



HP 3PAR StoreServ 7450 all-flash array

Performance without compromise

Key features and benefits

Thin deduplication increases capacity efficiency without compromising performance

- Inline deduplication lowers flash cost by saving capacity up front without the need for any storage pools or post-process
- ASIC-based Thin Deduplication offloads CPUs enabling them to continue delivering consistently high performance
- Avoids unnecessary writes to flash media extending its life
- Integration with Peer Motion increases storage efficiency across systems

Tier-1 resiliency accelerates application performance and enables QoS

- 900,000 IOPS at less than 0.7 ms latency¹
- Flash-optimized hardware and software reduce performance bottlenecks
- Priority Optimization ensures consistent quality of service (QoS) levels
- Persistent Technologies deliver high availability and Tier-1 resiliency
- Multi-tenant I/O processing efficiently handles media failures

Improve storage ROI with flash-based media life span and utilization enhancements

- Five-year warranty on new 1.92TB commercial MLC (cMLC) SSD, 480 GB and 920 GB SSDs
- System-wide striping enables uniform wear and avoids performance hot spots
- Thin Deduplication, Adaptive Write, and fine-grained capacity allocations extend flash media life span without performance impact
- Proactive media management constantly monitors flash utilization and wear

Balance performance and cost with seamless migration, data mobility

- Painless, no-cost migration from EMC arrays
- Online, non-disruptive data placement across all HP 3PAR storage systems ensures efficient use of storage resources
- Storage federation enables data mobility and load balancing at will
- Polymorphic simplicity across Tier-1, midrange, and flash-based storage

Are you struggling to balance performance and enterprise-class resiliency while meeting new virtualization, cloud, and IT as a Service (ITaaS) demands? What if you could instantly process six times more transactions per second with 90 percent fewer disks—without the real and hidden costs of adding a dedicated storage architecture?

Accelerate performance to boost agility

HP 3PAR StoreServ 7450 Storage is the only all-flash array in the industry that delivers the performance advantages of a purpose-built, flash-optimized architecture without compromising resiliency, efficiency, or data mobility. A flash-optimized architecture reduces the performance bottlenecks that can choke general-purpose disk arrays that have been retrofitted with solid-state disks (SSDs). However, unlike other purpose-built flash arrays, the 3PAR StoreServ 7450 doesn't require you to introduce an entirely new architecture into your environment to achieve flash-optimized performance. As a result, you don't have to sacrifice rich, Tier-1 data services, quad-node resiliency, advanced functionality, enterprise-class efficiency, or seamless data mobility between systems.

HP 3PAR StoreServ 7450 Storage accelerates business agility by boosting application performance with over 900,000 IOPS at less than 0.7 milliseconds (ms) latency. And it does this while delivering all the enterprise-class, Tier-1 features and functionality you have come to expect from the storage platform that powers three of the world's four largest managed service providers.² It's performance without compromise.

The last storage platform you will ever need

With HP 3PAR StoreServ Storage, the same effortless, efficient, bulletproof, and future-proof storage platform gives you optimized performance with both flash-based and spinning media that also scales to address the needs of the entire midrange, Tier-1 enterprises, and high-end service providers. The same common operating system, consolidated user interface, and rich set of data services are shared across the entire platform—regardless of model (figure 1).

You also get the peace of mind that your performance-critical applications are backed by storage with Tier-1 resiliency. With the Get 6-Nines Guarantee, HP stands behind the ability of all quad-node and larger HP 3PAR StoreServ Storage systems to deliver high data availability.³

