



NetApp®



## Datasheet

# NetApp E5600 Storage System

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

### KEY FEATURES

#### Performance Efficiency

The NetApp® E5600 brings together massive bandwidth performance, high IOPS, and extreme density to create a hybrid system perfectly suited for enterprise SAN 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

With the proven SANtricity® OS and SANtricity Storage Manager, you can use innovative Dynamic Disk Pools (DDP) to greatly simplify storage and data management, protection, and utilization. It also eliminates the complexity of configuring RAID groups and hot spares.

#### Your World

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

#### You need E-Series from NetApp

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 the SANtricity OS adaptive caching algorithms, which address a large range of application workloads. Those workloads range from database, high IOPS, or bandwidth-intensive streaming applications to a mixture of workloads in a high-performance storage consolidation point.

With fully redundant I/O paths, advanced data protection features, and extensive diagnostic capabilities, you can achieve greater than 99.999% availability, data integrity, and security.

Nearing one million systems shipped, E-Series technology is found in enterprise SAN application environments such as retail points of sale, web servers, billing systems, databases and data warehouses, collaboration, media, sporting events, surveillance, research, backup, and simulations of all kinds. These range from small systems in which E-Series is the only storage in a mixed workload environment to several of the world's largest storage systems in database, data warehouse, parallel file systems, and everything in between. It's almost impossible to get through your day without touching E-Series technology. Web services, weather, retail, electronics, design, energy, operations, sports, and more all run on E-Series technology.

#### Dynamic Disk Pools

Dynamic Disk Pools (DDP) greatly simplify traditional RAID management by distributing data parity information and spare capacity across a pool of drives. That enables easier greater capacity expansion and protection.

A key concept of DDP is the dynamic rebalancing of data during changes in the number of drives, whether adding drives or in the case of drive failure. Unlike a traditional RAID volume group's rigid configuration with a specific number

of drives, Dynamic Disk Pools can optimize from a minimum of 11 to the maximum supported by the E5600 system. By dynamically changing the number of physical drives in the pool, DDP improves data protection through dynamically rebalancing across the remaining (or additional) drives more quickly than traditional RAID while maintaining greater performance. This reduces exposure windows from days to minutes. Because drives are not getting any smaller and data needs are increasing, protection against drive failures is more important than ever.

Dynamic Disk Pools eliminate the complexities of RAID management with no idle spares to manage, no reconfiguring of RAID when expanding, and a significantly reduced performance impact following failure of a drive or 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. It provisions only what is actually used, while reporting full allocations to hosts, significantly lowering storage use and future storage purchases.

The result is reduced storage TCO (capex and opex) by reducing initial acquisition capacity and improving utilization.

With Thin Provisioning you get:

- No more guessing how much storage an application really needs
- Elimination of initial storage purchases based on inflated estimate usages
- Elimination of error-prone emergency out-of-space activities
- Significantly improved storage utilization rates, up to 33%
- Easy one-time single-click management at volume creation
- Autogrow to take care of usage expansion up to the maximum

### **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 ability to sustain high read

and write throughput. Database-driven transactional applications benefit from its high IOPS and low latency. Regardless of the application workload, the E5600 is designed to support maximum performance efficiency.

### **SANtricity Remote Mirroring: Proven Data Replication and Disaster Recovery Protection**

With NetApp SANtricity remote mirroring, customers now have a proven and efficient disaster recovery method for maintaining access to business-critical data in the event of site outages. Available for both FC and IP networks, SANtricity remote mirroring provides highly available data storage across campus, across the state, or around the world. All while simplifying the management of 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 requirements. The ultra-dense 60-drive system shelf supports up to 360TB in just 4U. It 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-inch drives. And the 12-drive shelf is a great fit or cost-conscious organizations that need to deploy both performance and capacity. All three shelves support E5600 controllers or can be used for expansion, enabling optimized configurations that best meet performance, capacity, or 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.

### **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 requiring optimal space utilization and reduced power/cooling requirements. Its ultra-dense 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 up to 40% and cooling requirements by up to 39%.

### **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 designed to provide 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 NetApp AutoSupport™ for proactive maintenance.

Keeping data accessible through redundant components, automated path failover, and online administration, (including online SANtricity OS and drive firmware updates), simplifies management and maintains organizational productivity. Its advanced protection features and extensive diagnostic capabilities deliver high levels of data integrity, including Data Assurance (T10-PI) to protect against silent drive errors.

### **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 have been deployed and used in today's most popular application environments, such as VMware® and Microsoft® Exchange. It also is used with databases such as Oracle® databases, Microsoft SQL Server®, and others. The system integrates into any environment with its configurable options. It also meets the demands of transactional applications, in which sustaining performance is critical.

