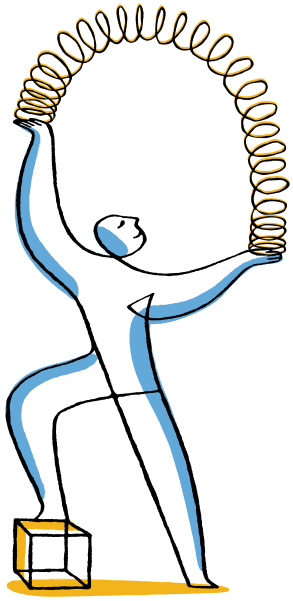

Datasheet

Disk Shelves and Storage Media for FAS and V-Series Systems

KEY FEATURES

Flexibility to Optimize Storage for a Variety of Needs
The NetApp® family of disk shelves and storage media gives you the flexibility to optimize for the highest performance or the highest capacity or to strike a balance between the two.

Integrated Flash SSD Support
Choose full solid state disk (SSD) configurations or mixed SSD and hard disk drive (HDD) configurations that combine the performance of flash with the capacity of hard disks.

High Availability and Resiliency
Full redundancy, multipath connections, out-of-band management, and advanced analytics are standard features in NetApp disk shelves.

Greater Simplicity
Use the same storage media and disk shelves across NetApp FAS and V-Series systems. This allows you to use the same storage media and disk shelves even as you upgrade storage controllers.

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 where the supported workloads can change quickly and without significant lead time.

Storage administrators must constantly think ahead to make sure that their architecture is highly available and contains the right amount of HDD and new SSD storage so that they are prepared for the growing capacity and performance requirements driven by modern business applications.

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

The Solution

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

Designed for the most demanding environments, the NetApp Data ONTAP® architecture offers a high degree of flexibility and choice in supported disk shelves and storage media. From high-capacity HDD to ultraperformance solid state drives, NetApp delivers the right drive technology to meet your specific capacity, density, and performance needs.

Our selection of disk shelves lets 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 the need to deploy new storage systems, making your infrastructure more agile and more responsive to your business needs.

NetApp is also a leader in the use of flash technology to optimize storage cost and performance. NetApp Flash Pool™ intelligent caching technology caches "hot" data to flash SSD in real time to accelerate performance in mixed shelves that use both SSD and HDD. All-SSD shelves provide high performance for longer term storage.

Figure 1) The DS4243, DS4246, and DS4486 disk shelves.

Figure 2) The DS2246 disk shelf.

The NetApp family of disk shelves delivers the enterprise-class resiliency and availability that you expect when leveraging all of the storage efficiencies of NetApp Data ONTAP, the world's #1 storage operating system[1].

Plus, the same drives and shelves work across multiple system platforms with nondisruptive controller upgrades for the utmost in flexibility. All shelves and media are also supported in clustered Data ONTAP[2] configurations.

Highly Resilient and Available

NetApp disk shelves are deployed using multipath high availability with storage controller pairs to improve overall system availability. NetApp HA features include:

- Full redundancy, including fans and power supplies, is standard in our disk shelf design.
- Alternate control path provides out-of-band management connections from disk shelf to storage controller.
- NetApp RAID-DP® offers superior data protection and performance over traditional RAID implementations.
- Maintenance Center, the newest addition to our storage resiliency software, performs proactive health monitoring of drives, distinguishes between transient events and real underlying issues based on drive diagnostics, and attempts preventive maintenance when necessary.

Optimize Performance and Capacity

Many workloads are characterized by a large dataset with a small "hot spot" of active data that tends to move unpredictably. Examples include databases, e-mail, file shares, and home directories. Previously, you had to choose between storage media that optimized for performance or for cost. Now it's possible to optimize for both.

As a key component of the NetApp Virtual Storage Tier, Flash Pool enables the creation of a Data ONTAP RAID-protected aggregate with a combination of HDDs and SSDs. SSD is used to dynamically cache random read and write operations for hot data to accelerate throughput while minimizing latency. Flash Pool keeps track of the cached data to determine how frequently it is used and evicts data from cache when it "cools down." With Flash Pool, the NetApp storage system takes advantage of the latency and throughput benefits of SSDs while maintaining the mass storage capacity of HDDs.

Flash Pool is compatible with deduplication, thin provisioning, and other storage features. Existing aggregates can be converted into a Flash Pool configuration without requiring any data copying, downtime, or disruptions to data access[3].

Storage Media to Meet a Variety of Needs

For low-latency and high-IOPS applications such as OLTP databases, solid state drives used either by themselves or in combination with hard disk drives in a NetApp Flash Pool aggregate can deliver a performance edge and faster completion of business processes that generate revenue.

If extreme IOPS and submillisecond latency aren't required by your applications, then consider using 15K RPM drives to achieve the highest performance available from hard disk drives. Choose small form factor (SFF) drives to maximize performance density (IOPS per rack unit) to conserve data center space.

