Overview

HPE 3PAR StoreServ 9000 Storage

The HPE 3PAR StoreServ 9000 Storage is an enterprise-class flash array that helps you consolidate primary storage workloads - for file, block, and object offering flexible IO host connectivity - without compromising performance, scalability, data services, or resiliency. This newest 3PAR model based on the proven 3PAR architecture is purpose built for all-flash consolidation, delivering the performance, simplicity, and agility needed to support your hybrid IT environment. HPE 3PAR StoreServ 9000 Storage is available in a single all-flash model, the 9450, that offers rich Tier-1 data services, quad-node resiliency, fine-grained Quality of Service (QoS), seamless data mobility between systems, high availability through a complete set of persistent technologies, and simple and efficient data protection with a flat backup to HPE StoreOnce Backup appliances.

HPE 3PAR StoreServ 9000 Storage

What's New

- HPE Primera 600 Upgrade Conversion Controller Kits
- Protect up to 100% of SSD investment and upgrade to HPE Primera. HPE 3PAR 9450 systems can be upgraded to HPE Primera A670 or A670 1TB without requiring a data migration.
- HPE 3PAR 9000/20000 2p 32Gb FC HBA: for high performance Fibre Channel host connectivity, it accelerates FC performance for 3PAR All Flash storage and delivers up to 2X performance compared to 16Gb FC in a smaller port footprint.
- HPE 3PAR 750GB NVMe SCM Module: Storage Class Memory Module significantly improves the performance of All-Flash Arrays in specific workloads by decreasing the latency for specified volumes. Intelligent caching algorithms are used to extend DRAM cache to Storage Class Memory devices through NVMe transport

Standard Features

Summary	9450
Number of Controller Nodes	2 or 4
HPE 3PAR Gen5 ASICs	4 or 8
Processors	4-8 x 10-core 2.4 GHz
Total Cache	896 GiB
Total Cache per node pair	448 GiB
Maximum Host Ports	80 ports
32Gb/s Fiber Channel Host Ports	0 – 40 ports
16Gb/s Fiber Channel Host Ports	0 – 80 ports
10Gb/s iSCSI Host Ports	0 – 40 ports
10Gb/s Ethernet Ports for File Persona	0 – 24 ports
Built-in 10GbE Ports[1]	2 – 4 ports
Number of Solid State Drives	6 – 576
Max Raw Capacity[2]	6000 TiB[3]
Maximum Usable File Capacity[4]	2 – 512 TiB
Capacity Details	**9450**
RAID Levels	RAID 0, 1, 5, 6
RAID 5 Data to Parity Ratios	2:1 - 8:1
RAID 6 Data to Parity Ratios	4:2, 6:2, 8:2, 10:2, 12:2, 14:2
Drive Capacities (SSDs)[5]	1.92TB SSD, 3.84TB SSD, 7.68TB SSD, 15.36TB SSD
Number of Add-on Drive Enclosures[6]	2 – 48 enclosures[7]

Notes:

Specifications are subject to change without notice.

- [1]32Gb FC host support requires 3PAR OS 3.3.1 Technology Release TR05 or later and the 32Gb FC HBA is the same SKU for the 3PAR 9000 and 20000 platforms. Check HPE Spock for latest supported 3PAR software and connectivity.
- [1] Two built-in 10GbE ports per node pair can be used for Remote Copy (RCIP), maximum of 8 usable.
- [2]The minimum supported raw capacity is equal to 6 x Min drive size available.
- [3]For storage capacity, 1 GiB = 2^{30} bytes and 1 TiB = 1,024 GiB
- [4]Usable file capacity supported for HPE 3PAR File Persona
- [5]SSDs are Solid State Drives
- [6]Each Drive Enclosure holds up to 24 small form factor (2.5”) drives in 2U
- [7] The recommended minimum is 4 drive enclosures per controller node pair

Host OS Support

Citrix® XenServer® | HP-UX® | IBM® AIX® | Microsoft® Windows® Server, including Microsoft® Hyper-V™ | Apple Mac OS
OpenVMS* | Oracle® Linux® (UEK and RHEL compatible kernels) | Oracle® Solaris | Ubuntu | VMware vSphere™
Red Hat® Enterprise Linux® | Red Hat® Enterprise Virtualization
SUSE® Linux Enterprise | SUSE® Linux Virtualization | IBM Virtualization | Oracle VM
For the latest information on supported operating systems refer to Single Point of Connectivity Knowledge for HPE Storage Products (SPOCK): **http://www.hpe.com/storage/spock**

Standard Features

All-Inclusive Single-System Software

The All-Inclusive Single-System Software is included as part of the array and offers all the software titles necessary to run a single HPE 3PAR Storage array.

HPE 3PAR Operating System Software

The HPE 3PAR Operating System Software Suite gives you everything you need to get up and running quickly and efficiently. It is the foundation software of HPE 3PAR StoreServ Storage, combining advanced virtualization capabilities with simple storage management, high efficiency, and world class performance.

HPE 3PAR Virtual Copy

HPE 3PAR Virtual Copy software protects and shares data affordably with rapid recovery using reservation-less, non-duplicative, copy-on-write snapshots.

HPE 3PAR Adaptive Optimization

HPE 3PAR Adaptive Optimization improves storage utilization by enabling cost-optimized storage tiering.

HPE 3PAR Dynamic Optimization

HPE 3PAR Dynamic Optimization delivers the required service levels for the lowest possible cost throughout the data lifecycle.

HPE 3PAR Priority Optimization

HPE 3PAR Priority Optimization assures service levels with QoS controls for mission critical applications.

HPE 3PAR Virtual Domains and Virtual Lock

With HPE 3PAR Virtual Domains and HPE 3PAR Virtual Lock software, 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.

HPE 3PAR Online Import

HPE 3PAR Online Import Software is the first do-it-yourself data migration tool for enterprise Storage Area Networks. Unlike traditional block migration approaches, Online Import Software enables customers to migrate storage volumes from HPE EVA Storage, EMC, Hitachi, IBM Storage to HPE 3PAR StoreServ Storage systems online and without complex planning or dependency on extra tools.

HPE 3PAR File Persona Software

This software enables rich set of file protocol services, core file data services and an Object Access API to extend the spectrum of primary storage workloads natively addressed by HPE 3PAR StoreServ 9000 Storage. With this solution, the architectural benefits of HPE 3PAR StoreServ 9000 Storage can be extended to use cases such as: home directories and user shares; content management and collaboration; data preservation and governance; and custom cloud applications.

HPE Recovery Manager Central (RMC) for VMWare vSphere, MS SQL, Oracle and more

Protect your business-critical applications without impacting performance using HPE RMC software. With this automated, non-intrusive software, the simplicity and performance of local and remote snapshots can be combined with the reliability and cost-effective retention of deduplicated backups to protect any application data stored on 3PAR arrays. Based on your RTO objectives, retain the space-efficient snapshots on the 3PAR array itself or offload them to a StoreOnce Backup system using fast, efficient, Express Protect Backups. Based on your RPO objectives, generate as many application-consistent recovery points as desired for VMware VMs, MS SQL and Oracle databases or automate the protection workflow for any application data on 3PAR using the RMC REST API SDK.

Notes: RMC for Oracle is supported for Oracle running on RHEL and OL platforms.

Standard Features

HPE 3PAR Recovery Manager for Hyper-V (RM-H)

Protect your Microsoft Hyper-V environment with HPE 3PAR Recovery Manager for Microsoft Hyper-V and the HPE 3PAR VSS Provider software, included in this software bundle. By leveraging HPE 3PAR Virtual Copy software, RM-H enables administrators to non-disruptively create space-efficient, application-consistent, point-in-time snapshots to protect and recover Hyper-V Virtual Hard Disks (VHDs) and individual VMs.

HPE 3PAR Recovery Manager for Exchange (RM-E)

Protect your Microsoft Exchange environment with HPE 3PAR Recovery Manager for Microsoft Exchange and the HPE 3PAR VSS Provider software, included in this software bundle. By leveraging HPE 3PAR Virtual Copy software, RM-E enables administrators to non-disruptively create space-efficient, application-consistent, point in time snapshots to protect and recover Exchange databases and mailboxes.

