

# Don't settle for anything less

Extend your flash investments by choosing  
HPE 3PAR StoreServ Storage



**Hewlett Packard**  
Enterprise

### A leader in flash storage innovation

HP (now Hewlett Packard Enterprise) has been consistently ahead of the rest of the industry when it comes to adopting newer, denser, and more cost-effective SSD technologies, including:

- **June 2013:** HPE introduces the flash-optimized 3PAR StoreServ 7450 with hardware-accelerated data compaction
- **Dec 2013:** HPE 3PAR Adaptive Sparing increases usable drive capacity by 20 percent with 480 GB and 920 GB SSDs
- **June 2014:** New 1.92 TB HPE 3PAR StoreServ SSD becomes the largest on the market
- **Dec 2014:** HPE introduces the 3PAR StoreServ 7440c, the industry's first Converged Flash Array, delivering flash performance with hybrid affordability and support for unified block and file
- **June 2015:** HPE introduces 3.84 TB SSD, the largest capacity offered by a Tier-1 all-flash array
- **Aug 2015:** HPE introduces industry's most affordable AFA, packing 5.5 PB of usable flash capacity into a single floor tile
- **Nov 2015:** HPE 3PAR 20850 Sets World Record **SPC-2 Benchmark**
- **Dec 2015:** HPE 3PAR StoreServ introduces support for 3D NAND SSDs
- **March 2016:** HPE 3PAR 8450 captures **#1 SPC-1 Price-Performance** for external storage arrays at \$0.23 cents per SPC-1™ IOP

### Recognized across the industry

The HPE 3PAR StoreServ Storage platform continually garners recognition for excellence in flash technology innovation, including:

- **Oct 2014:** #1 All-Flash Array, Storage Magazine, HPE 3PAR StoreServ 7450
- **June 2015:** Leaders Quadrant, HPE 3PAR StoreServ 7450c, 2015 Gartner Solid State Array Magic Quadrant
- **Aug 2015:** 2015 Best of Show, Flash Memory Summit, HPE 3PAR StoreServ 20850
- **Sept 2015:** Best-in-Class AFA, HPE 3PAR **20000**, Best-in-Class Hybrid Storage Array, HPE 3PAR StoreServ **7200c**—DCIG Buyer's Guides
- **Oct 2015:** HPE 3PAR StoreServ ranked #1 in Critical Capabilities by Gartner

The discrepancies between flash storage platforms available today may be greater than you think. Whether you are considering adding flash to your current storage infrastructure or increasing your existing flash deployment, it pays to understand how choosing an architecture designed to help you get the most out of flash can extend your flash investments and support your business goals while shielding you from risk.

### The flash advantage

Major technology revolutions don't come along often, and flash is definitely one of them—bringing big and exciting shifts to the storage industry with it. The exceptional throughput and low latency of flash-based media enable excellent application performance and response times while its power efficiency and compact footprint are a relief for power- and energy-strapped data centers. It's no wonder, then, that flash is on track to displace spinning media.

Flash may be the future, but it comes with limitations. In order to reap the advantages of flash without going over budget, introducing risk, or compromising on data services, it is critical to invest in a storage platform that's designed to leverage the strengths of flash while mitigating those limitations. An architecture flexible enough to capitalize on the rapid innovation taking place in the world of flash. An architecture capable of delivering enterprise-class data services—including data protection designed for flash. An architecture that doesn't ask you to compromise.

HPE 3PAR StoreServ Storage remains at the forefront of the industry in integrating the latest enterprise-class, solid-state drive (SSD) technologies. However, this is only part of the reason that 3PAR StoreServ is an ideal choice for those considering flash. HPE 3PAR StoreServ helps you extend your flash investments by increasing density and cost-efficiency—without compromising performance, cost, Tier-1 resiliency, or rich data services. It's the only architecture on the market that can make this claim. Don't settle for anything less.

