



Datasheet

NetApp E5600 Storage System

Achieve field-proven and reliable performance efficiency for modern enterprise applications

KEY BENEFITS

Performance Efficiency

Accelerate performance, boost IOPS, and increase density with a hybrid system perfectly suited for modern enterprise applications.

Modular Flexibility

Customize configurations to optimize performance and capacity requirements with three distinct disk system shelves, multiple drive types, and a complete selection of SAN network interfaces.

SANtricity Features

Use innovative Dynamic Disk Pools (DDPs) to simplify storage and data management, protection, and utilization and to eliminate the complexity of configuring RAID groups and hot spares.

The Challenge

Your enterprise relies on core applications that are critical to business success. To achieve business goals, you need consistent application performance and continuous availability. To deliver value and reduce complexity, you must have proven storage systems that work with your application software. Because your operations depend on these applications, they must have greater than 99.999% availability. To reach this goal you need proven storage purpose-built for hybrid storage environments.

The Solution

Your enterprise must have storage that can meet your performance and capacity demands without sacrificing simplicity and efficiency. That is why the E5600 was designed with NetApp® SANtricity® OS adaptive caching algorithms, which address a large range of application workloads. Those workloads range from high-IOPS or bandwidth-intensive streaming applications to a mixture of workloads delivering high-performance storage consolidation.

With fully redundant I/O paths, advanced data protection features, and extensive diagnostic capabilities, the E5600 storage systems enable you to achieve greater than 99.999% availability and provide data integrity and security.

Nearing one million systems shipped, E-Series technology is found in enterprise SAN application environments that support retail points of sale, web servers, billing systems, databases, and data warehouses. E-Series systems also are found in collaboration environments, media applications, sporting events, surveillance, research, backup, and simulations of all kinds. These systems range from small systems in which E-Series is the only storage in a mixed-workload environment to the world's largest storage systems in database, data warehouse, parallel file systems, and everything in between. It is almost impossible to get through your day without touching E-Series technology.

Dynamic Disk Pools

A key feature of DDPs is the ability to dynamically rebalance data across all the drives in the pool when drives are added or removed. Unlike the rigid configuration of a traditional RAID volume group, which has a fixed number of drives, DDPs can flexibly accommodate anywhere from 11 to 384 drives, the maximum supported by the E5600 system. DDPs dynamically rebalance across the remaining (or additional) drives more quickly than traditional RAID. Doing so reduces exposure windows from days to minutes.

Dynamic Disk Pools eliminate the complexities of RAID management. With DDPs, there are no idle spares to manage and you do not need to reconfigure RAID when expanding. DDPs also significantly reduce the impact on performance following failure of one or more drives when compared to traditional RAID.

Thin Provisioning: Improve Storage Efficiency by Up to 33%

Thin provisioning eliminates overprovisioning of storage by automatically allocating storage internally. This feature provisions only what is used while reporting full allocations to hosts. This benefit enables you to significantly lower near-term storage costs and defer storage purchases. SANtricity also enables you to lower the total cost of ownership by reducing initial acquisition capacity and improving utilization.

With thin provisioning you can:

- Eliminate having to guess how much storage an application needs.
- Put an end to purchasing storage based on inflated usage estimates.
- Eliminate error-prone, emergency out-of-space activities.
- Improve storage utilization rates by up to 33%.
- Easily create volumes with one-time single-click management.
- Automatically grow to take care of usage expansion up to the maximum allocated capacity.

Balanced Performance

The E5600 storage system continues the NetApp E-Series' longstanding heritage of balanced performance designed to support any workload. High-performance file systems and data-intensive bandwidth applications benefit from the E5600's capability to sustain high read and write throughput. Database-driven transactional applications benefit from the system's high IOPS and low latency. Regardless of the application workload, the E5600 is designed to support maximum performance efficiency.

SANtricity Synchronous and Asynchronous Mirroring: Proven Data Replication and Disaster Recovery Protection

With NetApp SANtricity remote mirroring, customers now have a proven and an efficient disaster recovery method for maintaining access to business-critical data in site outages. Available for both FC and IP networks, SANtricity remote mirroring provides highly available data storage across a campus, across the state, or around the world. This mirroring simplifies managing data replication to meet the application service levels of both virtual and traditional environments.

Modular Flexibility

The E5600 offers multiple form factors and drive technology options to best meet your requirements. The ultradense 60-drive system shelf supports up to 480TB in just 4U and is perfect for environments with vast amounts of data and limited floor space. Its 24-system shelf combines low power consumption and exceptional performance density with its cost-effective 2.5" drives. The 12-drive shelf is a great fit for cost-conscious organizations that need to deploy both performance and capacity. All three shelves support E5600 controllers or they can be used for expansion, enabling optimized configurations that best meet performance, capacity, and cost requirements.

Flexible Interface Options

The E5600 supports a complete set of host or network interfaces designed for either direct server attach or network environments. With multiple ports per interface, the rich connectivity provides ample options and bandwidth for high throughput. The interfaces include quad-lane SAS, iSCSI, FC, and InfiniBand to connect with and protect investments in storage networking. The InfiniBand host interface supports either SRP or iSER protocols for low-latency connectivity. The E5600 also supports dual FC ports and dual iSCSI ports in a single host interface card for multiprotocol connectivity and mirroring.

