



Eliminate Compromise

HP 3PAR StoreServ Storage-
the only primary storage architecture you need



2. The above is intended to highlight certain aspects of our Get Thin Guarantee and does not contain the full terms, conditions, limitations, definitions, and other provisions (“Terms”) of the Get Thin Guarantee. The Terms shall be contained in a written Get Thin Guarantee Terms and Conditions, which shall take precedence over the above. Qualification for the Get Thin Guarantee is subject to your acceptance of the Get Thin Guarantee Terms and Conditions and your compliance with such Terms. A copy of the Get Thin Guarantee Terms and Conditions will be provided to you by your sales representative.

3,4. The above is intended to highlight certain aspects of our Get Virtual Guarantee and does not contain the full terms, conditions, limitations, definitions, and other provisions (“Terms”) of the Get Virtual Guarantee. The Terms shall be contained in a written Get Virtual Guarantee Terms and Conditions, which shall take precedence over the above. Qualification for the Get Virtual Guarantee is subject to your acceptance of the Get Virtual Guarantee Terms and Conditions and your compliance with such Terms. A copy of the Get Virtual Guarantee Terms and Conditions will be provided to you by your sales representative.

Cut capacity requirements by 50 percent, guaranteed

Reduce capacity requirements by eliminating over-provisioning and using fast and simple space reclamation capabilities that are part of the HP 3PAR StoreServ platform’s industry-leading thin technologies. 3PAR ASICs in each controller node not only deliver mixed workload support, but provide the high-performance engine behind unique thin technologies that allow you to purchase 50 percent less storage to meet your application requirements—without compromising performance or utilization.² Looking to grow? Save on the cost of a storage technology refresh and then maximize storage ROI over time by keeping incremental purchases, administration, and operating costs to a minimum. Looking for a sure thing? The HP Get Thin Guarantee promises a minimum 50 percent reduction in capacity requirements when you replace legacy storage with HP 3PAR StoreServ Storage—guaranteed.²

Reduce administration by 90 percent with autonomic management

Simplify, automate, and expedite storage management with self-configuring, self-provisioning, and self-optimizing automation. HP 3PAR StoreServ Storage eliminates traditional manual storage planning and change management with autonomic management features that are intelligent, take place at a subsystem level, and don’t require administrator intervention. These features not only reduce management time by as much as 90 percent, but minimize the opportunity for human error and shrink provisioning time from hours, weeks, and days to just seconds. Provision a volume in only 15 seconds. Deliver high performance to all applications, even under failure conditions. Quickly adapt to the unpredictable by optimizing QoS levels with one click.

Double VM density, guaranteed

Get more out of your virtualization deployment. HP 3PAR StoreServ Storage is built to deliver performance that exceeds the demands of virtualized environments along with transformative levels of simplicity, agility, and efficiency. Integration with VMware vCenter and Microsoft System Center give you enhanced visibility into storage, and HP 3PAR Recovery Manager for VMware vCenter provides superior granularity and control of array-based snapshots. Integration with VMware vSphere API for Array Integration (VAAI), VMware vStorage APIs for Storage Awareness (VASA), Microsoft Offload Data Transfer (ODX), and thin provisioning enable HP 3PAR StoreServ Storage to improve virtual infrastructure performance, efficiency, and scalability. Low latency levels allow you to get more out of your VMware deployment, where extensive use of virtual memory pages to disk can limit virtual machine consolidation on physical servers when paired with legacy storage. By contrast, deploying HP 3PAR StoreServ Storage enables you to double virtual machine density on your physical servers, backed by the HP Get Virtual Guarantee.³

Seamlessly refresh storage and load balance across arrays

Move data seamlessly to balance performance and cost and to drive up utilization across your data center with peer-based storage federation. HP 3PAR StoreServ supports federated data mobility across Tier 1, midrange, and flash-optimized systems so you can manage resources at the data center level rather than just the system level. Peer-based storage federation lets you to move data and workloads between arrays without impact to applications, users, or services. Simply and non-disruptively shift data between any model HP 3PAR StoreServ system without additional management layers or appliances. Map workloads to the right resources and establish tiers of storage across the data center for different SLAs.