### Greater efficiency means greater flexibility

With systems that span from entry storage to multi-petabyte, service-provider-class arrays, HPE 3PAR StoreServ Storage is the only platform that offers a single, flash-optimized architecture capable of supporting block and file workloads while giving you a choice between

- All-flash arrays for extremely high performance and reduced OPEX
- Converged flash arrays that can support low-cost spinning media in addition to flash
- Tiered storage arrays also capable of extending DRAM cache onto SSDs for application acceleration

HPE 3PAR StoreServ offers the densest array on the market with up to 42 TB raw per rack unit and is the only platform with all-flash offerings capable of also supporting HDD drives.<sup>1</sup> As flash adoption continues to rise and more businesses look to all-flash arrays, choosing an architecture with the flexibility to also leverage high-capacity HDDs gives you an advantage not available with other platforms.

<sup>1</sup> See: [hp.com/us/en/hpe-news/press-release.html?id=1998063](http://hp.com/us/en/hpe-news/press-release.html?id=1998063) for details

### Your enterprise-grade SSD options

All flash drives currently available for HPE 3PAR StoreServ Storage are enterprise-grade SAS SSDs, giving you a choice between the latest planar NAND and emerging 3D NAND technologies.

HPE 3PAR StoreServ Storage currently offers several NAND flash options that leverage the latest enterprise Multi-level cell (MLC) technology

- MLC SSDs utilize MLC memory architecture but offer extended lifespan for greater return on flash investment
- Current MLC options provide you with a choice of price points and capacities, from 400 GB up to 3.84 TB SAS SSDs

The industry is in agreement that planar 2D NAND technology has reached the limits of its achievable density with current geometries. The next step in density requires new NAND geometry, such as 3D NAND

- In 2015, HPE 3PAR StoreServ added support for 3D NAND technology—a new flash memory architecture that stacks memory cells on top of each other for even greater density than was possible with planar MLC technologies
- Not only does this memory architecture provide greater density, but improvements to electrical performance by shortening the interconnect length between cells reduces power consumption and provides additional performance and latency benefits
- The 3D NAND technology by HPE 3PAR StoreServ offers increased performance and endurance at a more attractive price point than is possible with planar MLC SSDs.

Regardless of which model you choose, HPE 3PAR StoreServ Storage is designed to meet your needs even as they change over time—all with the same operating system, the same management interface, the same set of enterprise-class data services, and the same set of robust data protection options. No other vendor can offer this degree of flexibility from a single platform.

But the inherent flexibility of the HPE 3PAR Architecture isn't limited to its range of models and system configurations. At its core, the HPE 3PAR StoreServ platform is a multi-controller, multitenant, mixed workload platform designed to improve data storage efficiency across block as well as file workloads. This means that it is capable of not only delivering massive Tier-1 consolidation without risk, but making the most of the latest SSD technologies and rapidly integrating new ones as they become available. Considering the rapid pace of innovation taking place in the world of NAND and 3D NAND flash today, these are critical capabilities.

### Enterprise-class flash

Flash has come a long way since its introduction in 1998, and as memory technology has matured, HPE has continued to adopt lower cost, greater endurance, greater density and superior return on investment. HPE 3PAR StoreServ Storage currently supports a range of SSD options, with new drives continually being added. All drives currently available for HPE 3PAR StoreServ Storage are enterprise-grade, giving you a choice between the latest planar and emerging 3D NAND technologies (see sidebar for details).

The HPE 3PAR Architecture is capable of providing a superior mix of cost and performance by using the latest enterprise-class SSDs without compromising drive reliability—making it a good fit for your mission-critical applications. Add to this the ability to support HDDs and the platform provides hybrid flash economics but with a much superior architecture capable of greater performance headroom, greater flexibility, and no compromises when it comes to enterprise-class reliability or features.