HPE 3PAR Recovery Manager for Oracle (RM-O)

Protect your Oracle environment running on Solaris, HP-UX or IBM AIX platforms with HPE 3PAR Recovery Manager for Oracle. By leveraging HPE 3PAR Virtual Copy software, RM-O enables Oracle administrators to non-disruptively create space-efficient, application-consistent, point-in-time snapshots to protect and recover Oracle databases and instances. For Oracle environments running on RHEL or Oracle Linux, please refer to RMC for Oracle above.

HPE Smart SAN

HPE Smart SAN solution for HPE 3PAR makes end-to-end traditional tedious SAN configuration and management simple and automatic, reducing the probability of errors through end-to-end SAN automation. It is an application embedded in the SAN components (3PAR array, hosts FC HBAs and B-series FC switches) that enables the 3PAR to automate configuration for settings and policies across the SAN. Smart SAN features enable customers to automate switch zoning from a 3PAR CLI or SSMC, resulting in the creation of fewer zones, and enables configuration of zones in minutes, not hours.

HPE StoreFront Remote SaaS Portal

The HPE StoreFront Remote SaaS Portal provides proactive tools and integrated data collection from the HPE 3PAR StoreServ Storage arrays that call home to deliver unique insights and analytics all in one dashboard. Identify capacity and performance issues early through intuitive capacity and performance trend analysis and forecasting. These valuable analytics help maximize asset utilization and optimize the datacenter with recommendations and remedial actions when issues arise. Users can log into **http://www.storefrontremote.com** to claim their arrays and get access for free.

All-inclusive Multi-system software

The All-inclusive Multi-system software is an optional software suite that includes Peer Motion, Remote Copy, Peer Persistence, and Cluster Extension.

HPE 3PAR Peer Motion

HPE 3PAR Peer Motion enables load balancing at will wherein, movement of data and workloads between arrays is initiated without impacting applications, users or services.

HPE 3PAR Remote Copy

HPE 3PAR Remote Copy offers simple and cost-effective data protection for efficient multi-tenant disaster recovery.

Standard Features

HPE 3PAR Peer Persistence

HPE 3PAR Peer Persistence software enables HPE 3PAR StoreServ systems located at metropolitan distances to act as peers to each other, presenting a nearly continuous storage system to hosts connected to them.

HPE 3PAR Cluster Extension

HPE 3PAR Cluster Extension Software offers rapid automated protection against application downtime from fault, failure, or site disaster. CLX integrates with the Windows OS clustering software and HPE 3PAR Remote Copy to automate failover and failback between sites

Service and Support

Warranty

3 Year, On-site Warranty Service. 24x7 4-hour onsite response
The warranty on all HPE 3PAR StoreServ 9000 Solid State Drives is 5 years, 24x7 4-hour onsite response. Please refer to the HPE 3PAR StoreServ 9000 Drives section for the complete list of SSD SKUs. The HPE 3PAR NVMe SCM Module also has the 5 years, 24x7 4-hour on site response. Hewlett Packard Enterprise warrants only that the Software media will be free of physical defects for a period of ninety (90) days from delivery.
For more information about Hewlett Packard Enterprise's Global Limited Warranty and Technical Support, visit:
http://www.hpe.com/storage/warranty

Notes:

- All currently available HPE 3PAR StoreServ SSDs carry a five-year warranty offering unconditional replacement in case of drive failure, media wear-out, or both.
- For Storage Base SKUs and Drive SKUs the warranty only covers the HW and not the All-inclusive software that is included with the same SKUs.

HPE Pointnext - Service and Support

Get the most from your HPE Products. Get the expertise you need at every step of your IT journey with **HPE Pointnext Services**. We help you lower your risks and overall costs using automation and methodologies that have been tested and refined by HPE experts through thousands of deployments globally. HPE Pointnext **Advisory Services**, focus on your business outcomes and goals, partnering with you to design your transformation and build a roadmap tuned to your unique challenges. Our **Professional** and **Operational Services** can be leveraged to speed up time-to-production, boost performance and accelerate your business. HPE Pointnext specializes in flawless and on-time implementation, on-budget execution, and creative configurations that get the most out of software and hardware alike.

Consume IT on your terms

HPE GreenLake brings the cloud experience directly to your apps and data wherever they are—the edge, colocations, or your data center. It delivers cloud services for on-premises IT infrastructure specifically tailored to your most demanding workloads. With a pay-per-use, scalable, point-and-click self-service experience that is managed for you, HPE GreenLake accelerates digital transformation in a distributed, edge-to-cloud world.

- Get faster time to market
- Save on TCO, align costs to business
- Scale quickly, meet unpredictable demand
- Simplify IT operations across your data centers and clouds

Managed services to run your IT operations

HPE GreenLake Management Services provides services that monitor, operate, and optimize your infrastructure and applications, delivered consistently and globally to give you unified control and let you focus on innovation.

Connect your devices

Unlock all of the benefits of your technology investment by connecting your products to Hewlett Packard Enterprise. Achieve up to 77%[1] reduction in down time, near 100%[2] diagnostic accuracy and a single consolidated view of your environment. By connecting, you will receive 24x7monitoring, pre-failure alerts, automatic call logging, and automatic parts dispatch. HPE Tech Care Service and HPE Complete Care Service customers will also benefit from proactive activities to help prevent issues and increase optimization. All of these benefits are already available to you with your server storage and networking products, securely connected to Hewlett Packard Enterprise support.

Notes:

- [1]- IDC
- [2] – HP CSC reports 2014 - 2015

Service and Support

Free up resources with Operational Services from HPE Pointnext

HPE delivers services for IT by using proven best practices as well as automation and methodologies that have been tested and refined by HPE experts and artificial intelligence through thousands of deployments globally. Choose from the recommended services for customers purchasing from Hewlett Packard Enterprise or an authorized reseller. Services are quoted using Hewlett Packard Enterprise order configuration tools.

Recommended Services

HPE Pointnext Tech Care.

HPE Pointnext Tech Care is the new operational service experience for HPE products. Tech Care goes beyond traditional support by providing access to product specific experts, an AI driven digital experience, and general technical guidance to not only reduce risk but constantly search for ways to do things better. HPE Pointnext Tech Care has been reimagined from the ground up to support a customer-centric, AI driven, and digitally enabled customer experience to move your business forward. HPE Pointnext Tech Care is available in three response levels. Basic, which provides 9x5 business hour availability and a 2 hour response time. Essential which provides a 15 minute response time 24x7 for most enterprise level customers, and Critical which includes a 6 hour repair commitment where available and outage management response for severity 1 incidents.
https://www.hpe.com/services/techcare

HPE Pointnext Complete Care

HPE Pointnext Complete Care is a modular, edge-to-cloud IT environment service that provides a holistic approach to optimizing your entire IT environment and achieving agreed upon IT outcomes and business goals through a personalized and customer-centric experience. All delivered by an assigned team of HPE Pointnext Services experts. HPE Pointnext Complete Care provides:

- A complete coverage approach -- edge to cloud
- An assigned HPE team
- Modular and fully personalized engagement
- Enhanced Incident Management experience with priority access
- Digitally enabled and AI driven customer experience

https://www.hpe.com/services/completecare

HPE 3PAR SSD Support

3PAR SSD Extended Replacement Program

Provides for the post warranty replacement of eligible HPE 3PAR SSDs under active HPE support coverage in the event the SSD has reached its maximum usage limit based upon the HPE 3PAR SSD Life-Left reading.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/a00000122ENW.pdf

HPE Services Support Credits

Services Support Credits offer flexible services and technical skills to meet your changing IT demands. With a menu of service that is tailored to suit your needs, you get additional resources and specialist skills to help you maintain peak performance of your IT. Offered as annual credits, you can plan your budgets while proactively responding to your dynamic business.

Notes: HPE Tech Care and HPE Tech Care Advanced require that the customer connect their devices to make the most of these services and receive all the deliverables.

