatible with an existing optical patch panel infrastructure

For details of available cabling options, see Table 3.

Optimized Performance and Capacity

Many workloads are characterized by a large dataset with a small working set of active data that tends to change unpredictably. Previously, you had to choose between storage media that optimized for performance or that optimized for cost. Now it's possible to optimize for both.

With Flash Pool technology, NetApp supports the combination of HDDs and SSDs to dynamically cache random read and write operations, accelerating throughput while minimizing latency. Flash Pool takes advantage of the latency and throughput benefits of SSDs while maintaining the mass storage capacity of HDDs.

An existing aggregate can be converted into a Flash Pool configuration without requiring any data copying, downtime, or disruptions to data access.

Storage Media to Meet a Variety of Needs

NetApp offers a variety of SSDs and HDDs to meet your needs, including both performance HDDs and high-capacity HDDs. You can deploy these drives alone or in hybrid configurations that combine HDD and flash.

Performance HDDs. Small form factor (SFF) 2.5-inch 10K RPM drives are the core of our performance HDD offerings. These drives offer great performance density and a variety of capacity options.

High-capacity HDDs. You can maximize storage density and minimize cost per gigabyte by using high-capacity disk drives, deployed as secondary storage or for production workloads.

If you are concerned about security, self-encrypting drives are available in SSD, performance, and high-capacity options.

NetApp Storage Encryption is the NetApp implementation of full-disk encryption using self-encrypting drives. All data on a drive is automatically encrypted, so you know that data at rest is protected. Key management is provided by an external appliance or software.

To identify the right media and disk shelf options for your applications, see Table 1.

DS2246 disk shelf

The NetApp DS2246 is a performance-optimized disk shelf that packs 24 drives in only 2U of rack space using SFF drives. Compared with the 4U-high DS4246 disk shelf, the DS2246 doubles the storage density, increases performance density (IOPS per rack unit) by 60%, and reduces power consumption by 30% to 50%.

DS4246 disk shelf

The NetApp DS4246 provides an excellent balance between performance and capacity. It is 4U high and supports 6Gb/s SAS connections. It can be configured with either 24 large form factor (LFF) high-capacity disk drives or a combination of SSDs and high-capacity disk drives to support Flash Pool configurations.

DS4486 disk shelf

The capacity-optimized DS4486 holds 48 high-capacity disk drives. This disk shelf looks like the DS4246 from the front. However, it is slightly longer and uses a tandem disk carrier to enclose twice as many LFF disk drives in 4U of rack space.

In contrast to many capacity-optimized disk shelves, the DS4486 can be serviced from the front, and 10 DS4486 shelves in a 42U rack weigh less than 2,000 pounds (910kg). The rack can be supported by a raised floor in a traditional data center.

SELECTION CRITERIA	STORAGE MEDIA	DISK SHELF
<ul style="list-style-type: none"> Highest IOPS for random I/O Lowest latency 	<ul style="list-style-type: none"> SSDs 	<ul style="list-style-type: none"> DS2246
<ul style="list-style-type: none"> Flash Pool support 	<ul style="list-style-type: none"> SSD shelf Mixed shelf (SSDs + HDDs) 	<ul style="list-style-type: none"> DS2246 DS2246 DS4246
<ul style="list-style-type: none"> HDD performance 	<ul style="list-style-type: none"> Performance (10K RPM) HDDs 	<ul style="list-style-type: none"> DS2246
<ul style="list-style-type: none"> Maximum capacity Lowest cost per gigabyte Maximum storage density 	<ul style="list-style-type: none"> High-capacity (7.2K RPM) HDDs 	<ul style="list-style-type: none"> DS4246 DS4486
<ul style="list-style-type: none"> Data security NetApp Storage Encryption 	<ul style="list-style-type: none"> Self-encrypting disk drives (AES-256) 	<ul style="list-style-type: none"> DS2246 DS4246



SPECIFICATION	DS2246	DS4246	DS4486
Rack units	2U	4U	4U
Drives per shelf enclosure	24	24	48
Supported Drive Types (for specific drive information, see the Shelf and Media Technical Specifications on NetApp.com)			
High-capacity HDDs		•	•
Performance HDDs	•		
Self-encrypting HDDs ¹	•	•	
SSDs	• (All-SSD and mixed) ²	• (Mixed only) ²	•
I/O modules	Dual 6Gb/s	Dual 6Gb/s	Dual 6Gb/s
Optical SAS support	•	•	•
Power supplies, cooling	Dual redundant, hot-pluggable, integrated power supply and fan assemblies	Dual redundant, hot-pluggable, integrated power supply and fan assemblies	Quadruple redundant, hot-pluggable, integrated power supply and fan assemblies
Drive form factor	2.5" Small form factor	3.5" Large form factor	3.5" Large form factor
Drive carrier	Single drive	Single drive	Tandem drives
Enclosure dimensions	Height: 3.4" (8.5cm) Width: 19" (48.0cm) Depth: 19.1" (48.4cm) Weight: 49lb (22.2kg)	Height: 7" (17.8cm) Width: 19" (48.3cm) Depth: 24" (61cm) Weight: 110lb 49.9kg)	Height: 7" (17.8cm) Width: 19" (48.3cm) Depth: 28" (71cm) Weight: 160lb (72.5kg)
MetroCluster ³ support	•	•	

Table 2) Comparison of NetApp disk shelves for FAS/V-Series storage systems.

1. Self-encrypting HDDs adhere to standards such as AES-256 and FIPS 140-2.

2. An all-SSD shelf contains SSDs only; a "mixed" shelf contains a combination of SSDs and HDDs for use by Flash Pool.

Flash Pool also works in "shelf-to-shelf" configurations in which SSDs from an all-SSD shelf are combined into an aggregate with HDDs from other shelves.

3. For details on MetroCluster, go to <http://www.netapp.com/us/media/ds-2893-metrocluster-solnbrief.pdf>.

CABLE TYPE	LENGTHS	CONNECTIVITY	CONNECTOR TYPE
Multimode active optical cable	1m, 2m, 3m, 5m, 15m, 30m, 50m	Controller to shelf and shelf to shelf	QSFP to QSFP
Multimode direct cable connect	Custom lengths up to 150m	Controller to shelf and shelf to shelf	QSFP transceivers with MPO cable
Multimode optical patch panel connect ⁴	5m and 30m, max total cable distance 150m	Controller to shelf	QSFP transceivers with MPO cable to LC, SC, or MTRJ breakout
Single-mode optical patch panel connect ⁴	5m and 30m, max total cable distance 500m	Controller to shelf	QSFP to LC, SC, or MTRJ breakout

Table 3) Optical SAS options.

4. MetroCluster configuration is required.

About NetApp

Leading organizations worldwide count on NetApp for software, systems and services to manage and store their data. Customers value our teamwork, expertise and passion for helping them succeed now and into the future.

www.netapp.com