### Getting the most from your flash investments

Although HPE has been at the forefront of the industry in supporting the latest SSD memory technologies on HPE 3PAR StoreServ, this is only part of the story. HPE 3PAR StoreServ Storage is a platform designed to make the best use of drive capacity—regardless of type, regardless of underlying memory architecture—from the hardware layer all the way up through the software stack. This multi-level approach has four key design principles:

- **Performance acceleration** that optimizes the entire I/O path, eliminating system bottlenecks with an architecture that pools system resources for both high I/O and low latency
- **Efficiency enhancements** to extend the life and utilization of flash media via features such as hardware acceleration and fine-grained virtualization as well as thin technologies, data compaction, and media wear management technology
- **Tier-1 resiliency** via built-in high availability, automatic failover, snapshot/replication capabilities, and data protection designed for flash
- **Data mobility** that goes beyond the individual system, allowing resources to be optimized at the data center level and providing seamless data movement between peer systems for service level and quality of service (QoS) management

### The unique benefits of Adaptive Sparing

While flash has become more and more affordable over time, the growing adoption of flash for mainstream applications make capacity utilization and media endurance more important than ever.

With HPE 3PAR StoreServ, Hewlett Packard Enterprise does everything possible to give you the greatest return on your flash investments, including working with disk manufacturers to increase media efficiency, reducing the number of writes to flash, employing unique thin and data compaction technologies, increasing page allocation efficiency, and avoiding duplicate writes.

One of the most powerful of these technologies is patented HPE 3PAR Adaptive Sparing. Thanks to this capability, HPE is able to collaborate with SSD suppliers to allow disk capacity typically reserved for wear management to be used more efficiently in order to increase usable drive capacity and extend media endurance without sacrificing reliability or integrity of the drive.

Adaptive Sparing employs two different strategies for achieving these benefits. The first strategy extends usable drive capacity by up to 20 percent by reducing the amount of spare capacity reserved by the drive. The system allocates spare space by distributing it evenly across every drive. This space is handed back to the drive to increase sparing space while allowing the system to reclaim the capacity should a drive fail.

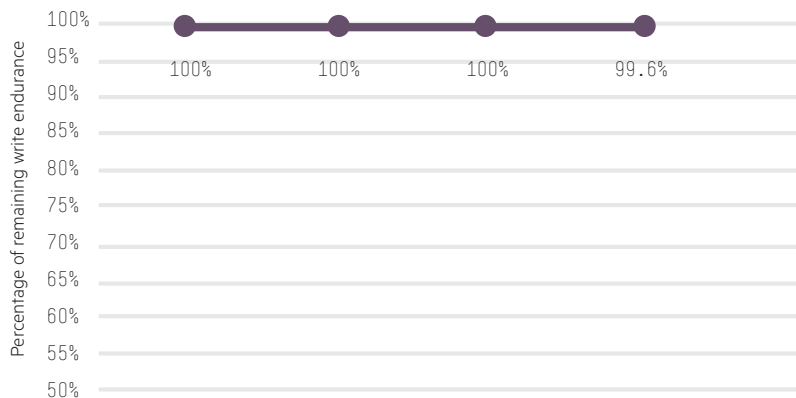
With ultra-high-capacity 3.84 TB SSDs, a modified strategy is employed that takes drives used by other platforms as read-intensive drives and allows them to be used in both read- and write-intensive environments. The result is greater system capacity, lower cost, and significantly greater SSD endurance without giving up the enterprise-class resiliency of the drive.

To learn more about Adaptive Sparing and other technologies involved in HPE’s multi-level approach to extending your flash investments, refer to the **HPE 3PAR StoreServ Storage: optimized for flash** white paper.

**Unconditional five-year warranty**

The platform’s efficient use of storage media also allows HPE to uniquely offer an unconditional five-year warranty for all HPE 3PAR SSDs that covers both media wear-out and electronic failure. This warranty spans all HPE 3PAR StoreServ SSD types, regardless of whether they are running in an all-flash array, a converged flash array, or are used for high-performance tiering. HPE is the only all-flash vendor to offer such a warranty without restricting it to all-flash arrays.<sup>2</sup>

Figure 1 illustrates telemetry data collected from actual 3PAR systems that demonstrates how, at the current rate of write operations, the average SSD in an HPE 3PAR StoreServ system could still have more than 50 percent of its write endurance remaining in the year 2064. It is this telemetry data that allows Hewlett Packard Enterprise to stand behind the integrity of HPE 3PAR StoreServ flash drives with this unique warranty.