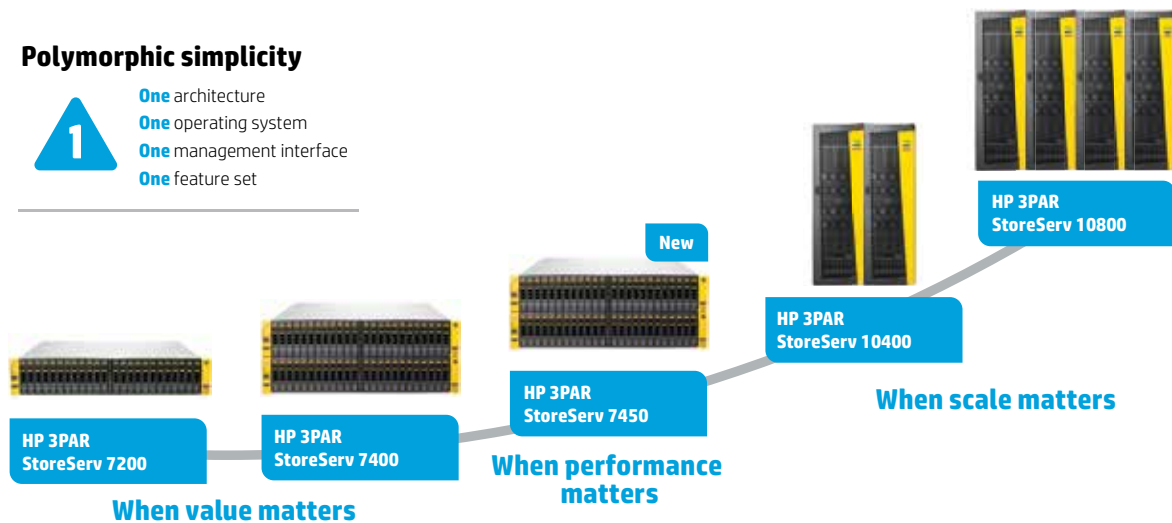
With the all-flash HP 3PAR StoreServ 7450, you can accelerate applications where milliseconds represent millions of dollars and make decisions based on analytics in hours or minutes vs. days or weeks. Cut your system capacity requirements with HP 3PAR Thin Deduplication, fine-grained zero-reclaim, and provisioning. Get more from your flash storage with features such as Adaptive Sparring, Adaptive Write, Thin Deduplication etc., that extend flash-based media life span. Protect your investments with a five-year warranty on 1.92TB cMLC SSD, 480 GB and 920 GB SSDs.

¹ Assumes a 100% 4K random read workload with no cache hits and with node specific volume layout.

² 451 Research—Market Monitor, 2012.

³ Requires a mission-critical support agreement. Contact HP for full terms and conditions.

Figure 1. HP 3PAR StoreServ Storage



HP 3PAR Priority Optimization

Need to assure QoS for mission-critical applications?

HP 3PAR Priority Optimization is optional software that enables you to manage service levels for applications and workloads as business requirements dictate to assure QoS. This means you can now provision storage performance as easily and efficiently as provisioning storage capacity. Reduce contention and certify that performance is delivered where you need it most in multi-tenant environments.

A highly automated approach allows you to quickly and easily assign a minimum goal for I/O per second, bandwidth, and latency to protect mission-critical applications in enterprise environments.

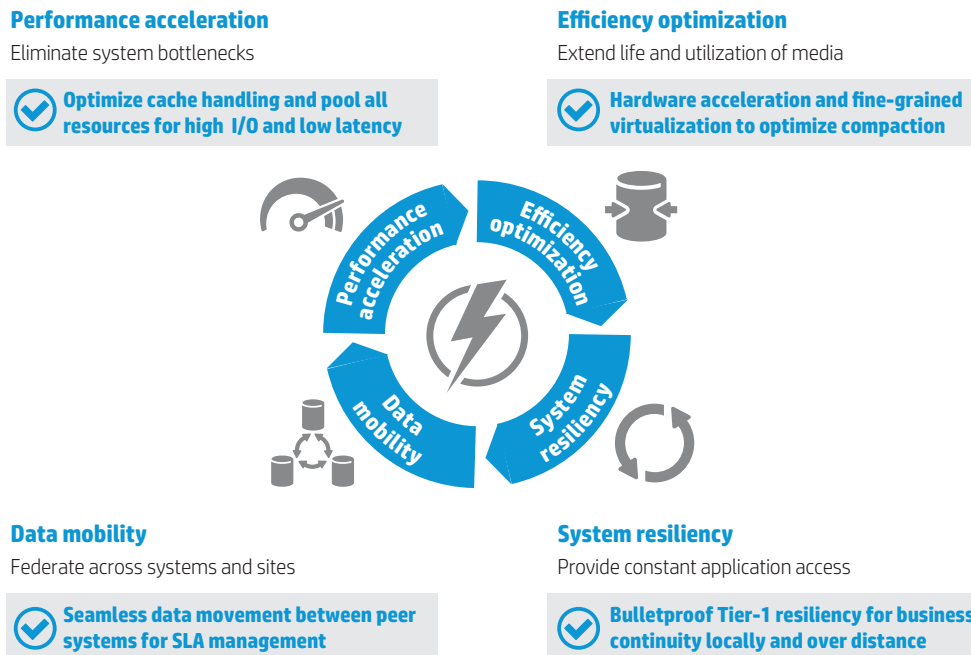
Or assign performance thresholds on workloads with lower service level requirements. This capability allows you to consolidate more applications on less infrastructure while delivering predictable performance to meet even the most demanding service level requirements.