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## E5600 TECHNICAL SPECIFICATIONS

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



	E5660 (DE6600)	E5624 (DE5600)	E5612 (DE1600)
<b>Form factor</b>	4U/60 drives (both 2.5" & 3.5")	2U/24 drives (2.5")	2U/12 drives (3.5")
<b>Maximum raw capacity</b>	360 TB 2.3 PB with expansion shelves (using 6TB drives)	43.2 TB 2.2 PB with expansion shelves (using 1.8TB* and 6TB drives)	72 TB 2.3 PB with expansion shelves (using 6TB drives)
<b>Maximum drives**</b>	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
<b>Drives supported</b>	<ul style="list-style-type: none"> <li>• 2/3/4/6 TB NL-SAS 7.2K FDE/non-FDE</li> <li>• 600/900 GB 1.2/1.8* TB SAS 10K FDE/non-FDE</li> <li>• 400 GB, 800 GB, 1.6 TB SSD non-FDE</li> <li>• 800 GB SSD FDE</li> </ul>	<ul style="list-style-type: none"> <li>• 600/900 GB, 1.2/1.8* TB SAS 10K FDE/non-FDE</li> <li>• 400 GB, 800 GB, 1.6 TB SSD non-FDE</li> <li>• 800 GB SSD FDE</li> </ul>	<ul style="list-style-type: none"> <li>• 2/3/4/6 TB NL-SAS 7.2K FDE/non-FDE</li> </ul>
<b>DC power</b>	Not Available	Available Option	Available Option
<b>System memory</b>	24 GB		
<b>Host I/O ports</b>	8 port 12 Gb SAS 8 port 10 Gb iSCSI-optical 8 port 16 Gb FC 4 port 56 Gb (FDR) Infiniband		
<b>Operating system &amp; system management</b>	SANtricity OS 8.20 SANtricity Storage Manager 11.20		
<b>High-availability features</b>	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 de-stage to flash SANtricity proactive drive health monitoring identifies problems before they create issues Greater than 99.999% availability (with appropriate configuration and service plans)		
<b>Host operating systems</b>	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™		
<b>Included software features</b>	SANtricity Mirroring SANtricity Volume Copy SANtricity Snapshot SANtricity SSD Cache SANtricity Thin Provisioning Dynamic Disk Pools		
<b>Optional software feature</b>	SANtricity Disk Encryption		
<b>System capabilities</b>	Data Assurance (T10-PI 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 & drive firmware upgrades VMware vSphere® Storage APIs – Array Integration (VAAI) Microsoft Offloaded Data Transfer (ODX)		
<b>Application plug-ins***</b>	SANtricity Plug-in for Oracle® Enterprise Manager SANtricity Management Pack for Microsoft System Center Operations Manager (SCOM) SANtricity Plug-in for Microsoft® SQL Server™ Management Studio (SSMS) 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		
<b>Open management</b>	SANtricity OpenStack Cinder SANtricity Web Services Proxy (REST and SYMbol Web) SANtricity PowerShell Toolkit		
<b>System maximums</b>	Hosts/partitions: 512 Volumes: 2,048 Snapshot copies: 2,048 Mirrors: 128		

\* Expected availability in mid-2015

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

\*\*\*No-charge download from mysupport.netapp.com

Dimensions and weight	E5660 system shelf DE6600 disk shelf		E5624 system shelf DE5600 disk shelf		E5612 system 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	236.2 lb (107.1 kg)		61.5 lb (27.9 kg)		63.7 lb (28.9 kg)	
	D5660 system shelf		E5624 system shelf		E5612 system shelf	
	Typical	Maximum	Typical	Maximum	Typical	Maximum
KVA	1.115	1.325	0.596	0.746	0.475	0.625
Watts	1104	1312	590	738	470	619
BTU	3767	4477	2013	2519	1605	2111
	DE6600 disk shelf		DE5600 disk shelf		DE1600 disk shelf	
	Typical	Maximum	Typical	Maximum	Typical	Maximum
KVA	0.801	1.011	0.296	0.446	0.175	0.325
Watts	793	1001	293	442	174	322
BTU	2707	3415	1001	1507	593	1099

The NetApp SANtricity Plug-Ins for Microsoft, Oracle, and VMware provide a consolidated view of the NetApp E-Series systems such as the E5600, enabling users to monitor and manage their NetApp E-Series storage from the application. Having such an integrated tool reduces the total cost of ownership by eliminating the need to manually compile critical information from several different tools, thus streamlining the correlation of configuration and performance problems across the entire set of IT components.

#### Disk Encryption (Licensed)

SANtricity Full-Disk Encryption combines local key management with drive-level encryption for comprehensive security for data at rest that doesn't sacrifice performance or ease of use. Since all drives eventually leave the data center through redeployment, retirement, or service, you can be reassured that your sensitive data isn't leaving with them.

#### Intelligent Cache Tiering with 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 are not required to set up complicated policies to define the trigger for data movement between tiers. Simply set it and forget it. SSD Cache accelerates data access through the caching use of SSDs located 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 either of the following:

<http://www.netapp.com/us/company/ourstory/sustainability/energy-star.aspx>

[http://www.energystar.gov/certified-products/detail/data\\_center\\_storage](http://www.energystar.gov/certified-products/detail/data_center_storage)

#### 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.

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