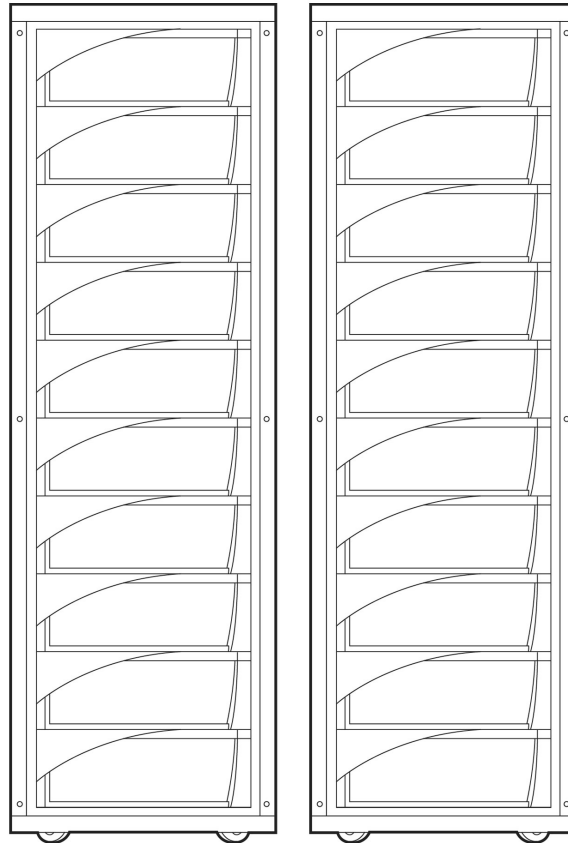## Overview

With the introduction of the HP 3PAR® T400 and T800 Storage Systems, HP 3PAR Utility Storage is the first storage platform to incorporate thin capabilities into array hardware. The HP 3PAR Gen3 ASIC in each Controller Node provides a hyper-efficient, silicon-based engine that drives simple, on-the-fly storage optimizations to maximize capacity utilization while delivering high service levels for enterprise and cloud data centers.

HP 3PAR T-Class Storage Systems

Overview

Summary	T400	T800
Number of Controller Nodes	2 or 4	2, 4, 6, or 8
Management Processors	4 - 8 Dual-Core 2.33 GHz	4 - 16 Dual-Core 2.33 GHz
Control Cache	8 - 16 GB	8 - 32 GB
Data Cache	24 - 48 GB	24 - 96 GB
Maximum Host Ports[1]	64 ports	128 ports
Fibre Channel Host Ports[2]	0 - 64 ports	0 - 128 ports
iSCSI Host Ports[3]	0 - 16 ports	0 - 32 ports
Number of Drives	16[4] - 640 drives	16[4] - 1,280 drives
Raw Capacity (approx.)[5]	4.84 - 400 TB[6]	4.84 - 800 TB[6]

Capacity Details		
RAID Levels	RAID 0, 1, 5, MP[7]	RAID 0, 1, 5, MP[7]
RAID 5 Data to Parity Ratios	2:1 - 8:1	2:1 - 8:1
RAID 6 Data to Parity Ratios	6:2, 14:2	6:2, 14:2
Drive Capacities (approximate GB[6]) (RAID levels, parity ratios, and drive capacities all mixable within the same Storage System)	50 SSD[8], 100 SSD[8], 200 SSD[8], 300 FC, 600 FC, 300 SAS[9], 450 SAS[9], 900 SAS[9], 2000 SAS[9], 1000 NL[10], 2000 NL[11]	50 SSD[8], 100 SSD[8], 200 SSD[8], 300 FC, 600 FC, 300 SAS[9], 450 SAS[9], 900 SAS[9], 2000 SAS[9], 1000 NL[10], 2000 NL[10]
Number of Drive Chassis (Each Drive Chassis holds up to 40 drives in 4U)	2[11] - 16 chassis	2[11] - 32 chassis

NOTE: Support for SAS drives on HP 3PAR T-Class Storage is currently available with HP 3PAR OS version 3.1.2 only. SAS Drives are not compatible with the back revision (currently 3.1.1 MU2) of HP 3PAR OS Software (Option 001)

[1] Fibre Channel and iSCSI host ports are mixable on same HP 3PAR Storage System
[2] Each port is full bandwidth 4 Gbit/s Fibre Channel capable
[3] Each port is full bandwidth 1 Gbit/s iSCSI with complete iSCSI and TCP/IP offload
[4] Recommended minimum is 32 drives which results in a 9.6 TB minimum raw capacity.
[5] Maximum raw capacity currently supported with any and all drive types
[6] For storage capacity, 1 GB = 1,024,000,000 bytes and 1 TB = 1,000 GB
[7] RAID MP is HP 3PAR Fast RAID 6 Technology
[8] SSDs are Solid State Drives
[9] SAS drives are Serial Access SCSI Drives
[10] NL drives are Nearline (Enterprise SATA) disks
[11] Recommended minimum is 4 drive chassis per pair of controller nodes
NOTE: Specifications are subject to change without notice.

