



NetApp®



## Datasheet

# NetApp EF560 All-Flash Array

Response in microseconds to your most demanding enterprise applications

### KEY BENEFITS

#### Extreme Performance

Over 650,000 IOPS and latency below 800 microseconds let you finish business operations more quickly and improve the customer experience.

#### Maximum Efficiency

Overprovisioning is eliminated and costs are dramatically reduced by cutting space utilization, power, and cooling by up to 95%.

#### High Availability

Fully redundant system with automated failover and advanced monitoring maximizes uptime.

#### Modular Scalability

Support for up to 192TB of raw capacity provides more of your data access to low-latency performance.

#### Enterprise-Proven Platform

Leveraging expertise gained from nearly one million NetApp® SANtricity®-powered systems, the flash-optimized EF560 is designed to work in the most demanding environments.

### The Challenge

Increasingly, organizations look for ways to drive greater speed and responsiveness from the applications that control their key business operations. Because the performance of these applications is tightly linked to time to market, revenue, and customer satisfaction, it is critical that they operate at maximum efficiency.

To achieve maximum performance, organizations have had to deploy hundreds more partially filled hard disks to meet the required performance. This overprovisioning of hard disks wastes disk capacity and data center space and drives up power consumption. To eliminate overprovisioning and maximize return on investment from high-performance applications, companies now look to all-flash systems. However, as buyers consider these new systems for their tier 1 applications, they are often challenged to find an offering that is also enterprise proven and highly reliable.

### The Solution

The NetApp EF560 all-flash array is an all-SSD storage system designed for applications demanding the highest levels of performance, reliability, and availability. Requiring just 2U of rack space, the EF560 all-flash array combines extreme IOPS, ultralow response times, and up

to 12GB/sec of bandwidth with leading enterprise-proven availability features, including:

- Redundant components with automated failover
- Intuitive storage management with comprehensive tuning functions
- Advanced monitoring and diagnostics with proactive repair
- NetApp Snapshot® copies and remote replication for subsecond backup and long-distance recovery

Combined, these capabilities enable the EF560 all-flash array to improve the speed of business as well as the overall efficiency and reliability of IT operations. This win for both the business and IT translates to a better overall experience for both you and your customers.

### Extreme Performance

The EF560 all-flash array continues NetApp's long heritage of delivering powerful solutions to meet business needs. Designed specifically for high-speed transactional applications that demand high IOPS and consistent low latency, the EF560 all-flash array delivers over 650,000 sustained IOPS and response times measured in microseconds. Bandwidth-oriented workloads also benefit from the EF560's capability to provide up to 12GB/sec of throughput.

# The NetApp EF560 is an all-SSD storage system designed for business-critical applications that demand the highest performance, consistent low latency, and maximum availability.

The all-flash design is built in a 2U enclosure and delivers the performance of over a thousand 15,000-RPM drives while requiring just 5% of the rack space, power, and cooling. With up to 95% reduction in space and power consumption, the EF560 all-flash array helps to significantly improve the overall efficiency of IT operations while continuing to meet performance requirements from business operations.

## High Availability and Enterprise Reliability

The EF560 all-flash array was engineered from the ground up to support applications that are the heart of a corporation's business. Built with enterprise reliability in mind, the EF560 all-flash array leverages generations of expertise learned across nearly one million E-Series system installations providing enterprise reliability and fault tolerance in both the architecture and software design.

Designed with no single point of failure, the EF560 all-flash array has fully redundant I/O paths with automated failover, extensive diagnostic capabilities that alert on and actively help resolve failures, and advanced data protection features such as Snapshot copies and replication. All management tasks are performed while the storage remains online with complete read/write data access. Storage administrators can make configuration changes

and conduct maintenance without disrupting application I/O.

As IT staff know, one of the most critical aspects of an enterprise solution is the capability to detect and resolve issues. In this area, the EF560 all-flash array provides significant depth of capabilities:

- Extensive capturing and monitoring of diagnostic data provide comprehensive fault isolation and simplify analysis of unanticipated events.
- Drive health monitoring proactively tracks the wear life of each SSD and issues an alert if defined thresholds are reached.
- The integrated Recovery Guru diagnoses problems and provides the applicable procedure to use for recovery.
- "Lost" data can be recreated on the fly using redundancy.
- A drive rebuild can continue even when encountering an unreadable sector (patented).

## Advanced Data Protection

The EF560 all-flash array offers advanced data protection common to enterprise storage to protect against data loss and downtime events, both locally and over long distances. These features include:

- **Snapshot copies.** Create and restore point-in-time copies of

datasets in under a second to protect against accidental data loss on the local array.

