

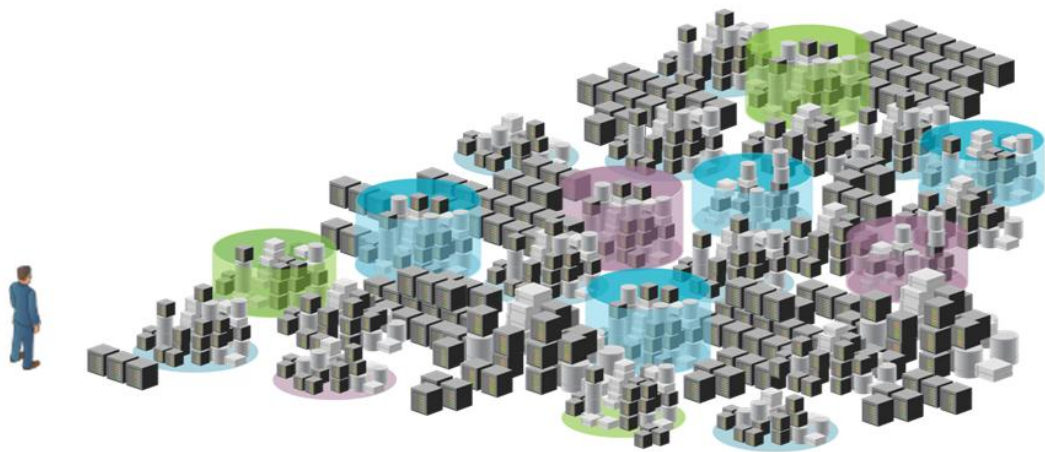
HP P4000 G2 LeftHand SAN Solutions

IT Sprawl has Business at the Breaking Point

In the data center the cost of operations absorb a huge portion of the IT budget—up to 70% (includes both support & maintenance), leaving little budget for more strategic or innovative needs. Enterprises clearly need to reduce the total amount of resources that are focused on operations and maintenance and free up resources to work on more strategic, innovative tasks. The budget is trapped in silos that are both costly and over provisioned and underutilized

To address these challenges, data centers need to make fundamental changes. They need to break down the silos, automate error prone manual processes and tighten management control. They need to bring together hardware, software and services to create next-generation data centers that operate more efficiently. There is a better way.

IT Sprawl has Business at a Breaking Point



70% Captive in Operations and Maintenance

- Rigid & aging infrastructure
- Application & information complexity
- Inflexible business processes

Business Innovation Throttled to 30%

- Time to revenue
- Cost of lost time, effort, opportunity
- Unpredictable business cycles

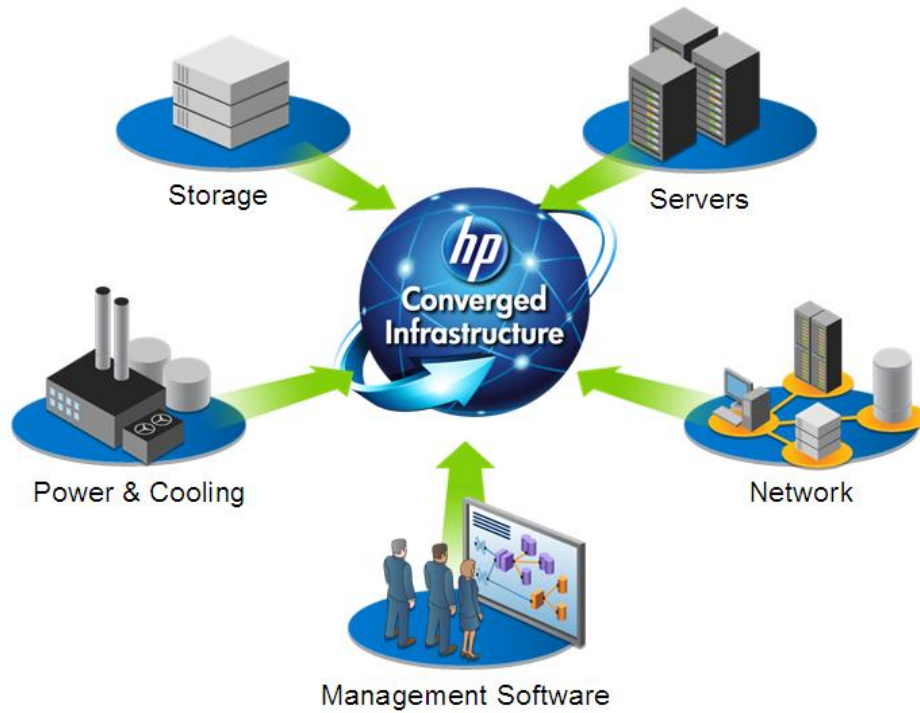
Tomorrow's Business will be Built on a Converged Infrastructure