Overview

**Host OS Support**

Citrix® XenServer® | HP-UX® | IBM® AIX®

Microsoft® Windows® Server, including Microsoft® Hyper-V™

Oracle® Linux® (UEK and RHEL compatible kernels) | Oracle® Solaris

Red Hat® Enterprise Linux® | Red Hat® Enterprise Virtualization

SUSE® Linux® Enterprise | VMware vSphere™

For latest information on supported operating systems refer to Single Point of Connectivity Knowledge for HP Storage Products (SPOCK): http://www.hp.com/storage/spock
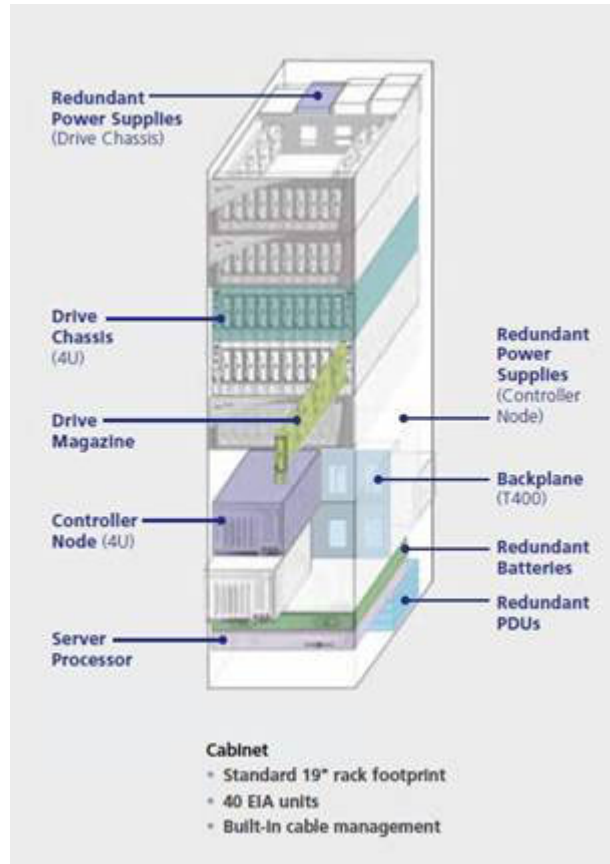
Features

Get Thin and Stay Thin	The revolutionary, zero-detect capable HP 3PAR Gen3 ASIC is a hyper-efficient storage optimization engine designed to power "fat-to-thin" volume conversions in silicon while preserving superior performance levels. Fat-to-thin volume conversions boost capacity utilization by removing allocated but unused space from traditional, "fat" storage volumes. With the HP 3PAR Gen3 ASIC's built-in, hardware-based zero-detection capabilities, migration of "fat" volumes from other storage platforms to new "thin" volumes on an HP 3PAR Storage System is achieved with the greatest speed possible and without the application disruption of software-based implementations. With fat-to-thin volume conversions taking place at the hardware level, more parallel memory transactions are possible and system performance is not impacted like it is with software-based approaches to volume optimization. Thin Built In capabilities within the T-Class also power the ongoing, automated optimization of thin provisioned volumes on HP 3PAR Storage Systems, so thin volumes stay thin.
Building Block for Cloud Computing	Building a converged infrastructure to support cloud and self-service computing models requires a high degree of virtualization that places new demands on storage. With their distinct architectural advantages, thin hardware capabilities, and superior performance, HP 3PAR T-Class Storage Systems are purpose-built to meet the demands of highly virtualized environments. HP 3PAR T-Class Storage Systems give enterprises and service providers the agility to respond quickly to changing business needs while maintaining the resiliency that "always-on" businesses demand.

Software

Start Thin. HP 3PAR Thin Provisioning Software	HP 3PAR Thin Provisioning Software improves storage system efficiency and optimizes capacity utilization system-wide. It does this by addressing the problem of capacity overallocation through eliminating the need to dedicate storage capacity on a per-application basis. Since its introduction, HP 3PAR Thin Provisioning Software has given HP 3PAR Utility Storage clients the ability to meet Green IT targets and reduce capacity purchases. Thin Provisioning makes this possible by cutting SAN costs, floor space requirements, and energy expenses by up to 75% and decreasing administration time by up to 90%. It does this by allowing organizations to purchase only the disk capacity they actually need, only as they actually need it through eliminating the need for up-front capacity allocation and dedicating resources to individual applications. This prevents clients from paying to power, house, and cool disks that they may not need for months or years to come, or may never actually need.
Get Thin. HP 3PAR Thin Conversion Software	With HP 3PAR Thin Conversion Software, a technology refresh no longer requires a terabyte-for-terabyte replacement, but instead offers the opportunity to eliminate 70-80% of the legacy capacity in a client's storage environment, simply and rapidly. The zero-detection capability built into the HP 3PAR Gen3 ASIC, combined with HP 3PAR Thin Conversion Software, can effectively and rapidly "thin" a heterogeneous data center to one-quarter of its original size or less while preserving service levels, and without impacting production workloads. This solution not only makes a technology refresh more affordable, but it reduces up-front capital costs as well as ongoing operational and environmental costs associated with powering, cooling, and housing storage equipment. It also provides space and power consumption relief for data centers approaching maximum density.

