Overview

HPE MSA 1050 SAN Storage

The HPE MSA 1050 SAN Storage brings affordable flash storage down to ever lower customer segments. The MSA 1050 is designed to meet entry-level storage requirements and budgetary constraints. With the lowest storage array price points in the HPE Storage portfolio and field-proven ProLiant compatibility, the MSA 1050 is the platform of choice for smaller SAS, iSCSI and FC deployments.
The HPE MSA 1050 features 8Gb Fibre Channel, 12 Gb SAS, and 1GbE and 10GbE iSCSI at previously unattainable entry price points.

The array allows users to take advantage of the latest storage technologies in simple and efficient ways by providing a good balance between performance and budget resulting in a highly favorable $/GB return on their investment. HPE MSA Storage has been the industry-leading entry storage Fibre Channel platform for the past eight years, with nearly 500,000 storage systems sold worldwide.

Starting at under $5,500* USD, the MSA 1050 provides affordable application acceleration. It's seriously simple and affordable flash-ready storage to help you get the most performance for the lowest cost.

- **Configurations starting at $5,500** *
  Factory-configured, dual controller array with 4 host ports of either 8Gb FC, 1GbE, 10GbE or 12Gb SAS protocols
  Small Form Factor (SFF) or Large Form Factor (LFF) models available
- **Simple, proven Gen10 ProLiant compatible shared storage**
  MSA continues its heritage of providing affordable, easy to use shared storage without a big learning curve
  Intuitive setup and management for ProLiant administrators.
  New look-and-feel will fit right in with your Gen10 ProLiant servers
- **Access to MSA 1050 advanced data services with simplified licensing approach**
  Leverage flash storage with easy to use, easy to maintain tiering and read cache technologies
  No storage expertise necessary, system dynamically responds to workload changes, so you don't have to
- **Expandable and upgradable to meet new demands**
  Add new HDDs or disk expansions to your MSA 1050
  Upgrade system to the MSA 2050 through data-in-place upgrade: a simple 15-minute upgrade!
  No time-consuming migrations required

Notes: *US Street Price (MSA 1050 base unit, dual 1GbE iSCSI controllers, four 300GB HDDs); prices are subject to change without notice.

HPE MSA 1050 SAN Storage

Overview
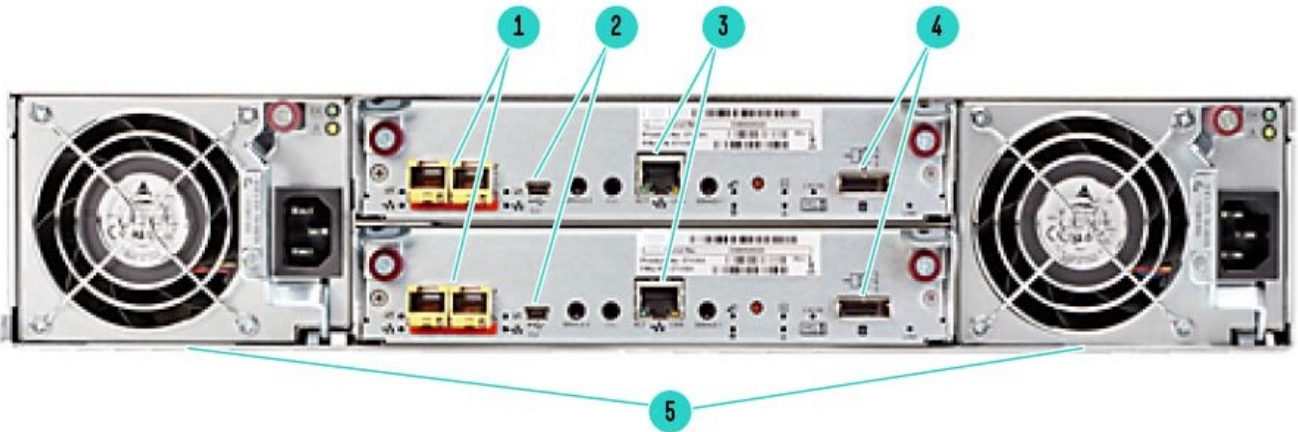
HPE MSA 1050 SAN Storage – Rear View