The pendulum is shifting to a new paradigm and new strategic opportunity for you exists. Organizations require proven innovation and results in real-world environments and HP been on this path for years with new and innovation solutions.

Instead of having individual stacks, like a storage stack, a server stack, and a networking stack—all are going to be reunited. HP has solutions that integrate storage, networking, servers, and management software—even facility power and cooling for the entire data center.

The HP Converged Infrastructure is a next-generation IT architecture that converges virtualized compute, storage, and networks into a single environment optimized for any workload

Tomorrow's Business will be Built on a Converged Infrastructure



Inside the HP Converged Infrastructure all resources and processes are controlled by a shared-services engine that provisions and adapts application environments to instantly respond to business demands

This architecture will help you accelerate the delivery of application environments in a predictable, repeatable way that makes the most efficient use of IT, facility and staff resources to drive business innovation. This strategy will help you unleash your full potential to:

- Deliver any application, anywhere, on the fly
- Flex resources on demand in an optimized way
- Unleash productivity of administrators, systems and facilities
- Provide predictable, continuity of service
- Accelerate time to business value from IT investments

Virtual Pool of Storage for the Converged Infrastructure

The HP P4000 G2 LeftHand SAN solutions (P4000) provide storage that is highly scalable and optimized for email, databases, and server virtualization. It will allow you to create a virtual pool of storage for the Converged Infrastructure that is simple to manage.

Virtual Storage for a Converged Infrastructure

HP P4000 G2 SAN

- ✓ Modular
- ✓ Scalable
- ✓ Highly available
- ✓ Efficient
- ✓ Standards based
- ✓ All inclusive software



Virtualized Pool of Storage



HP P4000 G2 SAN

The P4000 fit perfectly into the overall HP Converged Infrastructure. First, it offers you a clustered storage architecture that is completely modular. It will enables you to start with only the capacity and performance you need today, and over time can scale storage capacity and performance online without disruption.

P4000s leverage HP's leading industry standard hardware. This allows HP to stay ahead of technology curve, and adapt to your needs sooner with features such as 10 Gigabit Ethernet (GbE) and it allows for common spare parts, e.g., power supplies and disk drives.

In addition, every P4000 includes an enterprise-class feature set at no extra charge.

Finally, the Best Practice Configuration Wizard will help you choose highest availability configurations such as Failover Manager, hardware RAID, or volume replication.



Exploring Today's Storage Challenges

Virtual Infrastructure	– Virtualization triggers new storage requirements
High Availability and Fault Tolerance	– Addressing today's business continuity needs
Disaster Recovery	– Preparing for the unforeseen – Removing the barrier to remote site IT alignment

Virtual Infrastructure Puts New Requirements on Storage

The main reason virtual server implementations (VMware, Hyper-V, Xen) affect storage is many Virtual Machines (VMs) reside on shared storage such as a SAN. It may work well initially, but over time as your business needs dictate, new VMs or applications may need to come online and you have the beginning of VM sprawl. If storage resources are not added as number of VMs grows, capacity and performance issues become intolerable resulting in traditional storage upgrades that are expensive.

Traditional SAN storage technology often requires expensive add-on features that provide high availability (HA), disaster recovery, and cloning to make them work. The P4000 offers VMware VAAI integration and allow for VMs to be deployed in 85% less time with a simultaneous SAN traffic reduction of 94%.