Service and Support

Related Services

HPE 3PAR StoreServ 8000, 9000, and 20000 Storage Installation and Startup Service Hewlett Packard Enterprise provides onsite deployment of your HPE 3PAR StoreServ 8000, 9000, and 20000 Storage arrays into your storage environment. This Service is included in all the levels of Care mentioned above.
http://h20195.www2.hpe.com/v2/GetPDF.aspx/4AA5-8035ENW.pdf

HPE 3PAR All-inclusive Multi-system Software Installation and Startup Service
This service, which provides installation and startup for the HPE 3PAR Remote Copy, Peer Motion, and Peer Persistence functionality of HPE 3PAR All-inclusive Multi-system Software in your storage environment, is designed to help you get HPE 3PAR All-inclusive Multi-system Software up and running quickly and to provide a demonstration of the product's key features using sample or test data only
https://h20195.www2.hpe.com/v2/GetDocument.aspx?docname=4aa6-6385enw

HPE 3PAR All-inclusive Single-system Software Installation and Startup Service Complementing your new HPE 3PAR All-inclusive Single-system software, this service provides the necessary activities required to help you deploy Adaptive Optimization, Dynamic Optimization, File Persona, Priority Optimization, System Reporter, Virtual Copy, and an overview of Virtual Domain and Virtual Lock. For Virtual Copy, the service provides a demonstration of the product's key features using sample or test data only
https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA6-6549ENW.pdf

HPE 3PAR 9000 and HPE 3PAR 20000 to HPE Primera Controller Node Upgrade Service –
Provides deployment of the HPE Primera 600 Upgrade Conversion Kits to enable HPE 3PAR 9000 and HPE 3PAR 20000 systems to upgrade to a HPE Primera A670 Controller helping maximize your current investment in HPE 3PAR storage
http://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA5-8036ENW.pdf

HPE 3PAR 8000, 9000, and 20000 Software Installation and Startup Service
Designed to provide a smooth startup, this service provides deployment of individual HPE 3PAR 8000, 9000, and 20000 storage software features, helping to ensure proper installation in your storage environment as well as helping you increase the benefit from your storage investment.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA5-8036ENW.pdf

HPE 3PAR Peer Persistence Software Installation and Startup Service
Provides implementation of the HPE 3PAR Peer Persistence Software feature. The service is designed to help get HPE 3PAR Peer Persistence up and running quickly and to provide a demonstration of the product's key features using sample or test data only.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA4-2772ENW.pdf

HPE Storage Transformation Workshop
Explore data management to business-aligned visions, covering cloud, object, end to end data protection and BC/DR.

HPE 3PAR StoreServ Data Migration
Proven methodology, expertise and tools to help you migrate data across your data center or around the globe.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA5-3759ENW.pdf

HPE Storage Modernization Service
Modernize your storage environment to take better advantage of physical or virtualized server environments, all flash, cloud, and object storage solutions.
http://h20195.www2.hpe.com/v2/GetPDF.aspx/4AA5-8498ENW.pdf

Service and Support

Data Profiling Service
Let TS Consulting assess your current file storage and identify redundant, obsolete and trivial data – simplifying your transformation to 3PAR and reducing migration costs.

HPE StoreServ Integration Service
Integrate your new HPE 3PAR StoreServ system so that it is agile, performs effectively, and scales to rapid growth.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA4-9254ENW.pdf

HPE StoreServ Online Import Quick Start Service
Choose the most effective, appropriate methods for configuring and migrating to a HPE 3PAR platform.
https://www.hpe.com/psnow/doc/4aa6-0422enn

HPE EVA to 3PAR Acceleration Service - The HPE EVA to HPE 3PAR Acceleration Service provides customers with OPEX and CAPEX savings as a result of your journey from HPE EVA to HPE 3PAR StoreServ. This service provides customers with an alternative DIY ("do-it-yourself") data migration option with guidance from TS Consulting Storage migration specialists.

HPE SAN Deployment Service
Hewlett Packard Enterprise delivers complete design and implementation services for Fibre Channel, SAS, and iSCSI SAN connectivity components.
https://www.hpe.com/psnow/doc/5981-8527enw

HPE Data Replication Solution Service for 3PAR Virtual Copy
This service enables snapshots and mirroring to facilitate data restores, minimize downtime for backups, perform application testing and support data mining use with decision-support tools.
http://h20195.www2.hpe.com/v2/GetPDF.aspx/4AA3-8107ENW.pdf

HPE Data Replication Solution Service for 3PAR Remote Copy
HPE Data Replication Solution Service for 3PAR Remote Copy Software configures real-time data mirroring between local and remote 3PAR storage systems to safeguard critical business information.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA3-8627ENW.pdf

HPE 3PAR Adaptive Optimization Policy Implementation Service
Provides analysis, recommendations, and implementation of HPE 3PAR Adaptive Optimization policies to enable storage tiering using data collected from the HPE 3PAR Storage system over time.
https://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA4-3393ENW.pdf

HPE Storage Virtual Volume Design and Implementation Service
When deploying an HPE Storage array, the HPE Virtual Volume Design and Implementation Service provides the necessary activities required to design and implement a new virtual volume configuration.

HPE Thin Volume Conversion Service
Provides evaluation and execution of conversion from standard to thin provisioned virtual volumes for HPE 3PAR Storage. A service specialist advises the customer on HPE 3PAR Thin Provisioning best practices, provides evaluation of potential disk capacity savings if target virtual volumes are converted, and plans and implements thin conversion processing. The service leverages 3PAR thin provisioning capabilities to help optimize storage capacity, reduce cost, increase agility and maintain performance.
https://www.hpe.com/psnow/doc/4AA4-3393ENW.pdf

Service and Support

HPE Performance Analysis Service for HPE Disk Arrays

The service provides data collection, detailed I/O analysis and enhancement recommendations for HPE 3PAR StoreServ Storage disk arrays, HPE EVA P6000 Storage disk arrays and HPE XP Storage disk arrays. HPE Performance Analysis Service for HPE Storage Disk Arrays provides a single engagement concerning the performance of a single HPE Storage disk array.
https://www.hpe.com/psnow/doc/5982-6668enw

HPE Data Sanitization Storage and Server Services

These services provide the skilled resources and tools to help your organization address the need to protect data when your organization is retiring systems, upgrading storage and servers, returning leased equipment, or redeploying data storing devices. Using specialized software techniques, an HPE service specialist or authorized service partner will help ensure that data cannot be reconstructed or retrieved from hard disk media in your server and storage devices. These services offer you a smart alternative or augmentation to physical hardware destruction by executing procedures to remove data from disk media.
https://www.hpe.com/psnow/doc/5981-9510enw

HPE 3PAR Performance and Capacity Trending Service

HPE 3PAR Performance and Capacity Trending Service provides data collection, analysis, and reports with key performance and capacity metrics for your HPE 3PAR StoreServ array. Through this service, you will receive a specified number of reports describing long-term trends in performance and capacity usage and have the option to purchase additional reports. You will also receive briefing sessions highlighting The Hewlett Packard Enterprise findings and recommendations.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA5-8792ENW.pdf

HPE 3PAR Health Check Service

The HPE 3PAR Health Check service is delivered as a single engagement, providing data collection, analysis, report creation, and a briefing session concerning the performance of a single HPE 3PAR StoreServ Storage System. This health check service is best for HPE 3PAR StoreServ Storage Systems that have been installed and are in normal production mode. It can also be used to establish a baseline for future reference to improve the effective use of your storage system.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA4-3404ENW.pdf

HPE 3PAR Storage Rebalance Service

The HPE 3PAR Rebalance Service helps balance data across an HPE 3PAR StoreServ Storage array to take advantage of the capabilities of the array architecture. The service provides analysis, planning, and implementation of data movement and/or physical movement of drive magazines within the array.
http://h20195.www2.hpe.com/V2/GetPDF.aspx/4AA4-0280ENW.pdf

Parts and Materials

Hewlett Packard Enterprise will provide HPE-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product QuickSpecs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

The defective media retention service feature option applies only to Disk or eligible SSD/Flash Drives replaced by Hewlett Packard Enterprise due to malfunction.

Configuration Information

Customer Self Installation (CSI)

Customers have the option of self-installing the HPE 3PAR StoreServ 9000 Storage array. The Customer Self Installation option is available for HPE 3PAR StoreServ 9000 Storage arrays that meet the following criteria:

- 2-node or 4-node configurations
- CTO configurations (factory integrated)
- Single rack
- It is recommended to use a physical Service Processor

Customer technical profile

In order to successfully install the HPE 3PAR StoreServ 9000 Storage array the installer should:

- Have a good understanding and knowledge of Storage Area Networks, Fiber Channel fundamentals and a basic understanding of TCP/IP and other networking protocols (DNS/NTP).
- Have a good understanding of server virtualization technology, in particular of Hypervisors such as VMware ESXi and Microsoft Hyper-V.
- Be able to maintain and install server hardware and Microsoft Windows and/or Linux OS.
- Have experience creating Storage LUNs, presenting/exporting LUNs to a server and formatting the LUNs to make them usable for applications.
- Be able to troubleshoot hardware and software issues using logs and documentation.
- Have the required tools and mechanical skills to unpack, roll, and install a heavy rack (up to 2000 pounds/~900 kg). Three people are recommended to remove the racked system from its shipping container.