1.   Host Connection Ports (2) *
2.   CLI Port (mini USB)
3.   Management Ethernet Port

4.   Expansion Port
5   AC power supply

Notes: * 8 FC, / 1 and/or 10GbE iSCSI or 12Gb SAS

What's New in the MSA 1050 array family

- New free online MSA Health Check tool that provides users insight into the general health of their MSA array
- New MSA variants available that are in compliance with EU Commission Regulation No 2019/424.
- New 960GB and 1.92TB Read Intensive SSDs

MSA 1050 Storage Models

Description	SKU
HPE MSA 1050 8Gb Fibre Channel Dual Controller LFF Storage	Q2R18B
HPE MSA 1050 8Gb Fibre Channel Dual Controller SFF Storage	Q2R19B
HPE MSA 1050 12Gb SAS Dual Controller LFF Storage	Q2R20B
HPE MSA 1050 12Gb SAS Dual Controller SFF Storage	Q2R21B
HPE MSA 1050 1GbE iSCSI Dual Controller LFF Storage	Q2R22B
HPE MSA 1050 1GbE iSCSI Dual Controller SFF Storage	Q2R23B
HPE MSA 1050 10GbE iSCSI Dual Controller LFF Storage	Q2R24B
HPE MSA 1050 10GbE iSCSI Dual Controller SFF Storage	Q2R25B

Standard Features

HPE MSA 1050 SAN Storage

Array

Access Type	Block
Form Factor	2U, SFF or LFF
Number of controllers per array	2
Number of host ports per array	4
FC host connectivity	8Gb
iSCSI host connectivity	1Gb or 10Gb
SAS host connectivity	6Gb or 12Gb
Max Read cache per array	4TB
Data (read/write) cache + system memory per array	12GB
Pool Capacity (with Large Pool Support)	562 TB (512 TiB)
RAID Levels supported	RAID 0*, 1, 5, 6, 10 **Notes:** *Read Cache Only

Enclosures

Expansion Drive Enclosures	0-3 enclosures
LFF/SFF array/enclosure mixing	Supported
Maximum number of drives per array enclosure	24 SFF/12 LFF
Maximum number of drives per drive enclosure	24 SFF/12 LFF
Drive enclosure interface type	6Gb SAS
Drives	
Maximum total HDDs per array	96 SFF / 48 LFF
Maximum total SSDs per array	96 SFF / 48 LFF
Max raw capacity per array enclosure	76.8 TB SFF / 168TB LFF
Max raw capacity per drive enclosure	76.8 TB SFF / 168TB LFF
Max raw capacity per array	307.2TB SFF / 672TB LFF

Drive Capacities

SFF SSDs	800GB, 960GB, 1.6TB, 1.92TB, 3.2TB
LFF SSDs	800GB, 960GB, 1.92TB
SFF HDDs	15K: 600GB, 900GB 10K: 600GB, 1.2TB, 1.8TB, 2.4TB
LFF HDDs	7.2K: 4TB, 6TB, 8TB, 10TB, 12TB, 14TB

Software Features

Thin Technologies	Thin Provisioning, Space Reclamation, Thin Rebuild
Tiering	Performance Tier, Standard Tier, Archive Tier
Replication	Snapshots (512), Volume Copy, Remote Snaps
Quality of Service	Virtual Tier Affinity

Additional Features

Maximum number of volumes	512
Maximum number of snapshots	512
Maximum number of hosts	512
Maximum number of initiators	1024
Customer self-installable	Yes
Customer self-repairable	Yes
Customer self-upgradeable	Yes
Health Check analytics	Yes