Management complexities have been the bane of traditional SANs. Many SANs have very limited scalability, and when they hit their limits you need to buy a new SAN that is managed separately, which just adds management complexity. The P4000 SANs are simple to manage and easy to scale.

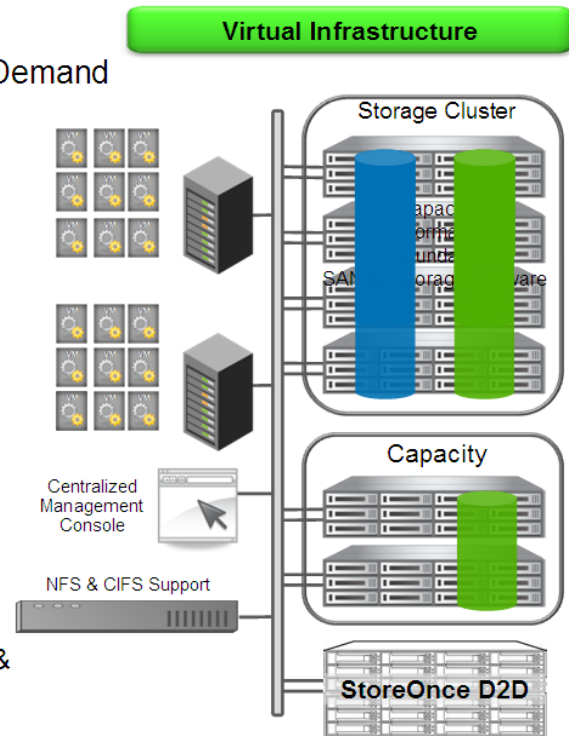
The P4000 is VMware Metro Cluster certified for multi-site solutions to improve failover in ESX/ESXi environments. Also, Storage Replication Adaptor for VMware Site Recovery Manager 5 integration streamlines/automates disaster recovery with P4000 and ESX/ESXi.



The P4000 G2 LeftHand SANs are simple to manage and easy to scale.

Fully featured SANs that Scale On-Demand

- Scale capacity and performance simultaneously; no disruption
- All inclusive feature-set; optimized for server virtualization
 - VAAI integration: 85% quicker VM deployments with 95% less SAN traffic
- Easy to install and manage:
 - Global configuration rules help control SAN management costs
 - Best Practice Analyzer
 - Thin provisioning for superior capacity utilization
- Supporting NFS and CIFS: P4000 Unified NAS Gateway
- P4000-compatible backup, restore & disaster-recovery protection



High Availability and Fault Tolerance Storage to Meet Business Continuity Demands

Traditional SANs do not fully address today's business needs regarding high availability and fault tolerance as they typically cannot tolerate all outages due to disk, network, processor, array, power, or site failures. Purely having redundant components such as fans or power supplies means you may have even more money sitting around idle when small or large outages occur.

When it comes to data protection, traditional methods such as hardware RAID and redundant components are not enough. Hardware RAID and redundant controllers will not protect data from human error, network, power or cooling, or site issues. Your business data must be protected beyond the box, in the event that an entire node goes off-line.

P4000 Network RAID will allow you to synchronously replicate volumes across all P4000 nodes in a SAN cluster. Essentially, multiple copies of data can be striped and protected across the cluster so that if any node was to go offline, your data would remain available. The data protection levels are defined on a per-volume basis. you can decide what level it needs based on the critically of the data. you can stripe and, if desired, replicate data with 1, 2, or 3 extra copies or use the Network RAID levels 5 or 6 with 1 or 2 parity bits. Each P4000 node is using hardware RAID 5, 6, or 10. you can reconfigure the Network RAID levels on the fly with zero downtime. you can tailor the level of data protection based on your needs. Bottom line—this is “high availability” for storage, and it is included with every P4000.

Using the Network RAID capabilities, you can attain higher levels of availability simply by making good implementation decisions. For example, stretching a P4000 SAN over two cabinets with two power distribution units and two top-of-rack switches adds a level of



robustness that does not incur any incremental costs. The same is probably true if these two racks are placed on different floors in a building, and thus, most heating, ventilating, and air conditioning problems will not impact the P4000 SANs continued operation. True multi-site SAN environment with synchronous or asynchronous replication will not incur extra P4000 SAN related costs since the entire feature set is included with each P4000 SAN.