The flash-optimized architecture behind the performance

HP 3PAR StoreServ Storage removes the bottlenecks that prevent legacy storage from taking full advantage of flash-based media. This is the driving force that allows the HP 3PAR StoreServ 7450 all-flash array to deliver accelerated performance that is six times greater than traditional platforms using hard disk drives (HDDs) while also delivering extremely low latency. This flash-optimized architecture relies on several new and unique HP 3PAR StoreServ innovations:

- **HP 3PAR Adaptive Read and Write:** Matches host I/O size reads and writes to flash media at a granular level to avoid unnecessary data reads and writes to reduce latency, enhance backend performance, and extend flash media life span to lower storage total cost of ownership (TCO).
- **Autonomic cache offload:** Reduces cache bottlenecks by automatically changing the frequency at which data is offloaded from cache to flash media based on utilization rate. This helps achieve consistently high performance levels as you scale the workload to hundreds of thousands of IOPS.
- **Multi-tenant I/O processing:** Enables performance improvement for mixed workloads or virtual desktop infrastructure (VDI) deployments by breaking large I/O into smaller chunks so that small read requests don't get held up or stuck behind larger I/O requests, which helps ensure reduced latency.
- **Unique, clustered, Mesh-Active architecture:** Fine-grained virtualization and system-wide striping shared by HP 3PAR StoreServ Storage delivers capacity and performance that scale automatically, even at extremely high capacity utilization levels.
- **Purpose-built HP 3PAR StoreServ ASIC:** Supports mixed workloads and enables Thin Deduplication with extremely high performance levels to alleviate legacy storage performance concerns.

Figure 2. The benefits of the HP 3PAR StoreServ flash-optimized architecture



Flash-based storage you can afford

HP 3PAR StoreServ 7450 Storage helps you radically improve efficiency, making an all-flash storage array more affordable for a wider range of applications than ever before. Unlike bolt-on thin storage solutions on legacy arrays, HP 3PAR StoreServ 7450 all-flash arrays feature hardware-enabled thin technologies that allow systems to run in a state of consistent high capacity utilization without any performance tradeoffs. In fact, the HP Get Thin Guarantee promises new HP 3PAR StoreServ customers at least 50 percent reduction in capacity requirements by simply replacing legacy storage with HP 3PAR StoreServ Storage—guaranteed.⁴

Unlike mechanical HDDs, SSDs leverage flash-based storage composed of electronic media that wears down with each write. Innovations to the HP 3PAR StoreServ Storage platform deliver additional media endurance that enables you to extend the life of your SSDs to get the most out of every dollar and I/O for increased storage return on investment.

The following features help maximize the efficiency of HP 3PAR StoreServ 7450 Storage to drive down the overall cost of flash performance and protect your critical investments:

- **HP 3PAR Thin Deduplication:** ASIC-assisted block-level deduplication on the array happens “inline”—upon ingest—which carries multiple benefits, including increasing capacity efficiency, protecting system performance, and extending flash media life span. Thin Deduplication is powered by the new HP 3PAR Express Indexing feature that accelerates hash signature comparison, detecting duplicate write requests and preventing duplicate data from being written.
- **Standard 5-year SSD warranty:** New 1.92TB cMLC SSD, 480 GB and 920 GB SSDs now carry a standard 5-year warranty to protect your flash storage investments.
- **Fine-grained allocation unit:** With its 16 KB write allocation unit, the HP 3PAR StoreServ Storage platform has long been known for pioneering innovation in storage capacity efficiency. This granular allocation size enables only the right amount of flash media to be allocated, avoiding waste due to unused allocated capacity.