Standard Features

All MSA 1050 models offer a common set of valuable features

- MSA 1050 storage system architecture maximizes performance
  - Includes SFF or LFF array chassis, depending on model
  - Two FC, iSCSI or SAS controllers, depending on model
  - Two host ports per controller
  - Each controller supports 8 Gb FC, 1GbE iSCSI, 10GbE iSCSI or 12Gb SAS host connectivity, depending on model
  - 6 GB cache per controller. (4GB Read/Write plus 2GB System)
  - Battery-free cache backup with super capacitors and compact flash
- Storage Management Utility (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 1050 will support a maximum of 3 expansion 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 1050 can grow incrementally to a maximum of 48 LFF, 96 SFF drives, or a combination of SFF and LFF drives.
- Virtual Storage Disks Groups can be spanned across multiple enclosures.
- Virtual Storage RAID levels supported: 1, 5, 6, 10.
- RAID 0 supported for Read Cache only. SSD read cache is a feature that extends the MSA controller cache. Read cache is most effective for workloads that are high in random reads A maximum of 2 SSDs per pool can be added for read cache
- Maximum hard drive counts vary by RAID levels: 2 drive max for RAID level 1; max of 16 drives for RAID levels 5, 6, and 10.
- 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)
- Customers 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 1040 array are able to do data-in-place upgrades to the new MSA 1050 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 Whitepaper before upgrading your MSA 1040, 2040 or 2042 systems.

Application Solutions

The HPE MSA 1050 SAN Storage is the ideal solution for customers running Oracle, Microsoft, SAP environments and those customers who are deploying virtual server technologies like VMware and Hyper-V. The MSA 1050 delivers enterprise functionality that enhances virtual environments, simplifies management, and reduces costs. Easy to deploy, scale and maintain, HPE MSA 1050 Arrays ensure that crucial business data remains available.

Hewlett Packard Enterprise has developed best-in-class expertise in Oracle, Microsoft, SAP, and Virtualization Hypervisor technology through extensive testing with the HPE MSA 1050, HPE servers, and management software; high availability and disaster recovery solutions; and backup and recovery on the Oracle, Microsoft, and SAP application platforms.

Learn more

To learn more about specific HPE Storage Solutions that are built with Oracle, Microsoft, SAP and Virtualization environments in mind, visit the solution sites supporting each of these applications.
HPE MSA Storage hyperlink to: **http://www.hpe.com/storage/MSA**

Standard Features

Product Technology
MSA 1050 Models
MSA 1050 Storage offers 8 factory configured models:
- MSA 1050 8Gb FC with 4-ports per array system, SFF or LFF
- MSA 1050 12Gb SAS with 4-ports per array system SFF or LFF
- MSA 1050 1GbE iSCSI with 4-ports per array system SFF or LFF
- MSA 1050 10GbE iSCSI with 4-ports per array system, SFF or LFF

Modular Chassis
2U rack height. 12 LFF or 24 SFF drive bays, accommodating SSDs, SAS and SAS MDL Drives
Notes: The MSA 1050 does not support single controller configurations. Single-controller support is provided only when a controller fails over to its partner controller.

Available Drives
The MSA 1050 Storage systems support a wide variety of the MSA 3.5-inch LFF drives, and the MSA 2.5-inch SFF drives.
- Solid-State Drives (SSDs) deliver the highest levels of performance and reliability.
- Enterprise-class SAS hard disk drives (10K/15K RPM) offer a balance of performance, capacity, and cost while delivering enterprise grade reliability.
- Midline SAS hard disk drives (7.2K RPM) are optimized to provide the best ratio of capacity to cost.