Storage federation on HP 3PAR StoreServ Storage can also help you improve availability in clustered VMware environments and eliminates data migration as a pain point when refreshing your primary storage arrays—including HP EVA. Now you can effortlessly import data from HP EVA Storage to HP 3PAR StoreServ Storage for a simple upgrade path that will allow you to maintain much of your existing SAN infrastructure.

Architecture that sets new standards for agility and efficiency

As IT evolves away from application-centric computing and towards more efficient and flexible models, infrastructure requirements are changing too. With a modern architecture built for virtualization, ITaaS, and the cloud, HP 3PAR StoreServ Storage anticipates these new requirements

with a resilient, secure, multitenant platform that lets you:

- Provision instantly
- Serve diverse and unpredictable workloads
- Deliver sustainable performance
- Flexibly adapt to shifting business demands
- Drive up resource utilization across the data center
- Drive down total cost of ownership for storage

A tightly clustered, multicontroller, scale-out architecture lets you grow into rather than out of your storage, adding new applications and workloads affordably and non-disruptively—all within a single, autonomically tiered, flash-optimized array.

Flash-optimized architecture featuring a Mesh-Active design

HP 3PAR StoreServ Storage features a Mesh-Active design based on a unique system of controller interconnects as part of a flash-optimized architecture. This architecture combines the benefits of monolithic and modular architectures while eliminating price premiums, scaling complexities, and performance bottlenecks of these designs. As a result, the HP 3PAR architecture delivers sustainable performance for diverse and unpredictable workloads that scales even with extremely high levels of capacity utilization.

Unlike legacy “Active-Active” controller architectures—where each volume is active on only a single controller—this Mesh-Active design, along with a virtualization strategy that uses three levels of abstraction—allows each volume to be active on every controller in the system. This forms a Mesh-Active cluster that delivers robust, load-balanced performance and greater headroom for cost-effective scalability that overcomes the tradeoffs typically associated with modular and monolithic storage.

A high-speed, full-mesh interconnection joins multiple controller nodes to form a cache-coherent, active-active cluster optimized for low-latency, high-performance, inter-node communication. This Mesh-Active design is one of many features that make the HP 3PAR StoreServ Storage architecture “flash-optimized”, eliminating the performance bottlenecks that can choke general-purpose disk arrays once flash-based media is introduced—particularly systems that lack the architecture to accommodate extremely high-performance drives.

The controller nodes that form the system’s tightly-coupled, cache-coherent Mesh-Active cluster feature ASICs that use Direct Memory Access (DMA) to enable a local ASIC in one node to directly access memory in other nodes to reduce latency times. These ASICs also connect every controller in the system with every other controller in the system over dedicated, high-bandwidth, low-latency links, enabling I/O workloads to be spread widely across the array. Within each ASIC is an efficient, built-in, silicon-based, zero-detection mechanism that powers zero-block deduplication and the removal of allocated but unused space without impacting performance—thereby extending the life of flash-based media by avoiding unnecessary writes. Adaptive Read and Write is another feature that helps extend the life of flash drives by automatically matching host I/O size reads and writes.

Adaptive Sparing is another technology that extends flash-based media endurance by adjusting the system’s sparing approach to minimize impact on SSDs. While other architectures generally reserve entire drives to use as spares, in the 3PAR architecture, the system reserves spare chunklets within

each drive. When using flash-based media, Adaptive Sparing adjusts sparing policies on the fly to avoid using SSDs for sparing and therefore lengthen flash media lifespan and drive down the cost of flash performance.

Mixed workload support for consistently high performance

Another major benefit of the system's ASICs is the support for mixed workloads with extremely high performance levels. Transaction- and throughput-intensive workloads run on the same storage resources without contention, enabling consolidation without compromise. This is particularly valuable in virtual server environments, where HP 3PAR StoreServ Storage allows you to double virtual machine density so you can increase server and storage consolidation and improve ROI.⁴

Multitenant I/O Processing enables performance optimization for mixed workloads by breaking large I/O into 32 KB sub-I/O chunklets to ensure small read I/Os don't get held up behind large I/O requests. With flash-based media, this granular approach ensures consistently high performance as you scale workloads to hundreds of thousands of IOPS and beyond. The accelerated performance of the system's ASICs, combined with Rapid RAID Rebuild capabilities, also fuel the platform's Fast RAID 5 and Fast RAID 6 capabilities, which enable the system to achieve the performance of traditional RAID mirroring with up to 66 percent less storage capacity.⁵