P4000 SANs can provide you a comprehensive, highly available storage solution.

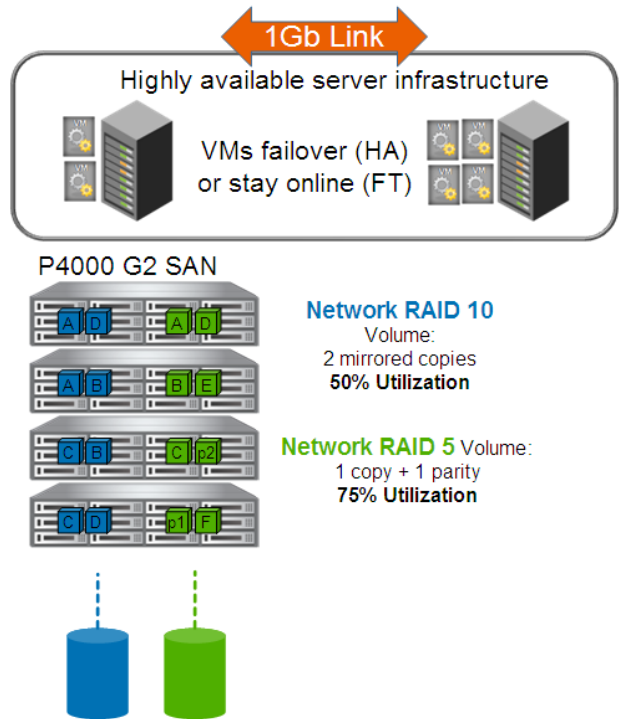
High Availability And Fault Tolerance

High availability is achieved via virtualized storage in a SAN cluster

- Hardware RAID: 5, 6, 10
- Network RAID: 10, 5, 6
- Balancing HA and utilization
- No single point of failure

Real-time site protection with Multi-site SAN

- Automatic Failover/Failback



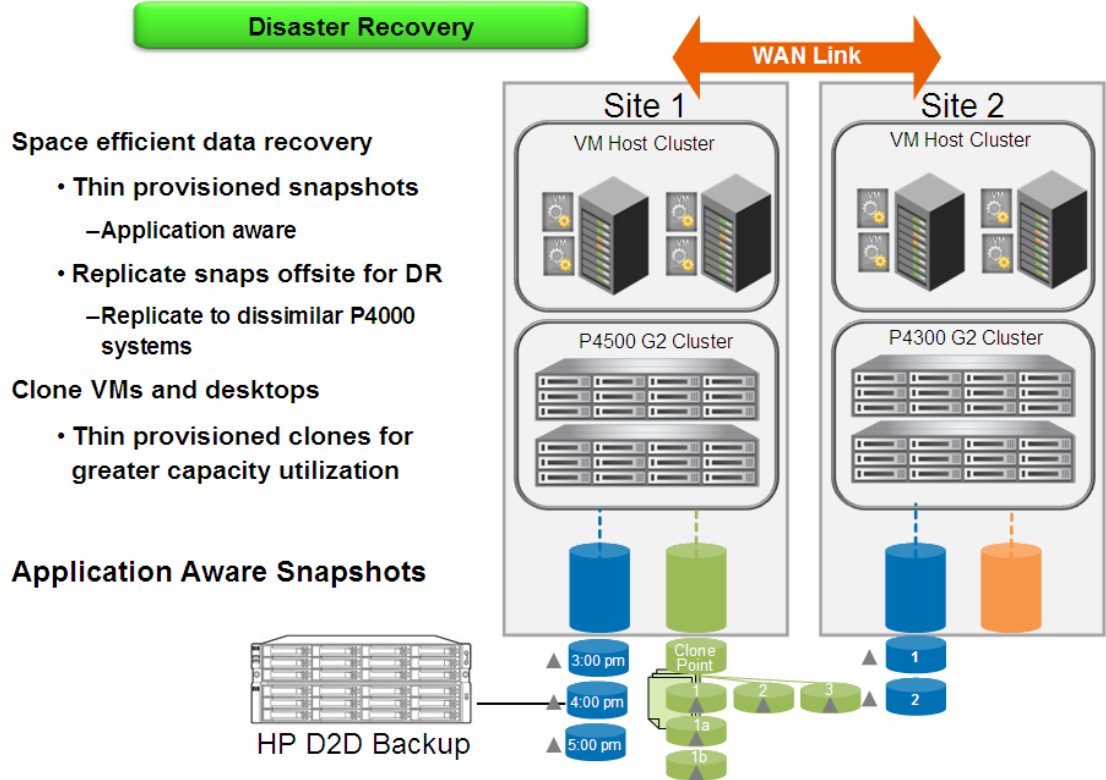
Disaster Recovery as Part of Business Continuity Mandates

