HPE MSA 2050 SAN Storage - Overview

Product description

The flash-ready HPE MSA 2050 Storage system is designed for affordable application acceleration that is ideal for small and remote office deployments. But do not let the low cost fool user. The HPE MSA 2050 Storage system gives the combination of simplicity, flexibility to grow now and into the future, and advanced features user may not expect to find in an entry-priced array. Start small and scale as needed with any combination of Solid State Disks (SSD), high-performance enterprise or lower-cost Midline (MDL) Serial Attached SCSI (SAS) based drives.

top

What's new in the MSA 2050 array family

- New MSA variants available for EMEA that are in compliance with EU Commission Regulation No 2019/424.
- New 6-Pack HDD bundles.
- New 960GB and 1.92TB Read Intensive (RI) SSDs.

top

Key features

- 200,000+ IOPS starting at affordable application acceleration.
  - Flexible base model delivers 2 x IOPS performance than the previous generation MSA for the same price.
- Advanced data services with no experience required.
  - Easy to install, easy to use, easy to maintain - no storage expertise necessary.
  - Automated tiering dynamically responds to workload changes, so user do not have to.
- Keep users business running with expanded data protection features.
  - New virtualized snapshot technology makes data protection and instant recovery a snap.
  - Remote replication with FC and iSCSI supports affordable disaster recovery.
- Grow flexibly now and into the future.
  - Data-in-place upgrades protect drive investments and eliminate data migrations.
  - Start small and scale as needed with any combination of SSD, Enterprise or Midline SAS drives.