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, Enterprise SAS or SAS Midline (MDL) hard drives. The pre-configured MSA 2050 LFF Disk Enclosure has two I/O modules and supports the MSA 1050 dual controller arrays.
- The MSA 2050 LFF Disk Enclosure can be attached to the MSA 1050 LFF or SFF storage models.
- Each MSA 2050 LFF Disk Enclosure ships standard with two .5m mini-SAS to mini-SAS cables for connection to the MSA 1050 array expansion port or existing disk enclosure cascade port.
- LFF and/or SFF Disk Enclosures can be mixed up to the maximum of 3 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, Enterprise SAS, or SAS Midline (MDL) hard drives. The pre-configured MSA 2050 SFF Disk Enclosure has two I/O modules and supports the MSA 1050 dual controller arrays.
- The MSA 2050 SFF Disk Enclosure can be attached to the MSA 1050 LFF or SFF storage models.
- Each MSA 2050 SFF Disk Enclosure ships standard with a two .5m mini-SAS to mini-SAS cables for connection to the MSA 1050 array expansion port or existing disk enclosure cascade port.
  LFF and/or SFF Disk Enclosures can be mixed up to the maximum of 3 total Disk Enclosures

Standard Features

Scalability
The MSA 1050 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, Enterprise SAS or SAS Midline (MDL) drives technology, form factors, sizes, speeds, and costs per GB allows a system to easily fit in almost any budget.
- Large Form Factor configurations can scale up to 168TB SAS MDL per array enclosure, expandable to 672TB SAS MDL with the addition of a maximum of three MSA 2050 LFF Disk Enclosures.
- Small Form Factor configurations can scale up to 76.8 TB SAS SSDs per array enclosure, expandable to 307.2 TB SAS with the addition of a maximum of three MSA 2050 SFF Disk Enclosures.
- 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 1050 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 (128 TiB). 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 1050 supports large, flexible Volumes with sizes up to 128TiB and facilitates seamless capacity expansion. As pools are expanded data automatically reflows to balance capacity utilization on all drives.

RAID 0, 1, 5, 6, 10
The MSA 1050 features several important additional RAID 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 bottleneck. Striping also allows users to reconstruct data in case of a disk failure. RAID 0 (Striping) is supported for Read Cache only.

Configuration and Management Tools
Management access, out-of-band, Storage Management Utility (SMU), CLI.
Interface Types: USB 100/1000 Ethernet.
Protocols Supported SNMP, SMI-S, SSH, SMTP, FTP, SFTP, HTTP, HTTPS, Telnet.

Web Browser support
The MSA 1050 arrays come integrated with web browser and CLI based software for storage and RAID management, setup, configuration, and troubleshooting. The MSA 1050 management supports Microsoft Internet Explorer, Mozilla Firefox, and Google Chrome.

Standard Features

Hot Plug Expansion and Replacement Support

All MSA 1050 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 1050 supports most HPE ProLiant and BladeSystems servers including

- HPE ProLiant DL, ML Servers
- HPE c-Class Blade Servers
- Compatibility must be confirmed at: **http://www.hpe.com/storage/spock**

Notes: depends on protocol.

3rd Party server support

The MSA 1050 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. Refer to the TSANet website for details: **http://www.tsanet.com**
- 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.

OS Support

Refer to the Hewlett Packard Enterprise support statements for complete current OS version support:
http://www.hpe.com/storage/spock

- Microsoft Windows Server 2019
- Microsoft Windows Server 2016
- Microsoft Windows Server 2012
- VMware
- Red Hat Linux
- SuSE SLES Linux
- Oracle Linux

Notes: depends on protocol.

Advanced Virtualized Features

Storage on the MSA 1050 is all virtualized including Automated Tiering of Enterprise SAS (Standard Tier) and Midline SAS (Archive Tier), Read Cache and Wide-Striping. Sub-LUN Tiering from SAS Midline to Enterprise SAS drives is also a standard feature.

Notes:

– The MSA 1050 supports virtual storage only. Linear storage is not supported on the MSA 1050.
– The purchase of an Advanced Virtualization Upgrade license is not required for virtual storage on the MSA 1050. The Advanced Virtualization Upgrade functionality is included in the base MSA 1050 system as a standard feature.