⁴The 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 our Get Thin Guarantee is subject to your acceptance of the Get Thin Guarantee terms and conditions and your satisfaction of those terms.

- **System-wide striping:** The HP 3PAR StoreServ Architecture stripes data across all system resources (controllers, ports, cache, and drives). This system-wide striping enables the array to simultaneously deliver uniquely high capacity utilization (no silos of any kind) and performance levels (all resources supporting each volume). This drives uniform I/O patterns across all media resources by spreading wear evenly across the entire system. Because the system automatically manages this system-wide load balancing, no extra time or complexity is required to create or maintain optimally better configured system.
- **System-wide sparing:** The HP 3PAR StoreServ Architecture reserves spare chunklets in all flash media. Unlike many competitive arrays that need to reserve dedicated spares which sit idle, the HP 3PAR StoreServ Architecture uses every single flash device, reserving spare chunklets in each of them. This ensures a balanced load and wearing across all flash media. Should there be a media failure, system-wide sparing also helps protect against performance degradation by enabling many-to-many rebuild, resulting in faster rebuilds.
- **Adaptive Sparing:** HP 3PAR StoreServ Storage releases the spare chunklets present in each SSD to the drive itself, allowing SSDs to use that spare capacity as additional over-provisioned capacity. This increase in over-provisioned capacity significantly enhances SSD media endurance for HP 3PAR StoreServ Storage.
- **Highly virtualized storage OS:** To enable performance and to help maximize the utilization of physical resources, the HP 3PAR Operating System employs a tri-level mapping methodology similar to virtual memory architectures. The first level of mapping virtualizes physical drives of any size into granular allocation units or chunklets. Complete access to every chunklet reduces large pockets of inaccessible storage. The second level of mapping associates chunklets with Logical Disks (LDs). It is at this second level that RAID characteristics are implemented. The third level of mapping associates Virtual Volumes (VVs) with all or portions of an underlying LD or of multiple LDs. The fine-grained, tri-level mapping approach to virtualization enables a single flash media device to support hundreds of volumes and up to a dozen RAID definitions at the same time, allowing the system to make the most efficient use of flash.
- **Zero-detect with ASIC:** The HP 3PAR StoreServ ASIC features an efficient, silicon-based zero-detection mechanism that gives HP 3PAR StoreServ Storage the power to remove allocated but unused space without impacting performance. On top of powering HP 3PAR Thin Technologies and Thin Deduplication, this capability also removes streams of zeroes present in write I/O prior to writing that data to flash-based media. In the world of flash-based storage, where there is a penalty for every single write (in terms of media endurance), this write elimination helps to elongate media life considerably. Not only can you reduce capacity requirements by up to 50 percent, but you also extend the life of your valuable SSD drives by avoiding unnecessary writes.
- **Proactive media management:** The HP 3PAR Operating System constantly monitors flash-based media utilization and wear to enable proactive reporting of possible media failures for effortless management. You can stay informed on the expected life of your flash-based media by monitoring the wear levels of each flash device at any given time. Never be caught off guard by planning for future upgrades before your flash-based media is worn out.

Tier-1 resiliency for mission-critical workloads

In order to meet service level demands for performance-critical applications, high availability and uncompromising data protection are must-haves. With HP 3PAR StoreServ 7450 Storage, you can decrease downtime while dramatically reducing the cost of remote data replication and disaster recovery (DR) with highly efficient, multi-mode replication across all HP 3PAR StoreServ models.

HP 3PAR Remote Copy software allows you to achieve low recovery time objectives (RTOs) and zero-data-loss recovery point objectives (RPOs) with complete distance flexibility. And since HP 3PAR Remote Copy configuration is now autonomic, meaning it is completed in one step, you can protect your data from the start.