Fine-grained virtualization and system-wide striping

As previously mentioned, the 3PAR StoreServ architecture uses three levels of virtualization to drive up capacity utilization and accelerate performance. Fine-grained virtualization divides each physical disk into granular allocation units, or chunklets, each of which can be independently assigned and dynamically reassigned to different logical disks that are used to create virtual volumes. Breaking media devices (disk- or flash-based) into chunklets virtualizes physical drives to enable higher utilization and avoid stranded capacity. This fine-grained virtualization unit also enables mixed RAID levels on the same physical drive to do away with dedicated RAID groups, and seamlessly supports new media technologies such as solid state drives (SSDs).

Logical disks are the virtualization layer in which QoS parameters are applied such as availability level, drive media type, RAID level, etc. This enables sub-LUN tiering and enables data and I/O for each volume to be striped widely across all system resources (controllers, ports, cache, and drives). This system-wide striping is responsible for the simultaneous delivery of high capacity utilization and performance levels. Even a small volume can leverage the performance of hundreds of media devices and all the system's controller nodes for optimal performance without compromising capacity utilization.

For flash-based media, fine-grained virtualization combined with system-wide striping drives uniform I/O patterns by spreading wear evenly across the entire system. Should there be a media failure, system-wide sparing also helps against performance degradation by enabling many-to-many rebuild and resulting in faster rebuilds. Because HP 3PAR StoreServ Storage autonomically manages this system-wide load balancing, no extra time or complexity is required to create or maintain an optimally configured system.

Dynamic caching optimized for flash

Caching is an important element of the HP 3PAR StoreServ architecture, where it is performed dynamically and in a manner that optimizes flash-based media longevity. The 3PAR caching algorithm is dynamic in that it adapts itself to media type (HDD vs. SSD), drive type (15K RPM vs. 7.2K RPM), and workload type (random vs. sequential; read vs. write). In addition, features like Adaptive Read and Write enable a more granular caching approach when handling flash-based media by matching backend reads and writes to host I/O sizes. This avoids unnecessary access to data, thereby significantly reducing I/O latency, avoiding unnecessary flash media wear-out, and boosting backend performance.

5. The HP 3PAR Architecture technical white paper, June 2011, HP 3PAR RAID MP (Multi-Parity) uses Fast RAID 6 and the accelerated performance of the HP 3PAR ASIC to prevent data loss as a result of double disk failures. Performance levels are maintained within 15 percent of RAID 10 and with capacity overheads comparable to popular RAID 5 modes.

To ensure consistent random I/O performance with flash media even under mixed workload conditions, the 3PAR caching algorithm breaks down large sequential I/O into smaller blocks before sending them to the backend. Designed to serve unpredictable multitenant workloads, this caching algorithm also adjusts autonomically to changes in workload patterns. For example, Autonomic Cache Offload eliminates cache bottlenecks by automatically changing the frequency at which data is offloaded from cache to flash-based media using cache utilization rates. Another important aspect of the cache offload algorithm is the determination of which cached data should be flushed to the backend. HP 3PAR StoreServ Storage keeps track of read cache hits and keeps hot data in cache itself, thereby lowering latencies of frequently accessed data. Most importantly, with HP 3PAR StoreServ Storage, you get all of these performance and latency advantages without having to introduce and support an entirely new flash-based storage architecture or silo into your IT environment.

Persistent technologies for Tier 1 resilience

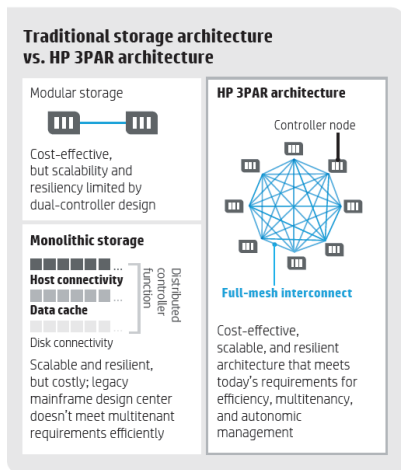
A major requirement of ITaaS is Tier 1 resiliency, which on HP 3PAR StoreServ Storage systems is delivered by hardware redundancy reinforced by persistent technologies that include Peer Persistence, Persistent Cache, and Persistent Ports.