Maximum Storage Density

Today's storage must keep up with continuous growth and meet the most demanding capacity requirements. The E5600 is purpose-built for capacity-intensive environments that require optimal space utilization and reduced power and cooling requirements. The system's ultradense 60-drive 4U disk shelf provides industry-leading performance and space efficiency that reduce rack space by up to 60%. Its high-efficiency power supplies and intelligent design can lower power use by up to 40% and cooling requirements by up to 39%.

E5600 TECHNICAL SPECIFICATIONS

All data in this table applies to dual-controller configurations.

	E5660 (DE6600)	E5624 (DE5600)	E5612 (DE1600)
Form factor	4U/60 drives (both 2.5" & 3.5")	2U/24 drives (2.5")	2U/12 drives (3.5")
Maximum raw capacity	480TB 3.1PB with expansion shelves (using 8TB drives)	76.8TB using 3.2TB SSD drives 3PB with expansion shelves using 8TB drives	96TB 3.1PB with expansion shelves using 8TB drives
Maximum drives ¹	360 with 60-drive shelves 384 with mixed shelves 120 SSDs (25 SSDs per 60-drive shelf)	384 120 SSDs	192 with 12-drive shelves 384 with mixed shelves
Drives supported	<ul style="list-style-type: none"> 2/3/4/6TB NL-SAS 7.2K FDE/non-FDE 8TB NL-SAS 7.2K non-FDE 6TB NL-SAS 7.2K FIPS 600/900GB 1.2/1.8TB SAS 10K FDE/ non-FDE 1.8TB SAS 10K FIPS 400/800GB, 1.6/3.2TB SSD non-FDE 800GB SSD FDE 1.6TB SSD FIPS 	<ul style="list-style-type: none"> 600/900GB, 1.2/1.8TB SAS 10K FDE/non-FDE 1.8TB SAS 10K FIPS 400/800GB, 1.6/3.2TB SSD non-FDE 800GB SSD FDE 1.6TB SSD FIPS 	<ul style="list-style-type: none"> 2/3/4/6TB NL-SAS 7.2K FDE/non-FDE 8TB NL-SAS 7.2K non-FDE 6TB NL-SAS 7.2K FIPS
DC power	Not Available	Available Option	Available Option
System memory	24GB / 96GB ²		
Host I/O ports	8-port 12Gb SAS 8-port 10Gb iSCSI-optical 8-port 16Gb FC 4-port 56Gb (FDR) InfiniBand		
Operating system and system management	SANtricity OS 8.25 SANtricity Storage Manager 11.25		
High-availability features	Dual active controller with automated I/O path failover Dynamic Disk Pools and traditional RAID levels 0, 1, 3, 5, 6, and 10 Redundant, hot-swappable storage controllers, disk drives, power supplies, and fans Automatic DDP or RAID rebuild following a drive failure Mirrored data cache with battery backup and destage to flash SANtricity proactive drive health monitoring identifies problems before they create issues Greater than 99.999% availability (with appropriate configuration and service plans)		
Host operating systems	Microsoft Windows Server, Red Hat Enterprise Linux, Novell SUSE Linux Enterprise Server, Apple Mac OS, Oracle Solaris, HP HP-UX, CentOS Linux, Oracle Enterprise Linux, IBM AIX, VMware ESX		
Included software features	SANtricity synchronous and asynchronous mirroring SANtricity Volume Copy SANtricity Snapshot [®] copies SANtricity SSD Cache SANtricity thin provisioning Dynamic Disk Pools		
Optional software feature	SANtricity disk encryption		
System capabilities	Data Assurance (T10-PI IEEE standard) Dynamic volume expansion Dynamic capacity expansion Dynamic RAID-level migration Dynamic segment size migration System Event Monitor Proactive drive health monitoring AutoSupport automatic support system Online SANtricity OS upgrades and drive firmware upgrades VMware vSphere Storage APIs-Array Integration Microsoft Offloaded Data Transfer		
Application plug-ins ³	SANtricity Plug-in for Oracle Enterprise Manager SANtricity Management Pack for Microsoft System Center Operations Manager SANtricity Plug-In for Microsoft SQL Server Management Studio SANtricity Plug-In for VMware vCenter SANtricity VASA Provider SANtricity Storage Replication Adapter for VMware vCenter Site Recovery Manager SANtricity Performance App for Splunk Enterprise SANtricity Plug-In for Nagios		
Open management	SANtricity OpenStack Cinder SANtricity Web Services Proxy (REST and SYMBOL Web) SANtricity PowerShell Toolkit		
System maximums	Hosts/partitions: 512 Volumes: 2,048 Snapshot copies: 2,048 Mirrors: 128		