If the installer does not meet the profile or is not comfortable with the self-installation process, Hewlett Packard Enterprise recommends engaging the Hewlett Packard Enterprise sales representative or Hewlett Packard Enterprise Channel Partner to purchase HPE deployment services.

Customer responsibilities

The Customer will:

- Ensure that the host and SAN environment is supported and compliant with Hewlett Packard Enterprise recommendations and best practices. Host and SAN Implementation Guides are available at **https://support.hpe.com/hpesc/public/home**
- Support Matrix are available on SPOCK (HPE Storage Single Point of Connectivity Knowledge) **http://www.hpe.com/storage/spock**.

Resolve any problems with their SAN and host environment, prior to installing the HPE 3PAR StoreServ 9000 Storage.

Customer Self Installation documentation

Prior to installing the HPE 3PAR StoreServ 9000 Storage array, the installer should thoroughly review the following documentation.

- HPE 3PAR StoreServ 9000 Storage Self-Install Guide: **http://www.hpe.com/support/3PAR9000CSI**
- HPE 3PAR StoreServ 9000 Storage Installation video: **http://www.hpe.com/support/3PAR9000CSIVideo**
- Forum on HPE 3PAR StoreServ 9000 Self-Install: **http://www.hpe.com/forum/3PARCSIHELP**

The Customer Self Installation option is available only for initial installs, not for upgrades. Customer Self Upgrade (CSU) is not available for HPE 3PAR OS software on HPE 3PAR StoreServ 9000 Storage arrays. Customer Self Repair (CSR) information is available at this link: **https://support.hpe.com/hpsc/doc/public/display?docId=emr_na-c05133912**

Notes: Customers performing a self-install (according to rules identified above) will not void their warranties and will be fully supported.

Configuration Information

Step 1 - Choose the Base configuration and Controller Nodes

HPE 3PAR StoreServ 9000 configurations start with the selection of the Base. The Base includes the controller node chassis and two controller nodes. Each Controller Node consists of CPUs, ASICs, Cache banks and connectivity options for the storage array.

HPE 3PAR StoreServ 9000 Storage Base

Description	SKU
HPE 3PAR 9450 2-node Storage Base with All-inclusive Single-system Software	Q0E92A

- A minimum of one (1) storage base must be ordered for each array.
- Each storage base includes the controller node chassis and two (2) controller nodes

Each controller node includes two (2) SAS adapters

HPE 3PAR StoreServ 9000 Controller Nodes

Add a pair of the HPE 3PAR StoreServ 9000 Controller Nodes to the 9000 Storage Base to configure an HPE 3PAR StoreServ 9000 4-node array.

HPE 3PAR 9450 Storage Node with All-inclusive Single-system Software Q7F41A

- Each Controller Node SKU represents a single (1) unit
- Each Controller Node SKU includes two (2) SAS adapters
- Controller Nodes are always ordered in pairs on an HPE 3PAR StoreServ 9000 Storage array
- Only one (1) pair of 9450 Controller Nodes can be ordered per array
- Each Controller Node SKU is loaded with All-inclusive Single-system Software
- The Controller Nodes have built-in Gigabit Ethernet ports for management and Remote Copy over IP

HPE 3PAR StoreServ 9000 Upgrade Controller Nodes

Use the HPE 3PAR StoreServ 9000 Upgrade Controller Nodes to increase the number of controller nodes on an existing previously installed HPE 3PAR StoreServ 9000 array. Increasing the controller nodes on an existing array helps improve resiliency, performance and increase scalability in a balanced fashion.

HPE 3PAR 9450 Upgrade Node with All-inclusive Single-system Software Q0E94A

- Each Upgrade Controller Node SKU represents a single (1) unit
- Each Upgrade Controller Node SKU includes two (2) SAS adapters
- Upgrade Controller Nodes are always ordered in pairs on an HPE 3PAR StoreServ 9000 Storage array
- Only one (1) pair of 9450 Upgrade Controller Nodes can be ordered per array
- Each Upgrade Controller Node SKU is loaded with All-inclusive Single-system Software
- The Upgrade Controller Nodes have built-in 1Gb Ethernet port for management and 10Gb Ethernet port for Remote Copy over IP

Step 2 - Choose Drive Adapter

HPE 3PAR StoreServ 9000 Storage uses SAS drive adapters for backend drive connectivity. Two SAS adapters are included as part of each controller node. Each SAS adapter on a controller node can connect up to 8 drive enclosures. HPE 3PAR StoreServ 9000 Storage arrays have 12Gbps SAS backend.

HPE 3PAR StoreServ 9000 Drive Adapters

Order the following SKU to configure a third SAS adapter on the HPE 3PAR StoreServ 9000 controller nodes. This is optional because each controller node already includes 2 SAS adapters.

HPE 3PAR 9000 4-port 12Gb SAS Host Bus Adapter Q0E96A

- Two (2) SAS adapters are included as part of each controller node
- A third optional SAS adapter can be ordered per controller node

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Configuration Information

Step 3 - Choose Host Adapter

Host adapters can be ordered separately to be installed in the field or they can be factory configured into controller nodes. Host adapter cards provide the array with additional FC ports, with 10Gb/sec iSCSI ports, or 10Gb/sec Ethernet ports. The additional FC ports can be used for multiple purposes including connection to hosts and connection to other HPE 3PAR StoreServ Storage systems in a Remote Copy or Peer Motion relationship. The iSCSI ports permit host connection in iSCSI environments. The Ethernet ports can be used to natively host various File protocols and core file data services.

HPE 3PAR StoreServ 9000 Host Adapters

Description	SKU
HPE 3PAR 9000/20000 2-port 32Gb Fibre Channel Host Bus Adapter	Q2P67A,
HPE 3PAR 9000 4-port 16Gb Fiber Channel Host Bus Adapter	Q0E97A
HPE 3PAR 9000 2-port 10Gb iSCSI Converged Network Adapter	Q0E98A
HPE 3PAR 9000 2-port 10Gb Ethernet Host Bus Adapter	Q0E99A

32Gb FC host support requires 3PAR OS 3.3.1 Technology Release TR05 or later and the 32Gb FC HBA is the same SKU for the 3PAR 9000 and 20000 platforms. Check HPE Spock for latest supported 3PAR software and connectivity.

- A minimum of one (1) host adapter per node must be ordered.
- The 16Gb Fiber Channel Adapter includes (4) 16Gb/s shortwave FC SFP+. The 10Gb iSCSI Adapter includes (2) 10Gb/s shortwave SFP+. The 10Gb Ethernet Adapter includes (2) 10Gb/s SR SFP+.
- Each node in a node pair must have the same number and type of adapters.

The 4 ports of the FC adapter can be individually configured to connect to a host or to a remote array in a Remote Copy configuration.

Notes: Ethernet Adapters can be used only for File services connectivity

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Step 4 – Choose Storage Class Memory Module

Storage Class Memory Module can be used to improve the performance of All-Flash Arrays by decreasing the latency for specified volumes. Intelligent caching algorithms are used to extend DRAM cache to Storage Class Memory devices through NVMe transport. Storage Class Memory Module is available in the form of an Add-in Card. Store Class Memory Module can be ordered separately to be installed in the field.

HPE 3PAR 750GB NVMe Storage Class Memory Module	Q2P70A

- Minimum of one (1) SCM Module per node must be ordered
- SCM Module will work with HPE 3PAR OS 3.3.1 TR05 (or later)
- SCM effectiveness should be assessed based on workload characteristics prior to configuration
- SCM module must not be configured on arrays expected to run Encryption

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Step 5 - Choose Drive Enclosures

Add drive enclosures to include drives in the configuration (the controller nodes don't include any drive). Drive enclosures can be ordered separately for installation in the field, or they can be factory configured in a rack. Each drive enclosure supports twenty-four (24) small form factor 2.5" drives. The HPE 3PAR StoreServ 9450 supports up to forty-eight (48) drive enclosures.