Product features

Features	Description

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Common set of valuable features (All MSA 2050 models)	• MSA 2050 Storage system architecture maximizes performance. • MSA 2050 SAN Controller allows users to create their own Combo Controller by mixing FC and iSCSI SFPs. Below are the valid configurations for mixing SFPs: • Storage Management Utility V3 (SMU). The MSA management GUI brings a new modern look and feel to array management. • Thin Provisioning allows storage allocation of physical storage resources only once they are consumed by an application. Thin Provisioning also allows over-provisioning of physical storage pool resources allowing ease of growth for volumes without predicting storage capacity upfront. • All models feature a wide variety of drives: High-performance SSD drives, enterprise-class SAS, and SAS midline drives. • The MSA 2050 will support a maximum of 7 disk enclosures (either LFF and/or SFF). Add-on enclosures can either be HPE MSA 2050 LFF Disk Enclosure or HPE MSA 2050 SFF Disk Enclosure. • The MSA 2050 can grow incrementally to a maximum of 96 LFF, 192 SFF drives, or a combination of SFF and LFF enclosures up to the maximum of 8 total enclosures. • Virtual Storage Disks Groups can be spanned across multiple enclosures.Virtual Storage RAID levels supported: 1, 5, 6, 10. • Maximum hard drive counts vary by RAID levels: 2 drive max for RAID level 1; max of 16 drives for RAID levels 5, 6, and10. • Multiple disk groups can be aggregated into a single Storage Pool. • Storage Pools allow data on a given LUN to span across all drives in a pool. When capacity is added to a system, the user is also getting a performance benefit of the additional spindles. The maximum LUN size is 140TB (128TiB). • Snapshot enhancements for virtual storage, including performance improvements, hierarchical snapshots, and simplified resource management. Administrators can monitor and optionally control snapshot space usage. • Prioritize data by assigning appropriate affinity level (Performance, No Affinity or Archive). • End-User can configure 512 TiB capacity per virtual pool by enabling large pool support. • Non-Disruptive on-line controller code upgrade. Requires Multi-pathing software. • Upgradable by design. Owners of an MSA 2040, MSA 2042 and MSA 1040 array are able to do data-in-place upgrades to the new MSA 2050 array. This unique ability protects the earlier investments in drives, and JBODs. ○ Certain limitations are applicable. Please review the Upgrading to the HPE MSA 1050/2050/2052 Technical Whitepaper before upgrading the MSA 2040, MSA 2042 or MSA 1040 systems.
Application solutions	The HPE MSA 2050 Storage is the ideal solution for users running Oracle, Microsoft, SAP environments and those users who are deploying virtual server technologies like VMware and Hyper-V. The MSA 2050 delivers enterprise functionality that enhances virtual environments, simplifies management, and reduces costs. Easy to deploy, scale and maintain, HPE MSA 2050 Arrays ensure that crucial business data remains available.
SAN Controller	MSA 2050 SAN controller supports 8Gb FC, 16Gb FC, 1 GbE iSCSI or 10 GbE iSCSI host connectivity.
SAS Controller	MSA 2050 SAS controller supports 6Gb and/or 12Gb SAS host connectivity.
Modular chassis	2U Rack height. 12 LFF or 24 SFF drive bays. All MSA 2050 SAN Storage systems come standard with 2 SAN controllers.
Drives available	The MSA 2050 SAN Storage systems support both the MSA 3.5-inch LFF drives, and the MSA 2.5-inch SFF drives. • Solid State Drives (SSDs) deliver exceptional performance for applications requiring high random read IOPs performance. • Serial Attached SCSI (SAS) enterprise-class drives are designed for high demand, 24x7 usage. • SAS Midline drives are usually reserved for archival of data as they are relatively inexpensive and are available in very large capacities.
Optional disk enclosures	Just as the user has a choice of chassis for the array enclosure (LFF or SFF drive bays), they also have a choice of expansion disk enclosures accommodating either drive size. Both the MSA 2050 LFF Disk Enclosure and MSA 2050 SFF Disk Enclosure can be hot-added to an operating array. SFF and LFF Array enclosures and Disk Enclosures can be mixed without limitations. **MSA 2050 LFF disk enclosure** This 2U enclosure is designed to support twelve HPE Storage LFF drives and accepts MSA dual-ported 12Gb SSD and SAS Midline hard drives. The pre-configured MSA 2050 LFF Disk Enclosure has two I/O modules and supports the MSA 2050 dual controller arrays. • The MSA 2050 LFF disk enclosure can be attached to the MSA 2050 LFF or SFF Storage models. • Each MSA 2050 LFF disk enclosure ships standard with two .5 m mini-SAS to mini-SAS cables for connection to the MSA 2050 array expansion port or existing disk enclosure cascade port. • LFF and/or SFF disk enclosures can be mixed up to the maximum of 7 total disk enclosures. **HPE MSA 2050 SFF disk enclosure** This 2U enclosure is designed to support twenty four HPE Storage 2.5-inch SFF drive bays and accepts MSA dual ported 12Gb SSD, SAS, or SAS MDL hard drives. The pre-configured MSA 2050 SFF disk enclosure has two I/O modules and supports the MSA 2050 dual controller arrays. • The MSA 2050 SFF disk enclosure can be attached to the MSA 2050 LFF or SFF Storage models. • Each MSA 2050 SFF disk enclosure ships standard with a two .5 m mini-SAS to mini-SAS cables for connection to the MSA 2050 array expansion port or existing disk enclosure cascade port. • LFF and/or SFF disk enclosures can be mixed up to the maximum of 7 total disk enclosures.