A unique suite of persistent technologies power HP 3PAR StoreServ 7450 Storage in delivering high availability and Tier-1 resiliency to performance-critical applications:

- **HP 3PAR Persistent Cache** preserves service levels, so they are not impacted by unplanned component failures—a key requirement for the virtual data center.
- **HP 3PAR Persistent Ports** allows non-disruptive upgrades to HP 3PAR StoreServ 7450 Storage systems without relying on multipathing software and without initiating failover.
- **HP 3PAR Peer Persistence** software delivers effortless resilience that comes with VMware vSphere Metro Storage Cluster (vMSC) certification. With Peer Persistence, you'll also be able to federate storage across data centers without being constrained by physical boundaries. Automated failover and failback between two sites or data centers is transparent to hosts, which keeps your VMware deployments seamlessly running even in the event of a disaster.
- **HP 3PAR StoreServ Data at Rest Encryption** protects data from both internal and external security breaches. If your application or environment requires protection from unauthorized access of the data on a drive, then consider the HP 3PAR StoreServ Data at Rest Encryption solution. HP 3PAR StoreServ models are available with self-encrypting drives (SEDs), where data is encrypted as it is written to the drive. You get the peace of mind in knowing that all data contained on these drives is protected against unauthorized access, regardless of hardware theft, drive failure, or drive retirement.
- **Flash-based media failure reconstruction** on HP 3PAR StoreServ Storage is different from reconstruction of spinning media in order to protect flash performance. In the case of a flash-based media failure, instead of doing large sequential reads/writes as is done with HDDs, the HP 3PAR StoreServ performs 32 KB read/write I/O for flash media. This enables the system to provide consistent performance levels even under situations of flash media failure, since large sequential writes can typically cause flash media performance to degrade.

Hassle-free data movement to balance performance and cost

For your business to consistently deliver high levels of application performance at an affordable cost, your storage architecture must allow easy data movement to keep up with the pace of change. For example, at times of peak demand on certain applications, you want the associated data placed on your fastest storage technology. You also need the flexibility to meet different service levels without having to manage multiple storage islands with incompatible management interfaces and data service technologies.

Meet the needs of today's dynamic applications with the ability to move data and workloads not just between tiers but between arrays—without impact to applications, users, or services. With HP 3PAR StoreServ Storage, you can simply and non-disruptively shift data between the HP 3PAR StoreServ 7450 all-flash array and any other HP 3PAR StoreServ array without additional management layers or appliances. Map workloads to the right resources and establish tiers of storage across the data center for different service level agreements (SLAs). Lower costs and manage capacity at a data center level by thinly provisioning volumes with the freedom to move data between systems. Refresh technology effortlessly by streamlining the movement of volumes from older systems and non-disruptively update storage without application impact.

HP 3PAR Online Import Software

Painless migration to Tier-1 storage built for cloud and ITaaS

Storage federation on HP 3PAR StoreServ Storage makes modernization simple by eliminating data migration as a pain point in refreshing your primary storage—including upgrading from HP EVA Storage and EMC CX4 and VNX arrays.

Upgrading from HP EVA Storage?

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.

Looking to replace your EMC array?

New online import capabilities make it easier to move from VNX to HP 3PAR StoreServ than from VNX to VNX2. Every HP 3PAR StoreServ Storage system comes with HP 3PAR Online Import software at no charge for 180 days—giving you painless, non-disruptive migration.

Software suites for HP 3PAR StoreServ Storage

HP 3PAR StoreServ Storage supports the same OS and software offerings as the other members of the HP 3PAR StoreServ Storage family. As with all HP 3PAR StoreServ models, you have the opportunity to purchase software bundled into a series of suites designed to simplify purchasing and save you money. Selected software titles can also be purchased separately, as indicated below.