In an ideal world, all storage volumes would start thin using HP 3PAR Thin Provisioning Software. But in some cases, starting thin has not been an option, particularly when it comes to data stored on legacy arrays from traditional storage vendors. HP 3PAR Thin Conversion Software uses a virtualization mapping engine for space reclamation called the HP 3PAR Thin Engine, together with the unique hardware capabilities of the HP 3PAR Gen3 ASIC to extend the benefits of thin provisioning to existing storage volumes. In tandem with the HP 3PAR Gen3 ASIC, Thin Conversion enables inline, wire speed "fat-to-thin" conversions compatible with any host volume. HP 3PAR Utility Storage is the only storage platform to offer this built-in, hardware-accelerated, fat-to-thin conversion capability. With HP 3PAR Thin Conversion Software, clients can rapidly and non-disruptively shrink storage footprint, reduce storage TCO, and meet Green IT targets. |
| **Stay Thin. HP 3PAR Thin Persistence Software and Thin Copy Reclamation** | To realize the ultimate efficiency and cost-saving benefits of starting thin or getting thin, storage also needs to stay thin. An industry first, HP 3PAR Thin Persistence Software ensures that thin volumes on the array stay as lean and efficient as possible. Thin Persistence Software accomplishes this by using the HP 3PAR Thin Engine with the system's built-in zero-detect capability to reclaim unused space associated with deleted data. With Thin Persistence, space reclamation on HP 3PAR arrays takes place simply, quickly, and without disruption to production workloads.

Thin Copy Reclamation is an HP 3PAR Operating System Software feature that performs a similar function to HP 3PAR Thin Persistence Software, but uses the HP 3PAR Thin Engine to reclaim unused space from thin copies (virtual copy snapshots and remote copies) rather than thin volumes.

On average, HP 3PAR Utility Storage clients already purchase 60% less capacity than with traditional storage arrays. With HP 3PAR Thin Persistence and Thin Copy Reclamation, customers can improve this average capacity savings by another 10% for a total savings of up to 70%. Volumes and snapshots can now stay thin to help sustain Green IT targets, defer the cost of purchasing raw capacity to handle new data growth, and keep costs down without the need to purchase special host-based software or retaining professional services. |
| **HP Storage Management Pack for Microsoft** | The HP Management Pack for Systems Center Operations Manager provides seamless integration with Microsoft Systems Center Operations Manager and now System Center Essentials by integrating |

Software

System Center

predefined discovery and state monitoring policies, event processing rules and tasks, and diagram and topology views for the storage system.

For more information:
lhttp://h18000.www1.hp.com/products/quickspecs/14249_div/14249_div.html

HP Storage Management Pack can be downloaded free from the following website:
https://h20392.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=SCOM

Service and Support, HP Care Pack, and Warranty Information

Warranty	3 Year, On-site Warranty Service. 7x24 4-hour remote response with next business day on-site response
	HP 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 HP's Global Limited Warranty and Technical Support, visit http://www.hp.com/products/storageworks/warranty

Services

HP Care Pack Services: Packaged server and storage services for increased uptime, productivity and ROI
When you buy HP server and storage products and solutions, it's also a good time to think about what levels of support you may need. Our portfolio of service options reduce deployment and management worries while helping you get the most out of your server and storage investments. We take a holistic approach to your environment, bridging servers, blades, storage, software and network infrastructures with our packaged HP Care Pack Services for servers and storage.

Protect your business beyond warranty
When it comes to robustness and reliability, standard computing equipment warranties have matured along with technology. Good news that can also create problems stemming from depending on standard warranties designed to only protect against product defects and some downtime causes. Using a standard approach to warranty uplifts, such as HP Care Pack Services, helps reduce downtime risks and provides operational consistency for mission-critical and standard business computing.

HP Care Pack Services: Upgrading or extending standard server and storage warranties cost effectively
HP Care Pack Services offer a standard reactive hardware and software support services suite sold separately, or combined with our Foundation Care 24x7 services. The portfolio also provides a combination of integrated proactive and reactive services, such as Proactive 24 Service and Critical Service. In addition with HP Proactive Select, you can acquire the specific proactive constancy and technical services. HP Proactive Select menu offers a broad set of service options that you can mix and match depending on your specific requirements. Proactive service options include offers for server, storage, network, SAN device, software, environment and education services.

HP server and storage lifecycle support services offers a full spectrum of customer care-from technology support to complex migrations to complete managed services. HP Factory Express provides customization, integration and deployment services for turnkey solutions. HP Education Services offer flexible, comprehensive training on to help your IT staff get the most out of your server and storage investments. HP Financial solutions extend innovative financing and cost-effective asset management programs-from purchase to equipment retirement.
Learn more: www.hp.com/services/servers and www.hp.com/services/storage

NOTE: Care Pack Services availability may vary by product and country.