Features	Description
Scalability	The MSA 2050 array configurations are designed to allow an installation to begin with smaller capacity and be able to grow gradually as needed. The flexibility of SSD, SAS or SAS MDL drives technology, form factors, sizes, speeds,and costs per GB allows a system to easily fit in almost any budget. • Large Form Factor (LFF) configurations can scale up to 144TB SAS midline per array enclosure, expandable to 1152TB SAS Midline with the addition of a maximum of seven MSA 2050 LFF disk enclosure. • Small Form Factor (SFF) configurations can scale up to 76.8TB SAS SSDs per array enclosure, expandable to 614.4TB SAS with the addition of a maximum of seven MSA 2050 SFF disk enclosure. • Users may configure an MSA 2050 SFF array enclosure with MSA 2050 LFF Disk Enclosure. This is an excellent option for a configuration that supports high-speed SFF SSDs or fast SFF enterprise-class SAS drives in the array enclosure, combined with economical LFF drives staged for archival purposes, all in the same array.
Disk group	• A disk group is a collection of disks in a given redundancy mode (RAID 1, 5, 6, 10) • Disk group RAID level and size can be created based on performance and/or capacity requirements • Multiple disk groups can be allocated into a Storage pool for use with the virtual Storage features
LUNs	• The MSA 2050 arrays support 512 volumes and up to 512 snapshots in a system. • All of these volumes can be mapped to LUNs. • Maximum LUN sizes up to 140TB (128TiB). • Thin provisioning allows the user to create the LUNs independent of the physical Storage.
Storage pools	• Storage pools are comprised of one or more disk groups. • A volume's data on a given LUN can now span all disk drives in a pool. • When capacity is added to a system, users will benefit from the performance of all spindles in that pool. • The MSA 2050 supports large, flexible volumes with sizes up to 128TiB and facilitates seamless capacity expansion. • As volumes are expanded data automatically reflows to balance capacity utilization on all drives.
RAID 1, 5, 6,10	• The MSA 2050 features several important additional levels. • RAID 6 offers the highest level of RAID protection. • It allocates two sets of parity data across drives and allows simultaneous write operations. • It can withstand two simultaneous drive failures without downtime or data loss. • RAID 10 is mirroring and striping without parity and allows large disk groups to be created with high performance and mirroring for fault tolerance. • RAID 5 combines the block striping and parity. • Because data and parity are striped across all of the disks, no single disk is a bottle neck. Striping also allows users to reconstruct data in case of a disk failure.
Performance	• The performance figures provided here are for reference as many variables exist between array configurations, workloads, hard drive types, disk group setup parameters and host system setup. • Hewlett Packard Enterprise has traditionally published a set of end-to-end MSA performance specifications that are fed into HPE sizer tools which are based on conservative real-world configurations. • For consistency, the MSA performance numbers have been documented in both benchmark and end-to-end performance tables. • Complete end-to-end performance results will be provided for the MSA 2050 in a subsequent publication. These numbers are subject to change without notice. MSA 2050 end-to-end performance results:
Configuration and management tools	• Management access, out-of-band, SMU, CLI. • Interface types: USB 100/1000 Ethernet. • Protocols supported:SNMP, SMI-S, SSH, SMTP, FTP, SFTP, HTTP, HTTPS, Telnet.

MSA 2050 Array Performance[1]	HPE MSA 2050 Converged SAN Controller with HDDs	HPE MSA 2050 Converged SAN Controller with Mixed Use SSDs
Protocol (Host connect)	16Gb fibre channel	16Gb fibre channel
MSA 2050 RAID 1 SSD performance results[2]		
Random reads (IOPs)	-	220,800
Random writes (IOPs)	-	103,000
MSA 2050 RAID 5 performance results[3, 4]		
Segmented sequential reads (MB/s)	5,290	-
Segmented sequential writes (MB/s)	4,650	-

Features	Description
Web browser supportt	The MSA 2050 management supports: • Mozilla Firefox. • Microsoft Internet Explorer. • Google Chrome.
Hot plug expansion and replacement support	• All MSA 2050 models support hot plug expansion and replacement of redundant controllers, enclosures, fans, power supplies, and I/O modules for simple, fast installation and maintenance. • Hot add expansion of disk enclosures is also supported.
HPE Server compatibility	The MSA 2050 supports most HPE ProLiant, BladeSystems and Integrity servers including: • HPE ProLiant DL Servers • HPE ProLiant ML Servers • HPE c-Class Blade Servers • Integrity servers, IA64 Click here to check and confirm the compatibility .
3rd Party server support	The MSA 2050 supports most multi-vendor industry standard Intel and AMD based (x86) servers. Hewlett Packard Enterprise requires the third-party server to be logged and listed on the Microsoft Windows Server catalog • Hewlett Packard Enterprise recommends that the third-party server vendor is an active member of TSANet. • Non-HPE servers will generally be supported if the HPE Storage stack is used. This includes supported HPE branded HBAs and drivers, and supported FC switches.
Additional features	• Storage based asynchronous snapshot replication. • Support of both Ethernet and Fibre Channel interconnects provides flexible options to the application environments. • Snapshot based replication technology means only changed data will be replicated to alternate site. • Many to 1 replication (Up to 4 nodes) - primary use case is to replicate from "many" branch offices to the home office for the purpose of backing up data from the branches. • Advanced scheduler provides several options to IT administrators for business continuance. • Flexible architecture allows remote replication between MSA 2050 and MSA 2040 or MSA 1040 arrays using the virtual storage architecture and licensed for Remote Snap. Protects existing investments and enhances business continuity planning objectives. • Snapshot based replication enables both local and remote recovery depending on the need. • Snapshot replication isolates problems to a specific point in time which can be selected by the administrator. Additionally snapshot replication supports longer distance replication. • Multiple relationships provide greater storage flexibility and utilization. • 512 Snapshots and Volume Copy integration provides better efficiencies by combining the management and array technologies to create local copies. • Fast application recovery with minimal or no transaction loss. • Creation of disaster tolerant copies of users critical business data. • No-single-point-of-failure solution to increase the availability of user data