**Figure 1:** Percentage of remaining SSD write endurance tracked over a 12-month period

**Data protection designed for flash**

When mission-critical data becomes unavailable for any reason, this can bring your business to a halt. When consolidating your mission-critical data onto flash, to shield your business from this risk, the platform you choose must have enterprise-class resiliency and support advanced data services—including a full range of data protection options. These capabilities are all but taken for granted with traditional Tier-1 disk storage systems today, but this is still an issue among flash platforms currently available on the market. With so much at risk, it pays to know the difference.

<sup>2</sup> Based on HPE internal analysis of publicly available information as of February 2016

**Go deeper**

Read the technical white paper **HPE 3PAR StoreServ Storage: optimized for flash**, for a deeper explanation of the architectural advantages of HPE 3PAR StoreServ Storage and how its flash design strategy differs from other platforms.

**Introduce flash at your own pace**

Not ready for an all-flash array? Wondering about the return on investment of adding flash to your existing 3PAR system? With the **HPE 3PAR Flash Advisor Toolset**, you can get the most out of your current storage investment by understanding the benefits of adding flash.

**Get smart on HPE 3PAR Remote Copy**

Read the technical white paper **Disaster-tolerant solutions with HPE 3PAR Remote Copy** to learn more about this solution.

HPE 3PAR StoreServ offers a full spectrum of enterprise-class resiliency and data protection features to deliver uninterrupted application availability and access to data optimized for flash. For example, HPE 3PAR StoreServ uses Persistent Technologies and a different approach to reconstructing failed flash drives as compared to spinning disks in order to maintain high and predictable application performance in the event of media, cache, port, controller node, or other hardware failures.

However, some failures cannot be protected against in a single site. For those scenarios, HPE 3PAR StoreServ arrays feature Remote Copy replication, a unique solution that allows replication of data between any array in the HPE 3PAR portfolio using three replication technologies: synchronous, asynchronous periodic, and streaming asynchronous—ideal for maintaining the low latency of flash without compromising on recovery point objectives (RPOs). Peer Persistence protects critical data from partial and even complete site failures by carrying out automated failover protection at the application level.

Integration with HPE StoreOnce Backup provides additional flash-optimized data protection options, including support for flat backup via HPE StoreOnce Express Protect (Figure 2), which accelerates application recovery in VMware® vSphere environments with support for others in development.

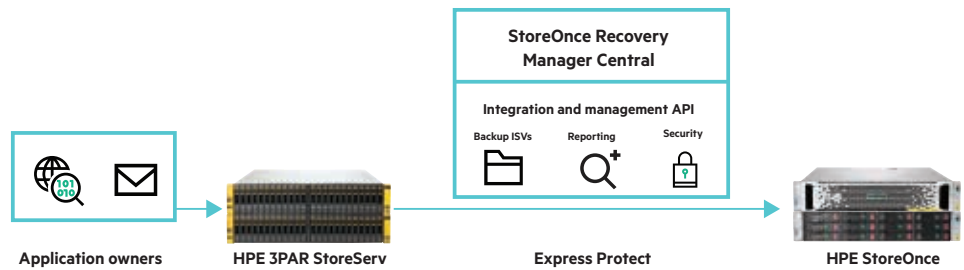


Figure 2: Flat backup with Express Protect

**The choice is yours**

Whether you are considering adding flash to your existing HPE 3PAR StoreServ system, evaluating the purchase of an all-flash or converged flash array, or simply investigating your options for bringing flash into your data center, no platform gives you more options for introducing the benefits of flash than HPE 3PAR StoreServ—and without compromising Tier-1 resiliency, rich data services, or application availability.<sup>3</sup>

Learn more at [hpe.com/storage/flash](http://hpe.com/storage/flash)

<sup>3</sup> Press release: [hp.com/us/en/hpe-news/press-release.html?id=1998063#.Vst-IU32Yqh](http://hp.com/us/en/hpe-news/press-release.html?id=1998063#.Vst-IU32Yqh)



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