HP Care Pack Services are sold by HP and HP Authorized Service Partners:

● Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools.
● Customers purchasing from a commercial reseller can find HP Care Pack Services at http://www.hp.com/go/lookuptool

Recommended HP Care Pack Services for optimal satisfaction with your HP product.

3-Year HP Support Plus 24
For a higher return on your server and storage investment, HP Support Plus 24 provides integrated hardware and software support services designed specifically for your technology. Available 24x7, this 3-year combined reactive support option delivers onsite

Service and Support, HP Care Pack, and Warranty Information

hardware support and over-the-phone software support around-the-clock. Leverage the full strength of HP Technology Services - customers can trust the services professionals at HP to work collaboratively with them, putting our strategic and technical know-how to work across their entire infrastructure.

- Improve uptime with responsive hardware and software services
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP software at a predictable cost
- Increase customer satisfaction-with no interoperability gaps

http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EEE

HP 3PAR Storage System Installation and Startup Service

For smooth startup, this service provides you with deployment of the HP 3PAR Storage System, ensuring proper installation into your storage environment and helping you realize the maximum benefit from your storage investment.

- Allows your IT resources to stay focused on their core tasks and priorities
- Reduces implementation time, impact and risk to your storage environment
- Helps ensure a successful implementation by providing HP installation planning and coordination
- Helps you more effectively utilize HP product by knowledge gained from service specialist during onsite delivery of the service

http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA2-8240ENW.pdf

Optional HP Care Pack Services that will enhance your HP product experience.

HP Storage Data Migration Service

For customers who need to safely transport mission critical data with minimal impact to their operations:
You need to move your critical enterprise data to your new HP SAN platform. And you need to accomplish that without losing data and without interrupting your ongoing business operations.

HP Storage Data Migration Service helps you minimize the risk of data loss, threats to data integrity, and avoid productivity-sapping performance slowdowns during data transport. A highly experienced HP Services storage specialist works with you to rapidly and securely migrate mission-critical business information across your data center or around the globe - regardless of the complexity of your environment.
http://h20195.www2.hp.com/V2/GetDocument.aspx?docname=5982-4107EN&cc=us&lc=en

eSupport	HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal
The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support

Service and Support, HP Care Pack, and Warranty Information

portal, visit https://support.3pardata.com/OA_HTML/jtflogin.jsp

The HP remote monitoring and support solution for the HP 3PAR Storage System provides 24x7 remote monitoring for hardware failure and other potential issues using secure technology that's been proven at thousands of companies around the world. In many cases, you can avoid problems before they occur, allowing you can spend less time solving problems and more time focused on your business. Our Secure Service Architecture leverages industry standard HTTP over Secure Socket Layer (HTTPS) for all external communication, ensuring secure and encrypted data transmission. The Secure Service Architecture delivers the three A's - Authentication, Authorization, and Audit Logging - that form the hallmark of secure communication.

Customer Technical Training	HP Education Services In today's cost-conscious business environment, IT professionals, developers, consultants and users face an interesting challenge: how to keep up with the latest technologies and expand important skills while delivering profitable results on current projects. To help address this challenge, HP offers innovative training solutions that help keep you up-to-date on virtualization, server, storage, Insight Control, Citrix, Microsoft® and open source/Linux-related topics-while spending less time away from business-critical activities.
HP Services Awards	HP Technology Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and award reflect our services team's dedications, technical expertise, professionalism and uncompromising commitment to customer satisfaction.
Additional Services Information	To learn more on HP ProLiant servers, HP BladeSystem servers and HP storage products, please contact your HP sales representative or HP Authorized Channel Partner. Or visit www.hp.com/services/proliant or www.hp.com/services/bladesystem or http://www.hp.com/services/storage

Configuration

Step 1 - Choose a Base Configuration

NOTE: The base configuration does not include control cache, data cache, adapters, drive chassis, or drives. Each of these must be ordered separately.

HP 3PAR T-Class Storage System	HP 3PAR T400 Configuration Base	QL221B
	HP 3PAR T800 Configuration Base	QL222B
	HP 3PAR Service Processor	QL340B

Configuration Rules: Base Configuration	- Must order one (1) T-Class Configuration Base - Includes two Controller Nodes, one 2-meter Cabinet - Service Processor - Must order one per HP 3PAR Storage System **NOTE:** For customers that require the previous version of the HP 3PAR OS (one revision back from the current revision) in their configuration the #001 option must be used. QL221B #001 or QL222B #001 must be added to the Watson configuration. **NOTE:** The base configuration does not include control cache, data cache, adapters (outside of the embedded ports), drive chassis, or drives. Each of these must be ordered separately.