NOTE: End-to-End performance notes

1. Performance results were generated using internal HPE test tools. Number and type of applications, drive type and number of drives, operating system used, and the number of hosts will affect overall performance. This table is provided strictly as a test-lab comparison
2. Dual Controller configuration, (8) 400GB Mixed Use SSDs, RAID: 1, two drives per Disk Group; two Disk Groups per Pool, 2 volumes per Pool, block size: 8k, average latency under 5 ms, Windows Server 2012 host, 16Gb FC direct connect to array
3. Dual Controller configuration, (72) 15k HDD, RAID: 5, nine drives per Disk Group, 4 Disk Groups per Pool, 32 volumes per Pool, block size: 256k, average latency under 30 ms, Windows Server 2012 host, 16Gb FC direct connect to array
4. Sequential performance numbers were generated using segmented sequential workloads. For segmented sequential workloads with a queue depth greater than 1, each sequential stream is targeted to operate on a separate LBA range. Other types of sequential workloads that target specific LBA ranges may achieve higher results

top

End-to-End performance figures using virtual storage

HPE MSA 2050 End-to-End Performance Figures[1]

Controller model	**HPE MSA 2050 SAN**						**HPE MSA 2050 SAS**	
Host protocol[2]	**16Gb FC**		**10 GbE iSCSI**		**1 GbE iSCSI**		**12Gb SAS**	
Drive technology	**HDD**	**SSD**	**HDD**	**SSD**	**HDD**	**SSD**	**HDD**	**SSD**
MSA 2050 RAID 10 performance results[3,4,5,11]								
Random Reads IOPS	63,600	220,800	63,500	208,400	63,200	103,700	50,800	219,100

HPE MSA 2050 End-to-End Performance Figures[1]

Random Writes IOPS	37,300	103,000	37,300	94,300	37,200	93,300	37,100	97,500
Random Mix 60/40 IOPS	47,600	142,100	46,600	133,000	46,800	130,500	44,500	138,800
Sequential Reads MB/s	5,350	-	5,350	-	880	-	5,350	-
Sequential Writes MB/s	3,110	-	3,110	-	880	-	3,120	-
MSA 2050 RAID 5 performance results[6,7,12]								
Random Reads IOPS	56,300	219,200	55,800	201,400	56,000	103,400	47,300	209,600
Random Writes IOPS	18,100	43,400	18,000	41,400	18,300	40,600	18,000	43,100
Random Mix 60/40 IOPS	29,100	80,000	29,200	75,400	28,700	73,900	28,000	78,700
Sequential Reads MB/s	5,290	-	5,280	-	880	-	5,290	-
	4,650	-	3,870	-	880	-	4,710	-
MSA 2050 RAID 6 performance results[8,9,10,13]								
Random Reads IOPS	56,100	219,000	55,700	201,300	55,700	105,000	47,400	209,800
Random Writes IOPS	13,000	36,000	13,000	35,600	13,200	35,300	13,000	36,700
Random Mix 60/40 IOPS	21,400	72,200	21,200	68,500	21,300	67,300	21,300	71,500
Sequential Reads MB/s	5,550	-	5,530	-	880	-	5,560	-
Sequential Writes MB/s	4,440	-	3,680	-	880	-	4,600	-

NOTE: RAID 1 was used for SSD testing.