HP 3PAR Peer Persistence software helps you keep your business-critical applications running seamlessly, even in the event of disaster, by enabling automated, transparent failover and failback, including between systems and sites. This transparency to hosts prevents disruption to the applications running on them so that your business isn't impacted. Certified for VMware vSphere Metro Storage Cluster (vMSC), Peer Persistence can be deployed to enable peer federation for VMware clusters to improve overall availability. It can also be used in conjunction with HP 3PAR Remote Copy software without the need for any additional hardware or appliance.

Persistent Cache removes performance impacts that result from unplanned component failures, making it a must-have for maintaining service levels in the virtual data center—a feature that you can't get from any other storage platform available for the midrange. This Tier 1 resiliency feature was designed to gracefully handle a controller failure by eliminating the performance penalties associated with "write-through" mode. A feature of all quad-node and larger HP 3PAR StoreServ arrays, Persistent Cache leverages the platform's unique Mesh-Active design to preserve write caching by rapidly remirroring the cache to other nodes in the cluster in the event of a failure. And while you may not need this level of Tier 1 resiliency today and may not choose to deploy a quad-node system to start, the grow-as-you-go capabilities of HP 3PAR StoreServ Storage mean that you won't need to rethink your storage strategy if and when your circumstances change.

Another Tier 1 resiliency feature, Persistent Ports is standard on all HP 3PAR StoreServ models and supports high availability in virtualized environments by automatically failing over a front-end controller node port that experiences laser loss, for example due to a cable or switch failure. The use of standard NPIV (N_Port ID Virtualization) technology enables a single host-facing 3PAR StoreServ port to assume the identity of additional predesignated partner ports, thus enabling transparent switchover of host path connections. Persistent Ports also provides nondisruptive online software upgrades on HP 3PAR StoreServ Storage without relying on multipathing software to initiate failover. This ensures that host paths remain online throughout the software upgrade process.

Figure 2. Traditional storage architecture vs. HP 3PAR architecture



HP 3PAR software and suites

HP 3PAR StoreServ Storage leads the industry in providing array management features that remove the layers of complexity typically weighing down storage administration and products that enhance visibility and control while eliminating costly, repetitive, and error-prone manual tasks.

Figure 3. 3PAR Software Suites enhance the agility and efficiency of your infrastructure.



Building on HP 3PAR Operating System software, HP offers a range of standalone software products and bundled software suites to enhance the agility and efficiency of your infrastructure and enable you to eliminate compromise.

Available software suites are as follows:

HP 3PAR Operating System Software Suite—Required for all new HP 3PAR StoreServ Storage systems, this foundational software suite gives you everything you need to get up and running quickly and efficiently. This suite includes the HP 3PAR Operating System, HP Management Console, HP Host Explorer, and HP 3PAR SmartStart⁶—software designed to get you off to a quick start with your new HP 3PAR StoreServ Storage system. This suite also includes all of the platform's thin software offerings—Thin Provisioning, Thin Conversion, and Thin Persistence. The suite's other highlights include Full Copy and autonomic rebalancing capabilities that help you optimize the use of future capacity expansions and support for standard multipathing software for high availability in clustered environments. A 180-day license for Online Import is included to enable migration from HP EVA Storage.

HP 3PAR Replication Software Suite—This optional suite bundles Virtual Copy with Remote Copy, both of which are also sold separately for all HP 3PAR StoreServ Storage models. Included in this bundle is Peer Persistence, which enables peer federation for VMware clusters to improve overall availability. Licensed based on system capacity.

HP 3PAR Data Optimization Software Suite—This optional software bundle combines HP 3PAR Dynamic Optimization, Adaptive Optimization, Peer Motion, and Priority Optimization so you can maintain high and predictable application performance in mixed workload environments and move data and workloads between arrays without impacting applications, users, or services. Licensed based on system capacity, the four software titles bundled in this suite are also sold separately for all HP 3PAR StoreServ Storage models. Depending on purchase date, titles included in this suite may vary. Check the HP 3PAR software QuickSpecs for complete details.