Advanced Data Services Suite

The HPE MSA Advanced Data Services Suite can be purchased as an option on the MSA 1050 Storage systems.
The optional Advanced Data Services Suite includes the following functionality:

- Performance Tiering between the SSD tier and the Standard or Archive Tier
- 512 Snapshots
- Remote Snaps

Standard Features

Performance Tiering and Archive Tiering
Disk tiers are comprised of aggregating 1 or more Disk Groups of similar physical disks. The MSA 1050 supports 3 distinct tiers:
- A Performance tier with SSDs
- A Standard SAS tier with Enterprise SAS HDDs
- An Archive tier utilizing Midline SAS HDDs.

The MSA 1050 supports sub-LUN tiering and automated data movement between tiers. The MSA 1050 automated tiering engine moves data between available tiers based on the access characteristics of that data. Frequently accessed "pages" will migrate to the highest available tier delivering maximum I/O´s to the application.

Configurations which have a mixture of both SSDs and HDDs within the same system being used as a capacity Tier (excluding SSD Read Cache), will require the Advanced Data Service Suite LTU. This rule applies to the system level and therefore the license is required regardless of whether the drives are configured for auto-tiering within the same Pool. All-SSD configurations and SSD Read Cache extension do not require a license on the MSA 1050 array.

Snapshot and Volume Copy
- All MSA 1050 arrays come standard with 64 snaps.
- A 512 Snapshot license is available as an option on the MSA 1050
- Snapshots create up to 512 point-in-time copies of data
- Volume Copy can create up to 128 point-in-time copies of data
- Point-in-time copies become standard volumes when they are complete
- Recovery is instant - revert data from any previous Snapshot or Volume Copy
- Backup 'snapped' data to disk, virtual tape, or physical tape without a backup window
- If telephone support and software updates are desired for bundled software functionalities like 64 snapshots and volume copy software, a combination HW + SW support care pack must be purchased.

Remote Snap
- HPE MSA Remote Snap Software is array-based software that provides remote replication on the HPE MSA 1050 array products. MSA Remote Snap is a form of asynchronous replication which consists of replication of block-level data from a volume on a local system to a volume on a second independent system. This second system may be co-located with the first system or may be located at a remote site.
- HPE Remote Snap replication technology provides the ability to accomplish key data management and protection capabilities. First, because Remote Snap uses snapshots as the underlying technology it creates multiple local recovery points which can be used for such tasks as to complement daily backups; second, replication provides the ability to access data in a remote site which could be used for dispersed operations; and third but definitely not least important replication allows for business continuance in the event of a failure on the primary site.
- In order to perform a replication, a snapshot of the volume to be replicated is taken, creating a point-in-time image of the data. This point-in-time image is then replicated to the destination volume by copying the data represented by the snapshot via iSCSI or Fibre Channel protocols. Replication via the SAS protocol is not supported. The amount of data transferred is minimized though the use of snapshots whenever possible.
- Storage based asynchronous snapshot replication
- Support of iSCSI 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
- Replication between on MSA 1050 to another MSA is supported (1 to 1 peer connection).
- Replication up to four MSA 1050s to a single MSA 2050 is supported. Typical 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 1050 and MSA 2050 or MSA 2040/1040 arrays using the virtual storage architecture and licensed for Remote Snap. Protects existing investments and enhances business continuity planning objectives.

Standard Features

- 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.

- 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 your critical business data
- No-single-point-of-failure solution to increase the availability of your data

Notes: One Advanced Data Services Suite License per array is required for replication. For example, if you have two MSA arrays performing replication (from Primary system to Remote System), you will need a total of 2 licenses.

HPE OneView for VMware vCenter

HPE OneView for VMware vCenter is a component within the HPE OneView plug-in for vCenter. It enables vSphere administrators to quickly obtain context-aware information and manage supported HPE storage devices like the MSA in their VMware vSphere environment directly from within vCenter. This plug-in operates independently of the core HPE OneView product and does not require a license to use. By providing a clear relationship between VM's, datastores and storage, the VMware administrator's productivity increases, as does the ability to ensure quality of service. Roles for administrators can be defined on an individual basis, providing the ability to apply specific permissions for both view and control functions.