Step 2 - Choose a Controller Node configuration
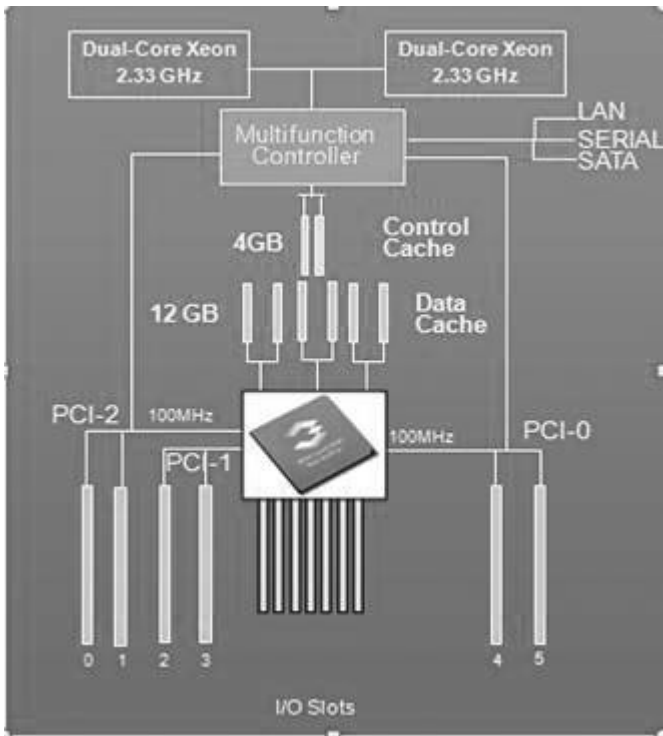
HP 3PAR T-Class Controller Node

Cache per node

- Control Cache: 4 GB (2 x 2-GB DIMMs)
- Data Cache: 12 GB (6 x 2-GB DIMMs)

I/O per node

- 3 PCI-X buses / 6 PCI-X slots
- Two disk-facing FC adapters
- Preferred slot usage (in order)
  - Slots 0, 2 and 4 for disk-facing FC adapters
  - Slots 5, 3, 1 and 4 for host-facing FC adapters
  - Slots 4 and 3 for Remote Copy over FC adapters
  - Slots 3, 1,and 4 for iSCSI adapters
- Max host-facing adapters
  - Up to 4 if direct-connect only
  - Up to 3 if mixed/SAN connect
- Built-in Gigabit Ethernet (GbE) for management
- Built-in Gigabit Ethernet (GbE)for Remote Copy over IP

Configuration

HP 3PAR Controller Nodes	HP 3PAR 2.33-GHz T-Class Controller Node	QL223C
	HP 3PAR Upgrade 2.33-GHz T-Class Controller Node	QL310C

Configuration Rules: Controller Nodes

- 2 controller nodes are included in the base configuration
- 2 or 4 are supported on T400
- 2, 4, 6, or 8 are supported on T800
- Nodes are arranged in pairs, starting with the highest-numbered backplane slots, where one node is the backup node for the other. The HP 3PAR Storage System is an Active/Active array where the same volume can be exported from all nodes.
- Valid Pairings
  - 0 and 1
  - 2 and 3
  - 4 and 5 (T800 only)
  - 6 and 7 (T800 only)
- Invalid Pairings
  - 2 and 1
  - 0 and 3
- 6 PCI-X slots per Controller Node (max 24 slots) to be used for host (FC or iSCSI), disk, or Remote Copy over FC
- Service Processor: Must order one per HP 3PAR Storage System
- Built-in Gigabit Ethernet port for Remote Copy over IP
- Max 4 host-facing adapters (any combination of FC and iSCSI) if direct connect only
- Max 3 host-facing adapters (any combination of FC and iSCSI) if SAN connect or mixed direct/SAN connect

Configuration Rules: Adding New Node Pairs

All values listed compare newly added node pair values compared to the largest existing node pair. Applies to systems with mixed drives (SSD/FC/NL) on node pairs[1].

Raw Capacity (per drive type, SSD[2]/FC[3]/NL)
- HP 3PAR OS 2.3.1 and later: Meets minimum node pair requirements[4]
- HP 3PAR OS 2.2.4: 33%

Disk Drive Count (per drive type, SSD[2]/FC[3]/NL)
- HP 3PAR OS 2.3.1 and later: Meets minimum node pair requirements[4]
- HP 3PAR OS 2.2.4: 33%

Disk Drive Cage Count
- 2 per node pair (minimum)

Total Disk Drive Cage Bandwidth
- 50%

Capacity with...
- Drive Chassis (40-disk, 4 Gb/sec) (aka "MBOD", "DC4")

Minimum chassis per node pair
- 2 (4 recommended)

Minimum chassis per node pair for RAID 5 with cage-level availability
- 3

Minimum chassis per node pair for RAID MP with cage-level availability
- 4

Daisy chaining allowed (one cage chained to another)?
- No

NOTES:

1. If each node pair exclusively has one drive type (all FC, or all NL), the drive type separation (FC vs.

Configuration

NL) ratios do not apply; you only need to reach the overall minimums for raw capacity and disk drive count for the applicable drive type. Example: Node Pair 1 has SSD, FC, and NL drives. You can add Node Pair 2 with FC drives only so long as you meet the FC raw capacity and drive count minimums.