Drive Enclosures

HPE 3PAR 9000 24-disk 2U SFF (2.5in) SAS Drive Enclosure	Q0E95A
HPE 3PAR StoreServ 9000 24-disk 2U SFF (2.5in) SAS Upgrade Drive Enclosure	Q2R36A

Configuration Information

- A minimum of 2 drive enclosures is required per node pair.
- Each drive enclosure includes 24 drive bays for small form factor 2.5" drives.
- Drive enclosures by default are connected directly to the controller nodes (direct connect). As an option, it is possible to have the drive enclosures connected to the controller nodes in (2-level deep) daisy chains.
- The best practice is to balance the drive enclosures across the SAS ports on each controller node.
- With a four node configuration, the best practice is to attach the same number of drive enclosures behind each node pair.
- Drive bays that are not filled with a drive must be covered with a drive blank to preserve proper air flow.
- If future capacity upgrades are expected, include enough Drive Enclosures so that there are some empty bays in each enclosure after all drives are added.

Step 6 - Choose Drives

Drives are orderable at the time the array is purchased, or can be added in the future when additional capacity is required. HPE 3PAR StoreServ 9000 drives are sold as single drives.

HPE 3PAR StoreServ 9000 Drives

Description	SKU
HPE 3PAR SSDs	
HPE 3PAR 9000 920GB SAS SFF (2.5in) SSD with All-inclusive Single-system Software	R0P67A
HPE 3PAR 9000 1.92TB SAS SFF (2.5in) SSD with All-inclusive Single-system Software	Q1J36A
HPE 3PAR 9000 3.84TB SAS SFF (2.5in) SSD with All-inclusive Single-system Software	Q0F41A
HPE 3PAR 9000 7.68TB SAS SFF (2.5in) SSD with All-inclusive Single-system Software	Q0F42A
HPE 3PAR 9000 15.36TB SAS SFF (2.5in) SSD with All-inclusive Single-system Software	Q0F43A
HPE 3PAR FIPS Encrypted SSD	
HPE 3PAR 9000 1.92TB SAS SFF (2.5in) FIPS Encrypted SSD with All-inclusive Single-system Software	R3B77A
HPE 3PAR 9000 3.84TB SAS SFF (2.5in) FIPS Encrypted SSD with All-inclusive Single-system Software	Q0F44A
HPE 3PAR 9000 7.68TB SAS SFF (2.5in) FIPS Encrypted SSD with All-inclusive Single-system Software	Q0F45A
HPE 3PAR 9000 15.36TB SAS SFF (2.5in) FIPS Encrypted SSD with All-inclusive Single-system Software	Q0F46A
HPE 3PAR TAA Compliant FIPS Encrypted SSD	
HPE 3PAR 9000 1.92TB SAS FIPS Encrypted TAA-compliant SSD with All-inclusive Single-system Software	R7N97A
HPE 3PAR 9000 3.84TB SAS FIPS Encrypted TAA-compliant SSD with All-inclusive Single-system Software	R7N98A
HPE 3PAR 9000 7.68TB SAS FIPS Encrypted TAA-compliant SSD with All-inclusive Single-system Software	R7N99A

- The minimum recommended initial quantity is eight (8) SSDs per node pair.
- Minimum upgrade quantity is 4 drives per node pair or 2 drives per enclosure, whichever is larger. Best practice is to run Autonomic Rebalance (also known as tunesys) after adding the drives.
- Arrays configured with lower capacity SSD's (400GB – 920GB), may use 1.92TB SSD's for capacity additions. A minimum of 8 units are recommended. Please consult HPE 3PAR StoreServ 9000 Configuration Guide.
- RAID 6 is strongly recommended for all drive types, SSDs and HDDs (both Fast Class and Nearline).
- All drive enclosures must contain an even number of drives, with a minimum of two (see note below).
- A best practice is to add equal numbers of drives to all enclosures.
- With a four node configuration, the best practice is to attach the same number of drives to each node pair.
- Small Form Factor (SFF) drives must be loaded in pairs of identical drives, beginning with the leftmost slot, slot 0, and filling to the right, leaving no empty slots between drives.
- TAA compliance is established by procuring only the SSDs with Country of Origin listed in the TAA Designated Countries and establishing documentation for Country of Origin verification. https://gsa.federalschedules.com/resources/taa-designated-countries/

Notes: For Q0F43A, Q0F45A, and Q0F46A the minimum number of drives per drive enclosure is 2 with 3PAR OS 3.3.1 MU1, and operating temperature of 95°F/ 35°C. With earlier 3PAR OS versions these three drives require a minimum of 8 SSDs (of any capacity) per drive enclosure.

Configuration Information

HPE 3PAR Encryption License

Description	SKU
HPE 3PAR 9450 Data Encryption LTU	L7F18A
HPE 3PAR 9450 Data Encryption E-LTU	L7F18AAE

- An encrypted HPE 3PAR StoreServ array, i.e. any HPE 3PAR StoreServ array that has the HPE 3PAR Data Encryption license activated or intended to be activated, must have only self-encrypted drives installed.
- A non-encrypted HPE 3PAR StoreServ array can have a mix of encrypted and non-encrypted drives.
- Customers have option to turn on encryption, non-disruptively, at any time, even after data has been written to the system.
- FIPS 140-2 Validated Self-Encrypting Drives (SEDs) have been certified by the U.S. National Institute of Standards and Technology (NIST) and Canadian Communications Security Establishment (CSE) as meeting the Level 2 security requirements for cryptographic modules as defined in the Federal Information Processing Standards (FIPS) 140-2 Publication
- Strengthen the DAR solution with an optional FIPS 140-2 Level-2 validated external key manager. Supports KMIP 1.1 for key management communications
- Supports HPE Enterprise Secure Key Manager 4.0 and SafeNet KeySecure k460 and k150 centralized key management
- A data encryption license (LTU) is required to enable encryption on the array. One encryption license is required for each encrypted array.
- Once encryption is enabled on the HPE 3PAR StoreServ Storage, it cannot be disabled.
- The local key manager is included in the HPE 3PAR OS. There is not a separately orderable part number for the local key manager.

Step 7 - Choose Service Processor Implementation

The HPE 3PAR Service Processor remotely monitors the HPE 3PAR StoreServ 9000 and enables remote servicing of the array. The key capabilities of the Service Processor are to:

- Enable rapid, proactive responses to issues
- Provide a secure communication channel between the customer's data center and HPE 3PAR Central for:
  - Remote Online Software Upgrade --Upgrade software with no application disruption
  - Remote Diagnostics --Maintain key diagnostic information centrally on a historical basis
  - Remote Serviceability--Provide fast predictive response and remediation

Each HPE 3PAR StoreServ 9000 requires its own Service Processor. The Service Processor functions as the communication interface between a customer's IP network and HPE 3PAR Central by managing all service-related communications. The Service Processor leverages the industry-standard HTTP over Secure Sockets Layer (HTTPS) protocol to secure and encrypt data communication. The Service Processor can be deployed either as a virtual Service Processor (VSP) or a physical Service Processor.

Virtual Service Processor

A virtual Service Processor is included free with the base HPE 3PAR Operating System. The virtual Service Processor can be installed on a customer-provided VMware or Microsoft Hyper-V system that meets the following specifications:

- Virtualization operating system
  - VMware ESXi 5.5/6.0/6.5
  - Microsoft Hyper-V 2012/2012 R2/2016
- Server features
  - 2 GB RAM (minimum for the vSP Virtual Machine)
  - 256 GB free disk space (minimum for the vSP Virtual Machine)
    Notes: vSP storage must not reside on the array it is managing.
  - DVD ROM or DVD RW
  - 1 Gb Ethernet port
  - For vSP on VMware, the server must be listed in the VMware Compatibility Guide
  - For vSP on Hyper-V, the server must be listed on the Windows Server Catalog

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Configuration Information

Physical Service Processor

The physical Service Processor is a dedicated storage appliance located within the storage rack providing close proximity to the HPE 3PAR StoreServ 9000 Storage. The physical Service Processor is fully supported and maintained by HPE Services. The physical Service Processor has serial port connectivity that provides maintenance access for trouble shooting capabilities.