HP 3PAR Operating System Software Suite	Required for all new HP 3PAR StoreServ 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 3PAR Management Console, HP 3PAR Host Explorer, and HP 3PAR SmartStart ⁵ —software designed to get you off to a quick start with your new HP 3PAR StoreServ system. It also includes all of the platform's thin software offerings—HP 3PAR Thin Provisioning, HP 3PAR Thin Conversion, and HP 3PAR Thin Persistence. Other highlights of this suite include HP 3PAR Full Copy, 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 EMC CX4 and VNX arrays as well as HP EVA Storage.
HP 3PAR Replication Software Suite	This optional suite bundles HP 3PAR Virtual Copy with HP 3PAR Remote Copy software, both also sold separately for all HP 3PAR StoreServ 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, HP 3PAR Adaptive Optimization, HP 3PAR Peer Motion, and HP 3PAR Priority Optimization software so you can 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 models. Depending on purchase date, titles included in this suite may vary. Check the HP 3PAR Software QuickSpecs for complete details. For the 10000 models only, HP 3PAR Optimization Suite is available and includes Adaptive Optimization and Dynamic Optimization.
HP 3PAR Security Software Suite	This optional suite bundles HP 3PAR Virtual Domains and HP 3PAR Virtual Lock software, both also sold separately for all HP 3PAR StoreServ models. With this suite, you can segregate access and deliver 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 HP 3PAR Recovery Manager for VMware, Host Explorer for VMware, vSphere APIs for Storage Awareness (VASA) support, and three essential plug-ins: the VMware Site Replication Manager (SRM) Adapter, the HP 3PAR VAAI Plug-in, and the HP 3PAR Management Plug-in for VMware View. This suite is optional and licensed on a per-system basis.
HP 3PAR Application Software Suite for Microsoft® 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 HP 3PAR Recovery Manager for Exchange and the VSS Provider software. This suite is optional and licensed on a per-system basis.
HP 3PAR Application Software Suite for Oracle	Everything you need for protecting Oracle databases, including HP 3PAR 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 HP 3PAR Recovery Manager for Microsoft SQL and the HP 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 the HP 3PAR System Reporter software and the HP 3PARinfo application, licensed on a per-system basis.

⁵HP 3PAR SmartStart is available for the 7200, 7400, and 7450 models only.

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. hp.com/go/factoryexpress

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. hp.com/learn/storage

Get the services you need

HP 3PAR StoreServ Storage prepares your data center for what's next—whether that is server virtualization, the delivery of ITaaS, 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 a rich portfolio of services to make the most of HP Storage, so you can move with confidence to take full advantage of the broadest, most advanced portfolio in the industry.

Design, integrate, migrate and transform

- HP Storage Efficiency Analysis
- HP Storage Impact Analysis
- HP Storage Modernization Service

Deploy and Implement

- HP 3PAR StoreServ Storage Installation and Startup Service
- HP 3PAR Software Installation and Startup Service
- HP Storage Data Migration Service
- HP EVA to HP 3PAR StoreServ Acceleration Service
- HP Data Replication Solution Service
- HP Enhanced Implementation Service for SANs
- HP 3PAR Adaptive Optimization Policy Implementation Service
- HP Storage Virtual Volume Design and Implementation Service
- HP Proactive Select
- HP Thin Volume Conversion Service
- HP 3PAR StoreServ Health Check
- HP Performance Analysis Service
- HP 3PAR Rebalance Service
- HP 3PAR StoreServ Replication Software Suite Installation and Startup Service

Operate and support—meet SLAs with the right support level. Choose from three levels of operate and support care:

- **Optimized Care**—with products connected to HP and proactive advice, delivers the highest levels of performance and stability through deployment and proactive management practices.

Support: HP Critical Service

Additional options: 10 HP Proactive Select credits per year, per array

- **Standard Care**—with products connected to HP and proactive advice, maintains high level of uptime, along with expert help to cut the cost and complexity of implementation and 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

- **Basic Care**—with products connected to HP and proactive service, minimum recommended support

Support: HP Proactive Care 24x7, plus 10 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

If none of our support recommendations meet your needs, we can tailor a service solution for your unique support requirements. Only HP brings together deep expertise, proactive, and business critical support and a strong partner network—plus a full set of infrastructure services designed to power a Converged Infrastructure.

For more services information, visit: hp.com/services/storage

Learn more at
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