- **Volume copy.** Create a complete physical copy (clone) of a volume for applications that require a full point-in-time copy of production data.
- **Remote replication.** Provide long-distance disaster recovery to a remote site or colocation facility to enable your business operations to continue running no matter what happens.

Unique to the EF560 all-flash array is the capability to replicate data to either an EF560 or a NetApp E-Series system. This capability allows you the choice of creating a high-speed, low-latency recovery system that runs at the same speed as your production operations and/or failing over to a consolidated E-Series system with more cost-effective disk storage. This flexibility in design allows you to choose the profile of performance and cost unique to your business.

## Disk Encryption

SANtricity full-disk encryption combines local key management with drive-level encryption for comprehensive security for data at rest with no impact on performance. Because all drives eventually leave the data center through redeployment, retirement, or service, it is reassuring to know that your sensitive data isn't leaving with them.

## TECHNICAL SPECIFICATIONS

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

| Attribute                             | NetApp EF560 Flash Array                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Burst I/O rate                        | 900,000 IOPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Sustained I/O rate                    | 650,000 IOPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Latency                               | <300 microseconds up to 500,000 IOPS; <800 microseconds up to 650,000 IOPS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Sustained throughput                  | Up to 12GB/sec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Maximum drives                        | 120                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Maximum raw capacity                  | 192TB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Drive types supported                 | 2.5" SSD 400GB, 800GB, 800GB (FDE), 1.6TB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Form factor                           | Base system: 2U/24*<br>Expansion shelf: 2U/24*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| System ECC memory                     | 24GB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| I/O interface options                 | 8 16Gb FC, 8 12Gb SAS, 8 10Gb iSCSI, or 4 56Gb InfiniBand                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Operating system<br>Management system | SANtricity OS 8.20<br>SANtricity Storage Manager 11.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| High-availability features            | <ul style="list-style-type: none"> <li>• Dual active controller with automated I/O path failover</li> <li>• Dynamic Disk Pools (DDP) and RAID levels 0, 1, 3, 5, 6, and 10</li> <li>• Redundant, hot-swappable storage controllers, disk drives, power supplies, and fans</li> <li>• Automatic DDP or RAID rebuild following a drive failure</li> <li>• Mirrored data cache with battery backup and destage to flash</li> <li>• SANtricity proactive drive health monitoring identifies problem drives before they create issues</li> <li>• Greater than 99.999% availability (with appropriate configuration and service plans)</li> </ul> |
| Host operating systems supported      | 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®                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Application plug-ins**                | <ul style="list-style-type: none"> <li>• SANtricity Plug-in for Oracle Enterprise Manager</li> <li>• SANtricity Management Pack for Microsoft System Center Operations Manager</li> <li>• SANtricity Plug-in for Microsoft SQL Server® Management Studio</li> <li>• SANtricity Plug-in for VMware vCenter™</li> <li>• SANtricity VASA Provider</li> <li>• SANtricity Storage Replication Adapter for VMware vCenter Site Recovery Manager</li> <li>• SANtricity Performance App for Splunk Enterprise</li> </ul>                                                                                                                            |
| Included software features            | SANtricity mirroring, SANtricity Volume Copy, SANtricity Snapshot, SANtricity thin provisioning, Dynamic Disk Pools                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Optional software features            | SANtricity drive encryption                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Dimensions and Weight | EF560 base system  | EF560 expansion shelf |
|-----------------------|--------------------|-----------------------|
| Height                | 3.47" (8.81 cm)    | 3.47" (8.81 cm)       |
| Width                 | 19" (48.26 cm)     | 19" (48.26 cm)        |
| Depth                 | 19.6" (49.78 cm)   | 19.6" (49.78 cm)      |
| Weight                | 60.1 lbs (27.3 kg) | 54.2 lbs (24.6 kg)    |

|       | Power and Cooling*** |         |         |         |
|-------|----------------------|---------|---------|---------|
|       | Typical              | Maximum | Typical | Maximum |
| KVA   | 0.477                | 0.626   | 0.477   | 0.626   |
| Watts | 472                  | 620     | 472     | 620     |
| BTU   | 1,610                | 2,116   | 1,610   | 2,116   |

\* Base system and expansion shelves can be configured with a minimum of 6 SSDs.

\*\* No-charge download from [mysupport.netapp.com](http://mysupport.netapp.com).

\*\*\* Nominal measured using 24 400GB SSDs. Maximum measured using 24 1.6TB SSDs.