HP 3PAR Security Software Suite—This optional suite bundles Virtual Domains and Virtual Lock, both of which are also sold separately for all HP 3PAR StoreServ models. With this suite, you can deliver secure, segregated access and robust storage services for different applications and user groups with additional security attached to the retention of storage volumes. Licensed based on system capacity.

HP 3PAR Application Software Suite for VMware—Everything you need to make your VMware environment more agile and efficient—including Recovery Manager for VMware, Host Explorer for VMware, VASA support, and three essential plug-ins: the VMware Site Replication Manager (SRM) Adapter, the 3PAR VAAI plug-in, and the 3PAR management plug-in for VMware vCenter. This suite is optional and licensed on a per-system basis.

HP 3PAR Application Software Suite for Hyper-V—Protect your Microsoft Hyper-V environment with HP 3PAR Recovery Manager for Microsoft Hyper-V and the HP 3PAR VSS Provider software, included in this optional suite and licensed on a per-system basis.

HP 3PAR Application Software Suite for Exchange—This bundle gives you the essentials for use with Microsoft Exchange, including Recovery Manager for Exchange and the Volume Shadow Copy Service VSS Provider software. This suite is optional and licensed on a per-system basis.

6. SmartStart is available for HP 3PAR StoreServ 7200, 7400, and 7450 models only.

HP 3PAR Application Software Suite for Oracle—Everything you need for protecting Oracle databases, including Recovery Manager for Oracle and Oracle Space Reclamation capabilities, sold as an optional suite and licensed on a per-system basis.

HP 3PAR Application Software Suite for SQL—Protect Microsoft SQL databases with Recovery Manager for Microsoft SQL and the 3PAR VSS Provider software, bundled with this optional suite and licensed on a per-system basis.

HP 3PAR Reporting Software Suite—Enhance system visibility and reporting capabilities with this optional suite, which includes System Reporter for historical and performance capacity reporting, and the 3PARInfo application, licensed on a per-system basis.

Application-managed storage

HP invests in technologies and partnerships to support key strategic IT initiatives by working with partners such as VMware, Citrix, Red Hat, Oracle, Symantec, and Microsoft to develop integrated, platform-specific storage solutions that work with HP 3PAR StoreServ Storage.



Server and desktop virtualization

Exclusive virtualization and automation features built into HP 3PAR StoreServ Storage work with our software products and solutions to deliver unique benefits for VMware vSphere, VMware View, Microsoft Windows® Server Hyper-V, Citrix XenServer, Red Hat Enterprise Virtualization (RHEV), and Oracle VM.

These benefits help you increase virtualization ROI by enabling you greater consolidation by allowing you to purchase 50 percent fewer physical servers to support virtualization, simplify by spending 90 percent less time managing your virtual data center, and save by cutting storage capacity requirements by 50 percent or more.



Databases

Database performance and availability are so critical that many organizations apply generous capacity and management resources to maintain needed service levels. HP 3PAR StoreServ Storage removes these inefficiencies, eliminating tradeoffs between capacity utilization, efficiency, and performance. For example, with HP 3PAR Thin Persistence software and the new Oracle ASM Storage Reclamation Utility (ASRU), your Oracle databases stay thin by autonomically reclaiming stranded database capacity. And HP offers the cost-effective Oracle- and SQL-aware snapshot technologies, HP 3PAR Recovery Manager for Oracle and HP 3PAR Recovery Manager for SQL Server.⁷



Email and communications

Given the importance of Microsoft Exchange for mission-critical email communications, many organizations devote significant amounts of storage capacity and management resources to this essential application. HP 3PAR StoreServ Storage enables you to support a large number of mailboxes with a larger size limit while reducing cost per mailbox from dollars to cents. In addition, with HP 3PAR Recovery Manager for Exchange⁸, you can recover email messages quickly, affordably, and from multiple points in time.

7. These software titles are delivered via the HP 3PAR Application Software Suite for Oracle and the HP 3PAR Application Software Suite for SQL, respectively.