2. SSD is available on HP 3PAR OS 2.3.1 MU1 or later
3. FC includes both 10K- and 15K-RPM FC drives
4. Non-SSD configuration: 4 magazines (16 drives) of a single drive type (FC,NL)
   SSD configuration: 2 magazines (8 drives) of SSD and 4 magazines (16 drives) of another type (16 FC drives, or 16 NL drives; 8 FC drives and 8 NL drives is NOT acceptable)

HP 3PAR Cache	HP 3PAR 4 GB (2 x 2-GB DIMMs) Control Cache	QL224B
	HP 3PAR 6 GB (3 x 2-GB DIMMs) Data Cache	QL225B
	HP 3PAR Upgrade 4 GB (2 x 2-GB DIMMs) Control Cache	QL311B
	HP 3PAR Upgrade 6 GB (3 x 2-GB DIMMs) Data Cache	QL312B

Configuration Rules: Cache
- One 4 GB Control Cache (2 x 2-GB DIMMs) per node
- One 12 GB Data Cache (6 x 2-GB DIMMs) per node
- Must order one Control Cache and one Data Cache per Controller Node. This is applicable to the 2 Controller Nodes in the base configuration as well as any additional Upgrade Controller Node that may be ordered

HP 3PAR Disk Adapters	HP 3PAR 4-Port 4 Gb/sec Fibre Channel Adapter	QL220B
	HP 3PAR Upgrade 4-Port 4 Gb/sec Fibre Channel Adapter	QL303B

Configuration Rules: Disk Adapters
- 2 required per node
- Base configuration does NOT include disk adapters for the 2 included Controller Nodes

Step 3 - Choose Host Adapters

HP 3PAR Adapters	HP 3PAR 2-Port 1 Gb/sec iSCSI Adapter	QL219B
	HP 3PAR 4-Port 4 Gb/sec Fibre Channel Adapter	QL220B
	HP 3PAR Upgrade 2-Port 1 Gb/sec iSCSI Adapter	QL296B
	HP 3PAR Upgrade 4-Port 4 Gb/sec Fibre Channel Adapter	QL303B

Configuration Rules Adapters
- iSCSI limited to a max of 2 adapters (4 ports) per node
- Built-in Gigabit Ethernet port for Remote Copy over IP
- Max 4 host-facing adapters (any combination of FC and iSCSI) if direct connect only
- Max 3 host-facing adapters (any combination of FC and iSCSI) if SAN connect or mixed direct/SAN connect

HP 3PAR Drive Chassis	HP 3PAR 40-disk 4 Gb/sec Drive Chassis	QL235B
	HP 3PAR Upgrade 40-Disk 4 Gb/sec Drive Chassis	QL313B

Configuration
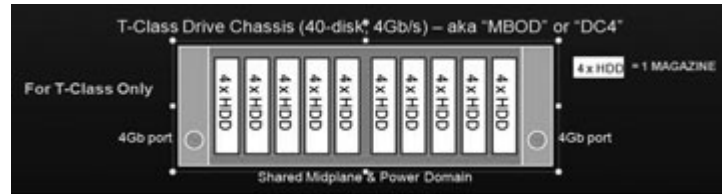
Step 4 - Choose Drives

HP 3PAR SAS HDDs	HP 3PAR T-Class 4x300 GB 6Gb/s 15K SFF SAS Drive Upgrade Magazine	QW896A
	HP 3PAR T-Class 4x450 GB 6Gb/s 10K SFF SAS Drive Upgrade Magazine	QW897A
	HP 3PAR T-Class 4x900 GB 6Gb/s 10K SFF SAS Drive Upgrade Magazine	QW899A
	HP 3PAR T-Class 4x2 TB 6Gb/s 7.2K SAS Drive Upgrade Magazine	QW901A
HP 3PAR SSDs	HP 3PAR 4x50 GB 4-Gb/sec SSD Magazine	QL251B
	HP 3PAR 4x100 GB 4-Gb/sec SSD Magazine	QR612B
	HP 3PAR 4x200 GB 4-Gb/sec SSD Magazine	QR614B
	HP 3PAR Upgrade 4x50 GB 4-Gb/sec SSD Magazine	QL335B
	HP 3PAR Upgrade 4x100 GB 4-Gb/sec SSD Magazine	QR616B
	HP 3PAR Upgrade 4x200 GB 4-Gb/sec SSD Magazine	QR618B
HP 3PAR FC HDDs	HP 3PAR 4x300 GB 15K 4-Gb/sec FC LFF Drive Magazine	QL239B
	HP 3PAR 4x600 GB 15K 4-Gb/sec FC LFF Drive Magazine	QL252B
	HP 3PAR Upgrade 4x300 GB 15K 4-Gb/sec FC LFF Drive Magazine	QL317B
	HP 3PAR Upgrade 4x600 GB 15K 4-Gb/sec FC LFF Drive Magazine	QL336B
HP 3PAR NL HDDs	HP 3PAR 4x1 TB 4-Gb/sec FC LFF Nearline Drive Magazine	QL242B
	HP 3PAR 4x2 TB 4-Gb/sec FC LFF Nearline Drive Magazine	QL255B
	HP 3PAR Upgrade 4x1 TB 4-Gb/sec FC LFF Nearline Drive Magazine	QL320B
	HP 3PAR Upgrade 4x2 TB 4-Gb/sec FC LFF Nearline Drive Magazine	QL339B