If a VMware server is not available to run the virtual Service Processor, the physical Service Processor is the alternative choice for remote monitoring and remote service.

Service Processor

Description	SKU
HPE 3PAR StoreServ RPS Service Processor	Q2S13A

HPE 3PAR Policy Server

HPE 3PAR Policy Server works to implement customer-configurable remote service access policies. Installed on a customer-provided host, Policy Server provides the customer with ultimate flexibility and control to allow or deny outbound communication or remote service connections to and from an HPE 3PAR StoreServ Storage system. Policy Server also serves as the centralized point for collecting and storing audit logs of all diagnostic data transfers and authorized remote service connections to and from all configured HPE 3PAR Storage systems. HPE 3PAR Policy Server provides the

- The customer has complete control over policy administration.
- A centralized policy administration for all HPE 3PAR Storage systems is provided.
- A centralized audit log to facilitate security audits is provided.
- Up to 100 3PAR systems can be managed with a single 3PAR Policy Server license
- Policy Server 6.1.5 can be run on a Virtual Machine. For the latest information on supported hypervisors, refer to Single Point of Connectivity Knowledge for HPE Storage Products (SPOCK): **http://www.hpe.com/storage/spock**

Step 8 - Choose Cables

Cables are required on the HPE 3PAR StoreServ 9000 Storage for drive enclosure connections and for host connectivity. Copper SAS cables are required for connecting the drive enclosures to the nodes on the base rack and for daisy chaining between adjacent drive enclosures. Active Optical SAS Cables are required for connecting drive enclosures in adjacent racks to the nodes in the base rack. OM4 Fiber Cables are required for host connectivity, Remote Copy, and Peer Motion.

Cables

SAS Cables for Drive Connectivity

HPE External 0.5m (1ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	691968-B21
HPE External 2.0m (6ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	716197-B21
HPE 10m Mini SAS High Density Active Optical Cable	E7V95A
HPE 25m Mini SAS High Density Active Optical Cable	E7V96A
HPE 100m Mini SAS High Density Active Optical Cable	E7V97A

OM4 Cables

HPE Premier Flex LC/LC Multi-mode OM4 2 Fiber 2m Cable	QK733A
HPE Premier Flex LC/LC Multi-mode OM4 2 Fiber 5m Cable	QK734A
HPE Premier Flex LC/LC Multi-mode OM4 2 Fiber 15m Cable	QK735A
HPE Premier Flex LC/LC Multi-mode OM4 2 Fiber 30m Cable	QK736A
HPE Premier Flex LC/LC Multi-mode OM4 2 Fiber 50m Cable	QK737A

Optical splitters

HPE Multi Fiber Push On to 4 x Lucent Connector 5m Cable	K2Q46A
HPE Multi Fiber Push On to 4 x Lucent Connector 15m Cable	K2Q47A

Configuration Information

Direct Attach Copper Cables

HPE FlexNetwork

Description	SKU
HPE FlexNetwork X240 10G SFP+ to SFP+ 1.2m Direct Attach Copper Cable	JD096C
HPE FlexNetwork X240 10G SFP+ to SFP+ 3m Direct Attach Copper Cable	JD097C
HPE FlexNetwork X240 10G SFP+ to SFP+ 5m Direct Attach Copper Cable	JG081C
HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 1m Direct Attach Copper Splitter Cable	JG329A
HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 3m Direct Attach Copper Splitter Cable	JG330A
HPE FlexNetwork X240 40G QSFP+ to 4x10G SFP+ 5m Direct Attach Copper Splitter Cable	JG331A
HPE ARUBA	
Aruba 10G SFP+ to SFP+ 1m Direct Attach Copper Cable	J9281D
Aruba 10G SFP+ to SFP+ 3m Direct Attach Copper Cable	J9283D
Aruba 10G SFP+ to SFP+ 7m Direct Attach Copper Cable	J9285D
Broadcom	
HPE B-series SFP+ to SFP+ Active Copper 5.0m Direct Attach Cable	AP820A
Cisco	
HPE C-series 3M Passive Copper SFP+ Cable	K2Q21A
HPE C-series 5M Passive Copper SFP+ Cable	K2Q22A
HPE C-series SFP+ to SFP+ Active Copper 7.0m Direct Attach Cable	QK701A
HPE C-series SFP+ to SFP+ Active Copper 10.0m Direct Attach Cable	QK702A
HPE BladeSystem	
HPE BladeSystem c-Class 10GbE SFP+ to SFP+ 3m Direct Attach Copper Cable	487655-B21
HPE BladeSystem c-Class 10GbE SFP+ to SFP+ 5m Direct Attach Copper Cable	537963-B21

DAC cables are supported for 10GbE speeds with iSCSI and File protocols.
Direct Connect between the host and storage is not supported with DAC cables, they require the use of a switch.
For the latest information refer to Single Point of Connectivity Knowledge for HPE Storage Products (SPOCK)

Step 9 - Choose Racking Options

The HPE 3PAR StoreServ 9000 Storage is available factory integrated in the HPE Intelligent Series racks with the appropriate power distribution units (PDUs). Alternatively, a third party rackmount kit can be purchased in cases where the HPE 3PAR StoreServ 9000 Storage needs to be installed on any rack other than the Hewlett Packard Enterprise racks mentioned below.

HPE 42U 600mmx1075mm G2 Kitted Advanced Shock Rack with Side Panels and Baying	P9K08A
HPE 42U 600mmx1200mm G2 Kitted Advanced Shock Rack with Side Panels and Baying	P9K10A
HPE 42U 600mmx1075mm G2 Enterprise Shock Rack	P9K38A
HPE G2 Rack 42U 1075mm Side Panel Kit	P9L15A
HPE 42U 600mmx1200mm G2 Enterprise Shock Rack	P9K40A
HPE G2 Rack 42U 1200mm Side Panel Kit	P9L16A
HPE 3PAR StoreServ Third Party Rack Mount Kit	C8S86A
HPE 600mm Rack Stabilizer Kit	BW932A

Configuration Information

- When installed in a 42U 1075mm rack (P9K08A, P9K38A) the array uses horizontal modular PDUs and can support up to 12 drive enclosures in the base rack.
- When installed in a 42U 1200mm rack (P9K10A, P9K40A) the array uses vertical PDUs and can support up to 16 drive enclosures in the base rack.

Expansion racks can support up to 20 drive enclosures.

Notes:

– The Third Party Rack Mount Kit is required for mounting the 3PAR StoreServ 9000 Node enclosure in third party racks. For mounting the drive enclosure, rail kits are included with the product.

– For 1200mm deep, factory-integrated racks, six power connections are required for US/Japan Single Phase PDUs. International single-phase and all three-phase power solutions require four power connections per rack.

For more information on the HPE rack offerings, please see the following URL:
https://www.hpe.com/us/en/products/integrated-systems/rack-power-cooling-infrastructure.html.

For more information on rack options, see: **http://www.hpe.com/products/rackoptions**.

PDUs

Description	SKU
HPE G2 Basic Modular 4.9kVA/L6-30P 24A/208V Outlets (6) IEC C19/1U Horizontal NA/JP PDU	P9Q39A
HPE G2 Basic 4.9kVA/L6-30P 24A/208V Outlets (20) C13/Vertical NA/JP PDU	P9Q41A
HPE G2 Basic Modular 7.3kVA/60309 3-wire 32A/230V Outlets (6) C19/1U Horizontal INTL PDU	P9Q43A
HPE G2 Basic 7.3kVA/60309 3-wire 32A/230V Outlets (20) C13/Vertical INTL PDU	P9Q45A
HPE G2 Basic Modular 3Ph 8.6kVA/L15-30P 24A/208V Outlets (6) C19/1U Horizontal NA/JP PDU	P9Q52A
HPE G2 Basic 3Ph 8.6kVA/L15-30P 24A/208V Outlets (18) C13/Vertical NA/JP PDU	P9Q54A
HPE G2 Basic Modular 3Ph 11kVA/60309 5-wire 16A/230V Outlets (6) C19/1U Horizontal INTL PDU	P9Q57A
HPE G2 Basic 3Ph 11kVA/60309 5-wire 16A/230V Outlets (36) C13 (6) C19/Vertical INTL PDU	P9Q58A

Notes: For more information on PDUs, see:
https://www.hpe.com/us/en/product-catalog/servers/power-distribution-units.html

Branding Kit

HPE 3PAR G2 Rack 42U Branding Kit	Q9D29A

Notes: The branding kit is an optional SKU available for G2 42U racks. It adds to the rack a storage specific branding consisting of a silver/green door panel and a yellow “Storage” element.