Number and type of applications, drive type and number of drives, operating system used, and the number of hosts will affect overall performance. This table is provided strictly as a test-lab comparison. These numbers reflect a full array configuration with the maximum number of front-end ports and controllers. The test results shown for the HPE MSA 2050 are designed to give a conservative reference point for comparisons

1. Sequential tests (MB/s) are based on 256K block sizes and random tests (IOPS) are based on 8K block sizes run against the storage. For sequential workloads with a queue depth greater than 1, each sequential stream is targeted to operate on a separate LBA range. Other types of sequential workloads that target specific LBA ranges may achieve higher results. Results cannot be expected with a single host.
2. Fibre Channel results were measured using 16 Gb FC Host Bus Adapters. SAS results were measured using 12 Gb SAS Host Bus Adapters. 10 GbE iSCSI results were measured using 10GbE iSCSI Host Bus Adapters. 1 GbE iSCSI results were measured using 1GbE network interface controllers (NICs). Hosts were directly attached to the HPE MSA 2050 array.
3. MSA 2050 RAID 10 Hard Disk Drive (HDD) random results: Dual Controller configuration, (192) 15K HDD, 12 drives per disk group, 8 disk groups per pool, 8 volumes per pool.
4. MSA 2040 RAID 10 Hard Disk Drive (HDD) sequential read results: Dual Controller configuration, (96) 15K SAS HDDs, 12 drives per disk group, 4 disk groups per pool, 4 volumes per pool.
5. MSA 2040 RAID 10 Hard Disk Drive (HDD) sequential write results: Dual Controller configuration, (48) 15K SAS HDDs, 12 drives per disk group, 2 disk groups per pool, 4 volumes per pool.
6. MSA 2050 RAID 5 Hard Disk Drive (HDD) random results: Dual Controller configuration, (180) 15K HDD, 9 drives per disk group, 10 disk groups per pool, 10 volumes per pool.
7. MSA 2050 RAID 5 Hard Disk Drive (HDD) sequential results: Dual Controller configuration, (72) 15K HDD, 9 drives per disk group, 4 disk groups per pool, 4 volumes per pool.
8. MSA 2050 RAID 6 Hard Disk Drive (HDD) random results: Dual Controller configuration, (180) 15K HDD, 10 drives per disk group, 9 disk groups per pool, 9 volumes per pool.
9. MSA 2050 RAID 6 Hard Disk Drive (HDD) sequential read results: Dual Controller configuration, (80) 15K HDD, 10 drives per disk group, 4 disk groups per pool, 4 volumes per pool.
10. MSA 2050 RAID 6 Hard Disk Drive (HDD) sequential write results: Dual Controller configuration, (40) 15K HDD, 10 drives per disk group, 2 disk groups per pool, 4 volumes per pool.
11. MSA 2050 RAID 1 Solid State Drives (SSD) results: Dual Controller configuration, (8) SSDs, 2 SSDs per disk group, 2 disk groups per pool, 4 volumes per pool.
12. MSA 2050 RAID 5 Solid State Drives (SSD) results: Dual Controller configuration, (6) SSDs, 3 SSDs per disk group, 1 disk group per pool, 4 volumes per pool.
13. MSA 2050 RAID 6 Solid State Drives (SSD) results: Dual Controller configuration, (8) SSDs, 4 SSDs per disk group, 1 disk group per pool, 4 volumes per pool.

top

Software overview

Feature	Description

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OS Support	• Microsoft Windows Server 2019 • Microsoft Windows Server 2016 • Microsoft Windows Server 2012 • VMware • HP-UX • Red Hat Linux • SuSE SLES Linux • Solaris • Oracle Linux • Citrix XenServer • OpenVMS

top

Link to product specifications

Click here to view the product specifications .

top

Warranty information

Click here for detailed information regarding worldwide limited warranty and technical support .

Click here to check warranty status .

top

Link to QuickSpecs

Information for this Overview is taken from the product QuickSpecs. To access the complete QuickSpecs for this product, select the desired link from the following list:

- Click here to access the HPE MSA 2050 Storage Worldwide QuickSpecs in html format .
- Click here to access the HPE MSA 2050 Storage Worldwide QuickSpecs in pdf format .
- Click here to view the QuickSpecs homepage, which provides access to the QuickSpecs for other regions/countries .

top

Link to drivers, firmware, software and manuals

Click here to access the drivers, firmware, software and manuals informations .

top

Link to product related documents

Click here to view the list of product related documents .

top