Configuration Rules: Drive Magazines	Drive Magazines	Supports "4 Gb/sec" Drive Magazines for T-Class Only
	Minimum Magazines per System and Mixed (FC, NL, SSD) Magazine Population	● HP 3PAR OS 2.3.1: minimum of 4 magazines (16 drives) of either FC or NL per node- pair. After that, the minimum increment for all other drive types is 2 magazines (8 drives). Allowable minimum configurations are:

  ○ 4 magazines (16 drives) of FC,
    2 magazines (8 drives) of NL
  ○ 4 magazines (16 drives) of FC,
    2 magazines (8 drives) of SSD
  ○ 4 magazines (16 drives) of FC,
    2 magazines (8 drives) of NL,
    2 magazines (8 drives) of SSD
  ○ 4 magazines (16 drives) of NL,
    2 magazines (8 drives) of FC

Configuration

- - 4 magazines (16 drives) of NL,
    2 magazines (8 drives) of SSD
  - 4 magazines (16 drives) of FC,
    2 magazines (8 drives) of NL,
    2 magazines (8 drives) of SSD
- HP 3PAR OS 2.2.4: minimum of 4 magazines (16 drives) of one drive type (FC or NL) per node-pair. After that, the minimum increment for the other drive type is 3 magazines (12 drives). Allowable minimum configurations are:
  - 4 magazines (16 drives) of FC,
    3 magazines (12 drives) of NL
  - 4 magazines (16 drives) of NL,
    3 magazines (12 drives of FC
  - SSD magazines not available on HP 3PAR OS 2.2.4
- A configuration with 2 magazines (8 drives) of FC drives and 2 magazines (8 drives) of NL is NOT acceptable
- SSD only configurations are NOT acceptable
- Minimum of 4 magazines (16 drives) of each drive type (FC or NL) spread across a minimum of 2 drive chassis on a given node-pair. See SSD rules below.

Minimum Magazines in each Chassis	• 2 magazines (8 drives) per drive chassis
SSD Magazine Population	• Minimum of 2 SSD magazines (8 drives) spread across a minimum of 2 drive chassis on a given node-pair • Maximum of 8 SSD magazines (32 drives) on a given node-pair • Minimum of 1 SSD magazine (4 drives) per drive chassis • Maximum of 2 SSD magazines (8 drives) per drive chassis • Requires a minimum of 4 magazines (16 drives) of another type (FC, NL) on the same node-pair; 8 FC drives and 8 NL drives is NOT acceptable) • SSD only configurations are NOT acceptable • SSD magazines not available on HP 3PAR OS 2.2.4

- Drive magazines should be populated from outside-in. That is, magazines must be added to a drive chassis in the following slot order: 0, 9, 1, 8, 2, 7, 3, 6, 4, and 5.
- In mixed FC/NL/SSD configurations, drive magazine population should be outside-in, with the highest RPM FC drives on the outside to Nearline drives to SSD drives on the inside. The order is:
- Largest 15K FC -> largest 10K FC -> largest NL -> largest SSD

Configuration

Step 5 - Choose Cables

HP 3PAR Fiber Cables	HP 3PAR 2m 50/125 (LC-LC) Fiber Cable	QL280B
	HP 3PAR 4m 50/125 (LC-LC) Fiber Cable	QL281B
	HP 3PAR 10m 50/125 (LC-LC) Fiber Cable	QL266B
	HP 3PAR 50m 50/125 (LC-LC) Fiber Cable	QL267B
	HP 3PAR 100m 50/125 (LC-LC) Fiber Cable	QL268B
	HP 3PAR 2m 62.5/125 (LC-LC) Fiber Cable	QL259B
	HP 3PAR 4m 62.5/125 (LC-LC) Fiber Cable	QL260B
	HP 3PAR 10m 62.5/125 (LC-LC) Fiber Cable	QL257B
	HP 3PAR 50m 62.5/125 (LC-LC) Fiber Cable	QL261B
	HP 3PAR 100m 62.5/125 (LC-LC) Fiber Cable	QL256B

Configuration Rules: Cabling	Capacity with...	● Drive Chassis (40-disk, 4 Gb/sec) (aka "MBOD", "DC4")
	Backend Cabling (non-Daisy chain)	● Two 2m 50um cables per drive chassis for 1st cabinet ● Two 10m (or greater) 50um cables per drive chassis for expansion cabinets
	Backend Cabling (Daisy chain)	● N/A
	Fibre Channel Host Cables	● Host Cables should be ordered from HP. Special short-boot connector ensures availability. ● Host cables must be multi mode fiber (62.5 or 50 Micron)
	iSCSI Host Cables	● HP 3PAR Storage Systems support standard iSCSI host cables.