Step 10 - Choose Software

Hewlett Packard Enterprise provides an extensive selection of features for HPE 3PAR StoreServ Storage. The HPE 3PAR StoreServ 9000 includes as part of the array and drives the All-Inclusive Single-System Software which includes: OS Suite, Virtual Copy, Adaptive Optimization, Dynamic Optimization, Priority Optimization, Virtual Domains, Virtual Lock, Online Import, File Persona, Recovery Manager Central (RMC), and Smart SAN. Additional software can be purchased by ordering the All-inclusive Multi-system Software, a frame license that includes Peer Motion, Remote Copy, Peer Persistence, and Cluster Extension. The Data-at-Rest Encryption Software completes the portfolio of software available with HPE 3PAR StoreServ Storage.
For more information regarding HPE 3PAR 9000 software SKUs see:
http://h20195.www2.hpe.com/v2/GetPDF.aspx/c04199812.pdf

For more information about HPE 3PAR, please visit the Standard Features section.

Configuration Information

HPE Primera 600 Upgrade Conversion Kits*

Use HPE Primera 600 Upgrade Conversion kits to upgrade qualifying HPE 3PAR StoreServ 9000 systems to HPE Primera. Protect up to 100%* of existing SSD investment and upgrade to HPE Primera A670 or HPE Primera A670 1T without requiring a data migration. Systems deployed using HPE 3PAR Multi-system software including: HPE Remote Copy and HPE 3PAR Peer Persistence may upgrade from qualifying HPE 3PAR StoreServ 9000 to HPE Primera without requiring application downtime.

Notes: *Contact your HPE account representative for more information.

Step 1: Choose an Upgrade Base and Upgrade Conversion Kits

HPE Primera Upgrade Conversion Kit configuration starts with the selection of the Upgrade Storage Base and Upgrade Conversion Kits. The Upgrade Storage Base includes the chassis and bays for small form factor drives, and it does not include any controller node or Power Supplies.

Description	SKU
Upgrade Base	
HPE Primera 600 4-way Upgrade Storage Base	R7E50A

- One (1) Upgrade Storage Configuration Base SKU must be ordered for each array.
- The 4-way Storage Configuration Base can host 2 or 4 controller nodes and up to 48 small form factor drives in 4U. All 48 drive slots are SAS, the 16 rightmost slots are dual personality SAS/NVMe.
- All required HPE Primera software is included with the HPE Primera 600 Upgrade Storage Base

Upgrade Conversion Kit	
HPE Primera A670 2-node Upgrade Conversion Kit	R6R04A
HPE Primera A670 4-node Upgrade Conversion Kit	R6R05A
HPE Primera A670 1TB 2-node Upgrade Conversion Kit	R6R06A
HPE Primera A670 1TB 4-node Upgrade Conversion Kit	R6R07A

- Only one Upgrade Conversion Kit SKU can be ordered per array. Each Conversion Kit SKU includes either two (2) nodes or four (4) nodes, two (2) or four (4) Power Supplies with Fan and Batteries, and Locking Power Cords.
- 2N HPE 3PAR StoreServ 9000 systems can only be upgraded with 2-node Upgrade Conversion Kits. 4N HPE 3PAR StoreServ 9000 systems can only be upgraded with 4-node Upgrade Conversion Kits. To upgrade a 2N HPE 3PAR StoreServ to a 4N HPE Primera, the node expansion must be performed following the controller upgrade to HPE Primera.
- Following a controller conversion, a converted HPE Primera can only be expanded with HPE Primera qualified adapters, SSD and drive enclosures.
- Each Node has two (2) built-in 10 Gigabit Ethernet ports for Remote Copy over IP, one (1) management port, one (1) service port and four (4) SAS ports.
- Each Node contains three (3) PCIe slots for adapters

Step 2: Choose Adapters

HPE Primera 600 host adapters must be configured for connection to hosts. They can be ordered standalone to be installed in the field or they can be factory integrated into controller nodes. HPE Primera arrays don't have any built-in host ports therefore any configuration needs to have at least one host adapter per node. Only HPE 3PAR StoreServ 9000 with 48 FC host ports or fewer may be eligible for upgrade to HPE Primera. ISCSI connected hosts are not currently supported for upgrade.

HPE Primera Host Adapters	
HPE Primera 600 16Gb 4-port Fibre Channel Host Bus Adapter	N9Z38A
HPE Primera 600 32Gb 4-port Fibre Channel Host Bus Adapter	N9Z39A

- Each node must have at least one host adapter. A node without any host adapters is not a supported configuration.
- Each node in a node pair (node 0/1 or node 2/3) must be configured with the same adapters.
- The best practice is to have all the nodes configured with the same adapters. However, in a 4-node system, nodes in different node pairs can have different adapters.
- The 16Gb Fibre Channel Adapter includes four- 16Gb shortwave FC SFP+ and does not support 32Gb SFP+.
- The 32Gb Fibre Channel Adapter includes four-32Gb shortwave FC SFP+ and does not support 16Gb SFP+
- Each node must have at least one host adapter. A node without any host adapters is not a supported configuration.

Configuration Information

HPE Primera SAS Adapters

Description	SKU
HPE Primera 600 12Gb SAS 4-port Host Bus Adapter	N9Z41A

- The HPE Primera SAS adapter is an optional adapter that provides additional SAS ports for drive enclosure connectivity.
- An array with SAS adapters must have one SAS adapter per node.

Notes:

- Prior to initiating conversion kit upgrade, the HPE 3PAR StoreServ must meet HPE Primera configuration attributes (RAID 6 with set size 12 or lower, and with one of the two volume types that are supported on HPE Primera: Thinly provisioned, or thinly provisioned plus deduped and compressed)
- Refer to SPOCK for the most current list of qualified OS for Conversion Kit upgrade and HPE Primera 600 support matrix
- HPE Primera 600 Upgrade Conversion Kits require HPE 3PAR OS 3.3.2 to be installed on the HPE 3PAR StoreServ 9000
- The raw capacity of the HPE 3PAR StoreServ 20000 cannot exceed supported HPE Primera raw capacity limits
- Following a conversion kit upgrade, a converted system can only be upgraded with HPE Primera qualified adapters, SSD, and enclosures.
- Node or capacity expansion must be completed following a conversion kit upgrade.
- HPE Pointnext offers custom services to pre-enable HPE 3PAR StoreServ for HPE Primera conversion kit upgrade*.
- *Contact your HPE account representative for more information.

Technical Specifications

System Architecture				
Physical Dimensions	**Width in/cm**	**Depth in/cm**	**Height in/cm/U**	**Weight lb/kg**
42U 1075mm Intelligent Series Rack	23.54/59.79	44.3/112.52	79/200.66	451/205
42U 1200mm Intelligent Series Rack	23.54/59.79	51.19/130.02	79/200.66	531/241
HPE 3PAR 9450 2N Storage Base (2 controller nodes, 2 SAS HBAs)	17.3/44	32.1/81.6	13.88/35.25/8	189.4/86
HPE 3PAR 9450 Controller Node (2 SAS HBAs)	12.7/32.2	27.2/69.1	3.2/8.2/8	48.15/21.8
HPE 3PAR 9000 2U SFF SAS Drive Enclosure (without drives)	17.6/44.8	24.7/62.7	3.5/8.8/2	38/17.3
Service Processor	17.1/43.46	23.9/60.76	1.7/4.29/1	33/15
Supported Host FC Connections				
FC Connector Type from Storage System to Host Port	LC to LC			
FC Cable Core Diameter	OM4			
Connector Boot Length	Standard			