8. This software title is delivered via the HP 3PAR Application Software Suite for Exchange.



HP 3PAR StoreServ 7000



All-Flash HP 3PAR StoreServ 7450



HP 3PAR StoreServ 10000

Description and usage	When value matters. The same features that the world's largest service providers get, in a platform that lets you start small and grow without disruptive upgrades.		When performance matters. Delivers the same set of rich, Tier 1 data services without introducing a new storage architecture to deliver extremely high performance and low latency.		When scale matters. Tier 1 resilience and application prioritization enable massive consolidation of unpredictable mixed workloads and bulletproof QoS delivery.	
Model	7200	7400	7450	10400	10800	
Controller nodes	2	2–4	2–4	2–4	2–8	
Maximum host ports	12	24	24	96	192	
Fibre Channel	4–12	4–24	4–24	0–96	0–192	
1 Gb iSCSI	N/A	N/A	N/A	N/A	N/A	
10 Gb iSCSI	0–4	0–8	0–8	0–16	0–32	
Maximum initiators per system	1,024	2,048	2,048	4,096	8,192	
Drive types (mixable)	SAS (performance, nearline, SSDs)	SAS (performance, nearline, SSDs)	SAS SSDs	Fibre Channel and SAS (performance, nearline, SSDs)	Fibre Channel and SAS (performance, nearline, SSDs)	
Max Hard Disk Drives (HDDs)	8–240	8–480	N/A	16–960	16–1920	
Max Solid State Drives (SSDs)	120	240	120/240	256	512	
Maximum capacity raw (HDD/SSD)	400 TB/110 TB	1.1 PB/220 TB	110 TB (2-node) 220 TB (4-node)	1.6 PB/235 TB	3.2 PB/470 TB	



3PAR StoreServ storage is revolutionizing the way our customers store data, but first and foremost IIS is about solutions that fit the customer. Our storage solutions are expandable and customizable, so you can start with exactly what you need, and adapt as you grow. Start the conversation with an IIS representative today; we'll discuss your current operation, your goals for the future, and how we can help you get there.



Take five minutes to calculate the potential three-year cost savings and ROI you can expect by migrating from your current storage to an HP 3PAR StoreServ solution. [Click here](#) to go to the HP Storage Quick ROI Tool.

Developing solutions for major social and environmental challenges
hp.com/hpinfo/globalcitizenship

Customize your IT lifecycle management, from acquisition of new IT, management of existing assets, and removal of unneeded equipment.
hp.com/go/hpfinancialservices

HP Factory Express

HP Factory Express provides customization and deployment services along with your storage and server purchases. You can customize hardware to your exact specifications in the factory—helping speed deployment. Visit hp.com/go/factoryexpress to learn more.

Customer Technical Training

HP offers a variety of training courses on storage software, networking, archiving, and disk storage systems. Our classes are available in many delivery modalities—from traditional instructor-led courses at one of our 80 training centers worldwide to online and onsite training. Visit hp.com/learn/storage to learn more.

HP Technology Services for 3PAR StoreServ Storage

HP 3PAR StoreServ Storage prepares your data center for what's next—whether that is server virtualization, the delivery of IT as a Service, cloud-based service delivery, or whatever your future may hold. Add to this HP 3PAR StoreServ Storage Service for a complete IT service solution that combines consulting, lifecycle events, and support.

Choose from three levels of operate and support care:

Optimized Care

For mission-critical environments demanding the best performance and stability

- Support—HP Critical Service
- Additional options—10 HP Proactive Select credits per year, per array

Standard Care

For business-critical environments that need to maintain the highest level of uptime

- Support—HP Proactive Care 24x7, plus 20 HP Proactive Select credits per year, per array
- Additional options—HP Proactive Care Personalized Support (once per Proactive Care support new environment), an additional day of HP Personalized Support, and 10 additional HP Proactive Select credits per year, per array

Basic Care

For the minimum recommended support

- Support—HP Proactive Care 24x7, plus 20 HP Proactive Select credits per year, per array
- Additional options—HP Proactive Care Personalized Support (once per Proactive Care support new environment), an additional day of HP Personalized Support, and 10 additional HP Proactive Select credits per year, per array

Turn to HP Technology Services for the know-how to make technology work for you

To stay competitive and capitalize on new revenue opportunities, you must learn how to access technology in new ways. HP Technology Services understands that to drive your business forward, you need collaborative, passionate partners to help develop and execute solutions that take full advantage of your technology. We believe that our approach, people, and processes will help you deliver more business value from IT. As storage and other technology innovations continue to expand your business with new opportunities, we respond to capitalize on it so you can solve your most pressing challenges—and always be ready for what's next.

Learn more at

hp.com/go/StoreServ