Step 6 - Add an optional Cabinet

| **HP 3PAR Cabinets** | HP 3PAR 2-meter w/Redundant PDU Pair Cabinet Kit | QL258B |
| | HP 3PAR 2-meter Cabinet Locking Fascia Kit | QL282B |

| **Configuration Rules: Cabinets** | ● Base configuration includes 2-meter rack. 1-meter and 3rd party rack options are not available for T-Class. |

Technical Specifications

Physical Specifications

2-Meter Cabinet

Dimensions (width x height x depth)	23.8 x 76.4 x 36 in	60.5 x 194.1 x 91.4 cm
Service Clearance (front and back)	30 in	76.2 cm
Weight (not populated)	485 lb	220 kg
Maximum Weight (fully populated)	1,956.5 lb	887.5 kg
Maximum Weight per Leveling Foot	489.1 lb	221.9 kg
Maximum Load per Leveling Foot	156 lb/sq in	10.98 kg/sq cm

Component Weights

T400 Base Configuration[1]	731 lb	331.6 kg
T800 Base Configuration[1]	792 lb	359.2 kg
2 Controller Nodes (fully populated)	160 lb	72.5 kg
Drive Chassis (fully populated)	175 lb	79.4 kg
Service Processor	16.5 lb	7.5 kg

Supported Host FC Connections

FC Connector Type from Storage System to Host Port	LC to LC
FC Cable Core Diameter	50- or 62.5-micron
Connector Boot Length	17 mm

Supported Host iSCSI Connections

iSCSI Cable Type	Cat-5, Cat-5e, Cat-6 copper (1-Gb/sec)

Power and Heat

Power Supply Requirements

Input Voltage (VAC)	220 (200 - 240)
Frequency (Hz)	50 - 60
Circuit Breaker Maximum	30 A per PDU[6] (de-rated to 24 A)
Power Connectors for 2-Meter Cabinet	(4) L6-30P with 1+1 redundant or (4) IEC 60309 with 1+1 redundant
Power Receptacles	(4) L6-30R with 1+1 redundant or (4) IEC 60309 with 1+1 redundant

Maximum Potential Power Draw per 2-Meter Cabinet

Watts per Cabinet	9,984 watts / 34,075 BTU/h

Actual Power Draw / Heat Dissipation

Service Processor	317 watts / 1,082 BTU/h	
Drive Chassis (without Drive Magazines) [2]	200 watts / 683 BTU/h	
	Transactional[3] **(watts / BTU/h)**	**Idle (watts / BTU/h)**

Technical Specifications

4 x 50-GB SSD Drives	14 / 48	12 / 42
4 x 100-GB SSD Drives	9.8 / 33	5.5 / 19
4 x 200-GB SSD Drives	10.3 / 35	7 / 24
4 x 300-GB 15K SFF SAS Drive Magazine	39 / 132	34 / 117
4 x 450-GB 10K SFF SAS Drive Magazine	29 / 99	24 / 81
4 x 900-GB 10K SFF SAS Drive Magazine	31.5 / 107.5	23 / 80
4 x 2-TB 7.2K LFF SAS Drive Magazine	47 / 160	35 / 119
4 x 300-GB FC Drive Magazine	75 / 256	57 / 195
4 x 600-GB FC Drive Magazine	76 / 258	65 / 222
4 x 1-TB NL Drive Magazine	59 / 201	44 / 150
4 x 2-TB NL Drive Magazine	62 / 211	38 / 131
Controller Node Pair	705 / 2,406	630 / 2,150
Example Full Cabinet Configuration (4-Node T400; 6 Drive Chassis, 240 600-GB drives,1 service processor)	7,487 / 25,472	6,677 / 22,800

Environmental Specifications

Temperature (°F/°C), 0 - 3,000 ft / 0 - 914.4 m	50 - 104°F / 10 - 40°C
Temperature (°F/°C), 3,000 - 10,000 ft / 914.4 m - 3,048 m	50 - 95°F / 10 - 35°C
Altitude (ft/m) max.	10,000 ft / 3,048 m
Humidity (%), Non-condensing	20 - 80%
Raised Floor	Recommended
Emissions / RFI / EMI	FCC Class A, EN55022 Class A,EN55024: 1998, VCCI Class A
Safety	CE Mark, C-TUVus Mark, TUV GS Mark, CB Scheme with all country deviations
Energy Consumption Efficiency[5] (Japan Green Law)	0.092

[1] Includes 2-meter rack and two controller nodes (fully populated)
[2] Up to 10 drive magazines (40 drives) of any combination of SAS, FC, NL, and up to 2 SSD magazines (8 SSD drives) per Drive Chassis
[3] Under maximum load
[4] Includes power and heat dissipation specifications for the Service Processor as follows: 317 Watts, 1082 BTU/hr, 100 - 240 VAC Input Voltage, 50 - 60 Hz Frequency, and (1) IEC-320 Power Receptacle
[5] Japan Green Law statement of compliance: The energy consumption efficiency value has been calculated per requirements for Category-G Magnetic Disk Drive Units by dividing the power consumption, measured according to the definition in the Law Concerning the Rational Use of Energy, by the storage capacity defined in the Energy Conservation Law. The efficiency value is based on a host-maximized T800 configuration using 450-GB drives.
[6] Power Distribution Unit
NOTE: Specifications are subject to change without notice.

Technical Specifications

For drives, 1 TB = 1 trillion bytes. Actual formatted capacity is less.