Power and Heat	
Single Phase Power Supply Requirements (per rack or cabinet)	
NEMA (North America, Taiwan, Philippines & Japan)	
Input Voltage (VAC)	220 (200 - 240)
Frequency (Hz)	50 - 60
Circuit Breaker Maximum	30 A per PDU (de-rated to 24 A)
Power Plugs	(4) L6-30P with 1+1 redundant (Base and Exp racks)
Power Connectors	(4) L6-30C with 1+1 redundant (Base and Exp racks)
Power Receptacles	(4) L6-30R with 1+1 redundant (Base and Exp racks)
IEC (International)	
Input Voltage (VAC)	220 (200 - 240)
Frequency (Hz)	50 - 60
Circuit Breaker Maximum	32 A per PDU
Power Plugs	(4) IEC 60309-332P6 (32A) with 1+1 redundant (Base and Exp racks)
Power Connectors	(4) IEC 60309-332C6 (32A) with 1+1 redundant (Base and Exp racks)
Power Receptacles	(4) IEC 60309-332R6 (32A) with 1+1 redundant (Base and Exp racks)

Technical Specifications

Three Phase Power Supply Requirements (per rack or cabinet)	
NEMA (North America, Taiwan, Philippines & Japan)	
Input Voltage (VAC)	200 - 240 p-p
Frequency (Hz)	50 - 60
Circuit Breaker Maximum	48 A per PDU (de-rated to 27.71 A per phase)
Power Plugs	(4) L15-30P with 1+1 redundant (Base and Exp racks)
Power Connectors	(4) L15-30C with 1+1 redundant (Base and Exp racks)
Power Receptacles	(4) L15-30R with 1+1 redundant (Base and Exp racks)
IEC (International)	
Input Voltage (VAC)	200 - 240 p-n; 380 - 415p-p
Frequency (Hz)	50 - 60
Circuit Breaker Maximum	16A per phase per PDU (Base and Exp racks)
Power Plugs	(2) IEC 60309-516P6W (16A) with 1+1 redundant (Base and Exp racks)
Power Connectors	(2) IEC 60309-516C6W (16A) with 1+1 redundant (Base and Exp racks)
Power Receptacles	(2) IEC 60309-516R6W (16A) with 1+1 redundant (Base and Exp racks)
Refer to the HPE Power Advisor online tool for power consumption, heat loading, and circuit sizing information available at **https://poweradvisorext.it.hpe.com/?Page=Index**	

Environmental Specifications	
Operating Temperature	41° to 95° F (5° to 35° C) – Reduce rating by 1° F for each 1000 ft (1.8° C/1,000 m)
Shipping Temperature (Controller Node)	-22° to 140° F (-30° to 60° C). Maximum rate of change is 20° C/hr (36° F/hr)
Shipping Temperature (Drive Enclosure)	32° to 140° F (0° to 60° C). Maximum rate of change is 20° C/hr (36° F/hr)
Operating Altitude (ft/m) max.	10,000 ft / 3,048 m
Shipping Altitude (ft/m) max.	40,000 ft / 12,192 m
Humidity	10% to 90% non-condensing
Shipping Humidity	10% to 90% non-condensing
Operating Vibration	0.25G, Sine, 5-500 Hz; 0.25 GRMS, Random 5-500 Hz
Non-operating Vibration	0.5G, 5 - 500 Hz, Sine; 0.5 GRMS, Random, 5-500Hz
Operating Shock (Controller Node)	5G, 11ms, half-sine
Operating Shock (Drive Enclosure)	5G, 11ms, half-sine
Non-operating Shock	10G, 11ms, half-sine
Raised Floor	Recommended
Maximum Exhaust Air Flow	Per Controller Node – 157 CFM Per Drive Enclosure – 81 CFM

Acoustics Sound pressure level			
Measured per ISO 7779 specifications during normal operating fan conditions			
Fan Speed (RPM)	**4-way Node**	**Fan Speed (RPM)**	**Drive Enclosure**
5600	76.7	5580	43
8500	87.1	16500	64

Technical Specifications

Electromagnetic Compatibility

- CISPR 22:2008/ EN55022:2010 Class A
- CISPR 32 Edition 2.0/EN55032:2010 Class A
- CISPR 24:2010/ EN 55024:2010
- IEC 61000-3-2: 2014/ EN 61000-3-2: 2014
- IEC 61000-3-3:2013/ EN 61000-3-3: 2013
- AS/NZS CISPR22: 2009 +A1:2010 Class A
- AS/NZS CISPR 32:2013
- CNS 13438:2006 Class A
- 47 CFR Part 15 Subpart b Class A
- ICES-003 Issue 6 Class A
- V-3/2015.04
- RRA Public Notification 2015-27, Dec 3, 2015

Safety

- IEC 60950-1:2005 (2nd Edition); +A1:2009 +A2:2013
- EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011 +A2:2013
- IEC 62368-1:2014 2nd Edition
- EN 62368-1:2014 2nd Edition
- EN 62479:2010
- CNS 14336-1 2nd Edition
- UL 60950-1-07 2nd Ed. +A1:2011 +A2:2014
- UL 62368-1
- CAN/CSA C22.2 No. 60950-1-07 +A1:2011 +A2:2014

Certifications / Markings

- cTUVus Mark
- TUV GS-mark
- EnergyStar
- CE Mark
- FCC Class A
- IC Class A
- VCCI Class A
- BSMI Class A
- BSMI RoHS
- BIS
- KCC
- EAC
- RCM
- Ukraine
- WEEE
- China RoHS
- Morocco
- Nordic text

Notes: Specifications are subject to change without notice.

Summary of Changes

Date	Version History	Action	Description of Change
22-Aug-2022	Version 27	Changed	Broken URLs were fixed
01-Nov-2021	Version 26	Changed	Service and Support section was updated.
04-Oct-2021	Version 25	Changed	920GB SSD removed, configuration information added
07-Jun-2021	Version 24	Changed	Configuration Information section was updated.
04-May-2021	Version 23	Changed	Overview, Service and Support and Configuration Information sections were updated.
06-April-2021	Version 22	Changed	Overview and Configuration Information sections were updated.
03-Aug-2020	Version 21	Changed	QuickSpecs layout was updated and Branding Refresh was applied.
01-Jun-2020	Version 20	Changed	Service and Support and Configuration Information sections were updated
15-Jul-2019	Version 19	Added	Configuration Information section was updated.
10-Jun-2019	Version 18	Changed	Add warranty information for HPE 3PAR NVMe SCM Module Appendix section was renamed to Technical Specifications
04-Feb-2019	Version 17	Changed	Configuration Information section was updated
07-Jan-2019	Version 16	Changed	Overview and Configuration Information sections were updated
26-Nov-2018	Version 15	Changed	Overview, Service and Support and Configuration Information sections were updated. Added SCM Module, 32GB FC HBA. 400GB SSD replaced by 920GB SSD
01-Oct-2018	Version 14	Changed	Updated Information links. Updated Service Processors
02-Jul-2018	Version 13	Changed	Configuration Info updated; Virtualization OS info format update; Update DAC Cable List;
11-Jun-2018	Version 12	Changed	SKU number for the HPE 3PAR G2 Rack 42U Branding Kit was updated.
04-Jun-2018	Version 11	Added	New HPE 3PAR G2 42U Branding Kit was added.
07-May-2018	Version 10	Added	New Service Processor SKU was added.
02-Apr-2018	Version 9	Changed	SKU descriptions were updated.
05-Mar-2018	Version 8	Removed	What is New section was removed.
05-Feb-2018	Version 7	Added	Added Operating Temp for FIPS Encrypted SSDs.
05-Feb-2018	Version 7	Changed	Customer Self Installation (CSI) content was revised; updated Racks options; updated Virtualization OS.
08-Jan-2018	Version 6	Removed	Removed SFP+ 7m DAC Cable; updated Racks & PDU Lists; Correct SAS Cable Verbiage for Step 6.
06-Nov-2017	Version 5	Changed	Updated operating temperature and added note on min number of drives per enclosure.
25-Sep-2017	Version 4	Changed	Updated 256 TiB per node pair capacity for File Persona Added G2 Enterprise Racks.
07-Aug-2017	Version 3	Added	Added Upgrade Drive Enclosure SKU (Q2R36A).
11-Jul-2017	Version 2	Changed	Fixed typos.
05-Jun-2017	Version 1	New	New QuickSpecs.

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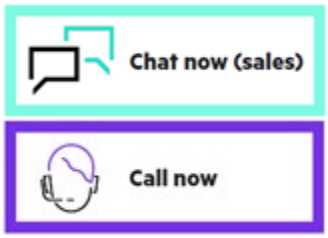

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