1. Source: NetApp internal estimates of revenue and storage capacity in the worldwide open-networked storage market, as of June 2012. VNX, VNXe, and Celerra NS can run any Flare or Dart operating system. The contribution of these products to the OS share has been estimated based on the proportion of NAS and SAN installations in these products (NAS – Dart; SAN – Flare).
2. For details about Data ONTAP, see http://www.netapp.com/us/media/ds-3231-0412.pdf.
3. For details about Flash Pool technology, see http://www.netapp.com/us/media/ds-3345.pdf.

SELECTION CRITERIA	STORAGE MEDIA	DISK SHELF
• Performance density	Performance (10K RPM) density HDDs	DS2246
• Best performance with hard disk drives	Performance (15K RPM) HDDs	DS4243
• Maximum capacity • Lowest cost per gigabyte • Maximum storage density	High-capacity (7.2K RPM) HDDs	DS4246 DS4486
• Highest IOPS for random I/O • Lowest latency	SSDs	DS4243 DS2246
• Data security • NetApp Storage Encryption	Self-encrypting disk drives (AES-128 and AES-256)	DS2246 DS4243 DS4246
• Flash Pool support	Pure SSD shelf: Mixed shelf: SSDs + HDDs	DS2246, DS4243 DS2246, DS4246

Table 1) Storage media selection guide.

Conversely, you can maximize storage density and minimize cost per gigabyte by using high-capacity disk drives. They are ideal for infrequently accessed data and for data archiving or when used in combination with Flash Pool or Flash Cache™ intelligent caching.

See Table 1, "Storage media selection guide," to identify the right media and disk shelf options for your applications.

DS2246 disk shelf

The NetApp DS2246 is our performance-optimized disk shelf that packs 24 drives in only 2U of rack space by using SFF drives. Compared to the 4U-high DS4243 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 ideal balance between performance and capacity. It is 4U high and supports 6Gb/sec SAS connection. 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.

DS4243 disk shelf

The NetApp DS4243 is 4U high and supports up to 24 hard disk drives (high capacity or high performance) or up to 24 SSDs with 3Gb/sec SAS connection.

DS4486 disk shelf

The capacity-optimized DS4486 holds 48 high-capacity disk drives. This disk shelf looks like the DS4246 from the front, but 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.

About NetApp

NetApp creates innovative storage and data management solutions that deliver outstanding cost efficiency and accelerate business breakthroughs. Discover our passion for helping companies around the world go further, faster at *www.netapp.com*.

Go further, faster®

NetApp disk shelves and storage media enable you to build a flexible and efficient shared infrastructure today as your foundation for an agile data infrastructure. All shelves and media are supported in both Data ONTAP operating in 7-Mode and clustered Data ONTAP configurations.

SPECIFICATION	**DS2246**	**DS4246**	**DS4243**	**DS4486**
Rack units	2U	4U	4U	4U
Drives per shelf enclosure	24	24	24	48
High-capacity HDDs	N/A	7.2K RPM 6Gb/s 1TB, 2TB, 3TB and 4TB	7.2K 6Gb/s 1TB, 2TB, and 3TB	7.2K RPM 6Gb/s 3TB and 4TB
High-performance HDDs	10K RPM 6Gb/s 450GB, 600GB, and 900GB	N/A	15K RPM 6Gb/s 450GB and 600GB	N/A
High-security HDDs	10K RPM 6Gb/s 600GB AES-256 FIPS 140-2	10K RPM 6Gb/s 3TB AES-256 FIPS 140-2	15K RPM, 6Gb/s 600GB 128-bit AES FIPS 140-2	N/A
Ultraperformance SSDs	200GB, 800GB 200GB + 900GB (mixed shelf)	100GB + 1TB or 3TB 200GB + 2TB	100GB[1]	N/A
I/O modules	Dual 6Gb/s	Dual 6Gb/s	Dual 3Gb/s	Dual 6Gb/s
Power supplies Cooling	Dual, redundant, hot-pluggable, integrated power supply and fan assemblies	Dual, redundant, hot-pluggable, integrated power supply and fan assemblies	Dual (high-capacity) or quadruple (high-performance), redundant, hot-pluggable, integrated power supply and fan assemblies	Dual, redundant, hot-pluggable, integrated power supply and fan assemblies
Drive carrier form factor	2.5” Small form factor	3.5” Large form factor	3.5” Large form factor	3.5” Large form factor
Drive carrier	Single drive	Single drive	Single drive	Tandem drives
Enclosure dimensions	Height: 3.4” (8.5 cm) Width: 19” (48.0 cm) Depth: 19.1” (48.4 cm) Weight: 49lb. (22.2kg)	Height: 7” (17.8 cm) Width: 19” (48.3 cm) Depth: 24” (61 cm) Weight: 110lb. (49.9kg)	Height: 7” (17.8 cm) Width: 19” (48.3 cm) Depth: 24” (61 cm) Weight: 110lb. (49.9kg)	Height: 7” (17.8 cm) Width: 19” (48.3 cm) Depth: 28” (71 cm) Weight: 160lb. (72.5kg)
MetroCluster™[2] support	✔	✔	✔	

1 100GB SSDs will be EOL in June 2013.

2 For details about MetroCluster, go to http://www.netapp.com/us/media/ds-2893-metrocluster-solnbrief.pdf.

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

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