1. All models are capable of reaching 384 disk drives when configured with intermixed drive shelves.

2. Availability with storage arrays having FC or iSCSI host I/O ports only.

3. No-charge download from mysupport.netapp.com.

DIMENSIONS	E5660 SYSTEM SHELF DE6600 DISK SHELF		E5624 SYSTEM SHELF DE5600 DISK SHELF		E5612 SHELF DE1600 DISK SHELF	
Height	7.0" (17.78 cm)		3.47" (8.81 cm)		3.4" (8.64 cm)	
Width	19" (48.26 cm)		19" (48.26 cm)		19" (48.26 cm)	
Depth	32.5" (82.55 cm)		19.6" (49.78 cm)		21.75" (55.25 cm)	
Weight	E5660 System Shelf		E5624 System Shelf		E5612 System Shelf	
	240.7 lb (109.2 kg)		63.2 lb (28.7 kg)		65.3 lb (29.6 kg)	
Weight	DE6600 Disk Shelf		DE5600 Disk Shelf		DE1600 Disk Shelf	
	235.6 lb (106.6 kg)		57.5 lb (26.8 kg)		59.6 lb (27.4 kg)	
	E5660 System Shelf ^f		E5624 System Shelf ²		E5612 System Shelf ³	
	Typical	Maximum	Typical	Maximum	Typical	Maximum
KVA	1.115	1.325	0.550	0.700	0.475	0.625
Watts	1,104	1,312	544	693	470	619
BTU	3,767	4,475	1,857	2,364	1,605	2,111
	DE6600 Disk Shelf		DE5600 Disk Shelf		DE1600 Disk Shelf	
	Typical	Maximum	Typical	Maximum	Typical	Maximum
KVA	0.801	1.011	0.250	0.400	0.175	0.325
Watts	793	1,001	248	396	174	322
BTU	2,707	3,415	845	1,352	593	1,099

4. E5660, E5624, and E5612 power specs are based on storage array with 24GB system memory.

High Reliability: No Scheduled Downtime

The E5600 storage system delivers high-speed, continuous data access. With over 20 years of storage development behind it, the E5600 is based on a field-proven architecture that provides high reliability and greater than 99.999% availability with appropriate configurations and service plans. As part of the E-Series family, the E5600 is covered by the NetApp AutoSupport[®] system for proactive maintenance.

The E5600 simplifies management, maintains organizational productivity, and keeps data accessible through redundant components, automated path failover, online administration (including online SANtricity OS and drive firmware updates), active drive recovery mechanisms, and user-directed drive data evacuation. The system's advanced protection features and extensive diagnostic capabilities deliver high levels of data integrity, including Data Assurance (T10 PI), to protect against silent data corruption.

Intuitive Management

NetApp SANtricity Storage Manager software offers extensive configuration flexibility, which allows optimal performance tuning and complete control over data placement. With its dynamic capabilities, SANtricity software supports on-the-fly expansion, reconfigurations, and maintenance without interrupting storage system I/O.

Application Integration

NetApp E-Series products are ideal for today's standard application environments, such as VMware and Microsoft Exchange, and databases, such as Oracle databases and Microsoft SQL Server. It is also ideal for the growing open-source big data applications such as NoSQL databases, including Couchbase, Mongo DB, Hadoop, and Splunk, and software-defined data center initiatives such as OpenStack and Ceph. The system integrates with any environment with its configurable options. The E-Series also meets the reliability and sustained performance demands of transactional applications in which sustaining performance is critical.

The NetApp SANtricity Plug-Ins for Microsoft, Oracle, VMware, Splunk, and Nagios environments provide a consolidated view of the NetApp E-Series systems. This view enables users to monitor and manage their NetApp E-Series storage from the application. Having such integration reduces the total cost of ownership by eliminating the need to manually compile critical information from several different tools. This benefit streamlines the correlation of configuration and performance problems across the entire set of IT components.

Disk Encryption (Licensed)

SANtricity Full Disk Encryption* (FDE) combines local key management with drive-level encryption for comprehensive security for data at rest that doesn't sacrifice performance or ease of use. Because all drives eventually leave the data center through redeployment, retirement, or service, you can rest assured that your sensitive data is not leaving with them. SANtricity also supports FIPS-certified hard drives for security-sensitive customers.

* Hardware and software for at-rest data encryption is not available in certain countries including Russia, Belarus, Kazakhstan and other Eurasian Customs Union countries.

SSD Cache

The SSD Cache feature provides intelligent caching capability for active high-reuse data and caches that data on higher-performance, lower-latency SSDs. This caching approach works automatically in real time. Users do not need to set up complicated policies to define the trigger for data movement between tiers—you can simply set it and forget it. SSD Cache accelerates data access through the caching use of SSDs in the drive shelves and is expandable up to 5TB per storage system.

ENERGY STAR Certification

All E-Series systems utilize “85% PLUS” power supplies, exceeding the EPA ENERGY STAR requirements of 80% efficiency.

The modular E-Series can be configured in tens of thousands of different energy-efficient configurations. The following configurations are EPA ENERGY STAR certified:

- E5612 up to 24 drives
- E5624 up to 48 drives
- E5660 up to 120 drives

For the latest EPA ENERGY STAR–certified E-Series configurations, see www.netapp.com/us/company/ourstory/sustainability/energy-star.aspx

www.energystar.gov/certified-products/detail/data_center_storage

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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.

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