P4000 SANs offer application integrated snapshots for VMware and Microsoft Volume Shadow Copy Service (VSS) based workloads. These snapshots create instant point-in-time copies of data on a per-volume basis. Snapshots can be created in a variety of ways to meet your business or application requirements. you can create them manually ad-hoc, on a scheduled or scripted basis, or via the Microsoft VSS framework, and can access these point-in-time snapshots to recover individual files or folders from the volume, or rollback an entire volume. Built-in application integration provides automated quiescing for VMware and Hyper-V VMs and Microsoft VSS applications. Unlike most SAN vendors that require a snapshot reserve, P4000 snapshots are always thin provisioned for efficiency, only consuming storage space on the SAN when snapshot data written eliminating any upfront space reservation or guesswork that could lead to snapshot and backup job failures. And thin provisioning can save a lot of money.





P4000 SANs can provide you cost effective backup and recovery solutions.



The P4000 SANs are managed from the Centralized Management Console (CMC). The CMC can run on any Windows or Linux machine connected to the storage network, and manages all the components of the P4000 from a single location. The CMC can manage all storage nodes, management groups and clusters, regardless of physical locations.

Using P4000 SAN storage nodes, you can create a cluster, or pool of resources to meet today's storage and capacity needs. The cluster will aggregate all of the critical components of every contained storage node (processor, disk, memory, network ports, and cache). As a multi-node SAN cluster is created, every node's critical components will aggregate to determine the SAN cluster's total performance and capacity.

Host servers connect to the SAN to access the disk as if it was local to the system. As storage volumes are created, each one will span every node in the cluster. This includes access to all processors, cache, disks, and network interface cards so every volume can obtain peak performance. Peer Motion Data Mobility with Cluster Swap functionality allows users to replace or upgrade P4000 clusters with just a few clicks - no maintenance windows and no downtime. Migrate data online between tiers with Peer Motion. Storage clusters are easily scalable without any downtime. If you needs grow, simply add another P4000 SAN node to the cluster. The SAN/iQ software will automatically restripe all volumes across the nodes in the cluster. Because the storage is virtualized, SAN/iQ can add or remove P4000 SAN nodes from the cluster without having to take the volumes offline, or reconfigure the volumes. Bandwidth throttling tools are included so restriping will not interfere with your production environment.

You can also create a tiered storage environment to meet performance and capacity needs and dynamically migrate volumes between clusters with no downtime. SAN/iQ does all the work, without the user having to reconfigure the volumes.





The Best Practices Analyzer constantly compares the current SAN configuration to best practices and alerts the SAN manager to suggestions for better configuration choices. It is not obtrusive and provides links to online documentation.

The Global Update Manager in SAN/iQ 9.0 allows for all patches to be downloaded automatically. This feature saves valuable time. These patches are not applied unless triggered by the administrator.