## Simple, Optimized Management

The EF560 all-flash array runs on the enterprise-proven SANtricity software platform. Optimized for flash, SANtricity software allows storage administrators to achieve maximum performance and utilization of their EF560 through extensive configuration flexibility, custom performance tuning, and complete control over data placement. Its graphically based performance tools provide key information on storage I/O from multiple viewpoints, allowing administrators to make informed decisions on configuration adjustments to further refine performance.

SANtricity Dynamic Disk Pools (DDP) allow storage administrators to simplify RAID management, improve data protection, and maintain predictable performance under all conditions. DDP evenly distributes data, protection information, and spare capacity across the EF560's entire pool of drives, simplifying setup and maximizing utilization. Its next-generation technology minimizes the performance impact of a drive failure and can return the system to optimal condition up to eight times more quickly than traditional RAID. With shorter rebuild times and patented prioritize-reconstruction technology, DDP significantly reduces exposure to multiple disk failures, offering a level of data protection that simply can't be achieved with traditional RAID.

With SANtricity software, all management tasks can be performed while the storage remains online with complete read/write data access. This allows storage administrators to make configuration changes, conduct maintenance, or expand the storage capacity without disrupting I/O to attached hosts. SANtricity software's online capabilities include:

- Dynamic volume expansion allows administrators to expand the capacity of an existing volume.
- Dynamic segment size migration enables administrators to change the segment size of a given volume.

- Dynamic RAID-level migration changes the RAID level of a RAID group on the existing drives without requiring the relocation of data. Supported RAID levels are 0, 1, 3, 5, 6, and 10.
- Nondisruptive controller firmware upgrades (no interruption to data access) are supported.

## Application Integration

The NetApp SANtricity Plug-ins for Microsoft®, Oracle®, and VMware® provide a consolidated view of the NetApp EF-Series systems, enabling users to monitor and manage their NetApp EF-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 availability and performance problems across the entire set of IT components.

## Professional Services

### Modular offerings customized for you

NetApp Professional Services can assist you in any and every phase of the storage lifecycle. Whether you need help planning your next-generation storage system, need an extra set of hands for a major storage deployment, or want to upgrade your existing infrastructure, NetApp Professional Services personnel have the skills and expertise you need. They offer:

- **Solution suites.** These customized solutions are designed to address your business-level challenges holistically.
- **Assessment services.** Enlist NetApp to identify and document business, storage, and infrastructure requirements and provide recommendations for improvements.
- **Consulting services.** Reduce the complexity of your networked storage implementation when our experts design, document, and implement a range of applications and solutions.
- **Deployment/implementation services.** Reduce risk when we prepare your site, install and connect systems, set up your software, and perform complete verification.

- Managed services. Have NetApp experts on site to perform storage management services so you can focus on core business initiatives.

## Global Support

### SupportEdge Services

NetApp Global Support delivers the highest availability for your enterprise data environment and helps you optimize your storage investments. Let NetApp mitigate support issues and drive operational best practices. NetApp's innovative, proactive support means you'll have fewer and less severe support cases. But if a problem arises, our award-winning technical centers and field support staff—delivering in over 100 countries—won't rest until it's solved.

As an industry leader in innovation, NetApp Global Support provides tools and technology to enable business continuity. The NetApp AutoSupport™ system, NetApp's suite of automation tools, is delivered as a service to help you proactively manage your systems and quickly resolve issues. AutoSupport functions as a “virtual staff” to protect critical data, save time, and reduce impact on your IT resources.

## 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. Learn more at

[www.netapp.com](http://www.netapp.com)

For More Information

- **NetApp EF560:** [www.netapp.com/us/products/storage-systems/flash-EF560/](http://www.netapp.com/us/products/storage-systems/flash-EF560/)
- **Additional products and software:** [www.netapp.com/us/products/](http://www.netapp.com/us/products/)
- **Professional Services:** [www.netapp.com/us/services/professional/](http://www.netapp.com/us/services/professional/)
- **Support:** [www.netapp.com/us/support/](http://www.netapp.com/us/support/)



© 2015 NetApp, Inc. All rights reserved. No portions of this document may be reproduced without prior written consent of NetApp, Inc. Specifications are subject to change without notice. NetApp, the NetApp logo, AutoSupport, SANtricity, and Snapshot are trademarks or registered trademarks of NetApp, Inc. in the United States and/or other countries. VMware and ESX are registered trademarks and VMware vCenter is a trademark of VMware, Inc. Microsoft, Windows Server, and SQL Server are registered trademarks of Microsoft Corporation. Linux is a registered trademark of Linus Torvalds. Oracle is a registered trademark of Oracle Corporation. Apple and Mac are registered trademarks of Apple Inc. All other brands or products are trademarks or registered trademarks of their respective holders and should be treated as such. DS-3648-0215

Follow us on:     