Remote Office/Branch Office Disaster Recovery

The P4500 G2 LeftHand Virtualization SANs and P4500 G2 LeftHand Multi-Site SANs include, at no extra charge, ten licenses for Replication for Remote Offices/Branch Offices (ROBO) which is essentially the same as the P4000 Virtual SAN Appliance Software (VSA). Replication for ROBO capability is optionally available via a VSA license on all other P4000 models

VSA supports Hyper-V and VMware. It is the first VMware certified 'Storage Virtual (details can be found on VMware's Hardware Compatibility Guide). VSA creates a virtual SAN in ROBO locations using VMware Or Hyper-V server disks, VMware or Hyper-V server JBODs or unused SAN disk drives that already exist at the remote location. Like VSA, the Replication for Remote Offices capability enables replication from ROBO locations to primary locations (or the other way if the remote location is e.g., a DR site). Thus remote data can be integrated into regular storage operations like backup and restore.

The remote copy capabilities described above are of particular interest for ROBO deployments.

Remote office / branch office deployments are enabled by P4000 SANs and VSA. In summary:

- **Replication for Remote Office licenses included with some P4000 SANs**—The VSA capabilities to create virtual SANs by pooling server disks, JBODs or SAN. Multiple data centers and sites can be managed from an all inclusive "single pane-of-glass." All of the P4000 SAN features are managed from the CMC for simple, easy-to-manage storage.
- **Centralized Management Console**—Multiple data centers and sites can be managed from an all inclusive "single pane-of-glass." All of the HP P4000 features are managed from the CMC for simple, easy-to-manage storage.
- **Remote Copy reduces costs for disaster recovery**—Remote Copy replicates snapshots between P4000 SANs at primary/remote locations. Copies are thinly provisioned with no space reservation required. Remote Copy enables centralized backup and disaster recovery on a per-volume basis and leverages application integrated snapshots for faster recovery. Furthermore, it saves time by pre-detecting the empty space/unchanged data and only copies changed data.














A Choice of HP P4000 G2 LeftHand SAN Solutions

HP P4000 G2 LeftHand SAN Solutions

Cost effective, highly available storage for virtualization, easy to implement

	P4300 G2 MDL SAS Starter SAN	P4300 G2 SAS Starter SAN	P4500 G2 Virtualization SAN	P4500 G2 Multi-Site SAN	P4500 G2 Scalable Capacity SAN	P4800 G2 SAN for BladeSystem	Custom P4000 G2 Storage Systems	P4000 Virtual SAN Appliance
Disk Drives	16-256	16-256	24-384	48-384	60-384	70-1120	Varies	Varies
Starting Capacity	16.0 TB 7.2K MDL SAS	7.2 TB 15K SAS	14.4 TB 15K SAS	28.8 TB 15K SAS	60/120 TB 7.2K MDL SAS	31.5 TB 15K SAS	Varies	Varies; license limit 10 TB
Features	Storage Clustering - Network RAID 5/6/10/10+1/10+2 - Thin Provisioning - Application Integrated Snapshots - SmartClone - Remote Copy							
Replication for Remote Offices	Optional via VSA		10 licenses included		Optional via VSA			
Support coverage included	3 years, next business day (NBD) support for HW and SW						1 year HW & SW, NBD	1 year SW support, NBD

HP P4000 G2 LeftHand Unified NAS Gateway

HP P4000 G2 LeftHand Unified NAS Gateways boost the value of your P4000 SAN by adding Windows-powered IP-based gateway services to an existing P4000 SAN. HP P4000 G2 LeftHand Unified NAS Gateways are enhanced Windows-powered gateways that are built on industry-standard HP ProLiant servers and come with the Microsoft Windows Storage Server 2008 R2 Enterprise operating system -- including cluster services—pre-installed. They connect via Ethernet and add file, print, and management services to an existing P4000 SAN to build an affordable and highly-available unified storage solution. Since HP P4000 G2 LeftHand Unified NAS Gateways are Windows-based, integration into your Windows environment is easy, your antivirus and backup applications run right on the box and management has a familiar look and feel.

HP P4800 G2 LeftHand BladeSystem SAN—A First

HP P4800 G2 LeftHand BladeSystem SAN is the industry's first SAN fully converged with HP BladeSystem. HP extends the HP BladeSystem advantages to storage with a common management tool set for BladeSystem hardware management, use of common spare parts, and benefits from the power and cooling efficiencies of the HP BladeSystem c7000 enclosures all while reducing data center footprint. Available in flexible 2-node increments based on 450 GB, or 600 GB drives for field installation or factory integration from 2 to 8 nodes per C7000 enclosure.

HP has eliminated the external SAN switch and external Fibre Channel

(FC) SAN network by merging it into the BladeSystem architecture thereby reducing acquisition and operating cost.





HP P4800 G2 LeftHand BladeSystem SAN

The industry's first SAN converged with HP BladeSystem

Better infrastructure delivers:

- Common hardware management and spare parts
- 65% smaller storage footprint
- 30% reduction in storage power/cooling costs
- Elimination of SAN switch



Superior software delivers:

- Reduce storage management costs by 1 FTE per year¹
- Defer CAPEX 25%-50% with better capacity utilization¹
- All-inclusive storage SW avoids budgeting issues
- Zero downtime³
- VMware VAAI and Microsoft integration

VALUE

30% savings²

1 year payback on storage⁴

¹ ESG P4000 White Paper; ² P4800 cf. EMC CX4; ³ for NIC, controller, switch, or double disk failures¹; ⁴ HP estimate

For large scale general SAN and Virtual Desktop Infrastructure (VDI) projects the P4800 SAN as the industry's first SAN fully converged with BladeSystem offers the following:

- Has been tested and documented via Reference Architectures
- Extends the BladeSystem advantages to storage deployments
- Eliminates need for separate FC SAN network infrastructures
- SAN infrastructure management is done via a common BladeSystem tool set
- An energy efficient architecture offers power throttling / capping
- Storage domain experts use the P4000 SAN/iQ capabilities for thin provisioning, Network RAID, cost effective HA, and easy SAN management
- Reduces acquisition and operating costs by 30% with a break even period of less than 12 months





HP P4000 G2 LeftHand SAN Solutions: Complete Storage Solutions for Today's Needs

Virtual Infrastructure	<ul style="list-style-type: none">- Scale storage online to keep up with virtual server growth- Buy only what you need today- All-inclusive features matching server virtualization- No up-front space reservations
High Availability and Fault Tolerance	<ul style="list-style-type: none">- Flexibility to select protection level for each LUN- Real-time multi-site protection- Eliminate single-point-of-failure
Disaster Recovery	<ul style="list-style-type: none">- Application integrated snapshots- Space efficient disaster recovery- Turn DAS and SAN storage into virtual P4000 SAN- Full support for VMware SRM, Microsoft Hyper-V, Citrix

Warranty and Support

The P4000 SANs (MDL SAS Starter SAN, SAS Starter SAN, Virtualization SAN, Multi-site SAN, and High Capacity SAN) come with a 3-3-3 warranty (three years parts exchange, three years labor and three years onsite, next business day response). In addition, P4000 SANs come with three years of HP Software Support, standard 9x5 business hours phone support (software technical support and software product and documentation updates).

All P4000 single nodes systems come with a 1-1-1 warranty (one year parts exchange, one year labor and one year onsite, next business day response). In addition, P4000 Systems come with one year of HP Software Support, standard 9x5 business hours phone support (software technical support and software product and documentation updates).

Summary

HP P4000 SAN Solutions represent a virtualized pool of storage resources and deliver enterprise functionality that enhances virtual environments, simplifies management, and reduces costs. Easy to deploy, scale and maintain, P4000 SANs help crucial business data remain available. Using unique, innovative data protection levels across the entire SAN, P4000 SANs reduce vulnerability without driving up costs the way traditional SANs can. Wherever virtual infrastructures, VDI, business continuity, ROBO deployments need to be addressed, the P4000 SANs are the storage cornerstones to such projects.

For P4000 configuration assistance and discount pricing, contact Storage Networks, a leading HP Authorized Business Partner. Certified Integration Engineers assist small and large organizations in product selection, customization, integration, and support. Visit storagenetworks.com or contact Storage Networks directly to obtain detailed Visio network diagrams depicting how the HP P4000 products can be integrated into your infrastructure.

Dial 855-NET-STOR, then Press 1

http://www.storagenetworks.com/hp_p4000.php