HPE OneView for VMware vCenter supports mixed array environments including MSA Storage, and other HPE Storage systems including 3PAR Storage, Nimble Storage, StoreVirtual and StoreOnce.

When deployed with MSA Storage, HPE OneView provides the following:
- Active Management functionality for the MSA Storage:
  - Create/Expand/Delete a Datastore
  - Create a Virtual Machine from a template
- Monitors the health and status of the MSA Storage
- Displays LUN / volume connections from VMs and ESX servers to the arrays and provides the location and attributes of the MSA array within the SAN
- Identifies what storage features are available to allow administrators to match the features available on the MSA array to their requirements
- Provide a cluster-level view of the storage

HPE OneView for VMware vCenter is downloadable from Software Depot:
https://h20392.www2.hpe.com/portal/swdepot/displayProductInfo.do?productNumber=HPVPR

HPE OneView for System Center

HPE OneView for Microsoft System Center provides a comprehensive integration of HPE Storage, HPE Servers, HPE Blade System and HPE Virtual Connect with Microsoft System Center. HPE OneView for System Center enables management and monitoring of HPE MSA Storage running in Microsoft environment with a single pane-of-glass view to events/alerts, capacity and health dashboards and detailed virtual infrastructure information. It provides seamless integration with Microsoft System Center Operations Manager (SCOM) enabling predefined discovery and monitoring policies, event processing rules and topology views for HPE Storage including the MSA Storage Systems.

When deployed with the MSA 1050 array, HPE OneView for System Center provides the following:
- Monitors the health, events and alerts for the MSA 1050 – virtual pools, and volumes
- Provides topology information for VMs provisioned on the MSA Storage array

HPE OneView for System Center is downloadable at no charge from Software Depot:
https://h20392.www2.hpe.com/portal/swdepot/displayProductInfo.do?productNumber=System_Center

Standard Features

vStorage API for Array Integration (VAAI)

The vStorage API for Array Integration (VAAI) is one of the storage application programming interface (API) sets in vSphere. VAAI is an API storage partners can leverage to enhance performance of virtual machine (VM) management operations by delegating these operations to the storage array. With hardware offload, ESX/ESXi hosts perform certain operations faster and consumes less server CPU, memory resources, and storage port/storage fabric bandwidth. VAAI includes high performance and scalable VM data path primitives.

Storage Hardware Primitives for VAAI

- Full Copy or Hardware Assisted Move
- Block Zeroing or Hardware Assisted Zeroing
- Hardware Assisted Locking or Atomic Test and Set (ATS)

UNMAP reclaims space that is no longer on a thinly provisioned VMFS volume

LDAP Support

LDAP (Lightweight Directory Access Protocol) is an industry standard application protocol for accessing and maintaining distributed directory information services over an IP network. LDAP provides the ability to authenticate MSA users with a central directory.

- Domain or Directory Credentials are not stored on the MSA for authentication – avoids a security issue
- Once user groups are configured on all MSAs in your organization, users can be authenticated on any MSA through the Active Directory
- Uses an LDAP implementation to authenticate users with a Windows Active Directory
- The MSA CLI and SMU will allow the configuration of new LDAP users groups into the MSA security scheme (manage vs monitor users, interface restrictions Web/CLI/FTP)
- Ability to authenticate Local or LDAP users

I/O Workload Functionality

A new user interface element called "I/O Workload" has been added to the main screen on MSA's WBI home screen for GL270 or later firmware. The MSA array controllers keep track of a substantial amount of data pertaining to the I/O dynamics at a logical page level (4MB chunks). From this data, it is possible to provide some visibility to what percent (%) of I/O's are being processed by what percent (%) of the overall array's capacity across a 7 day timeline. While some workloads have "transient" data access patterns, many workloads have steady access patterns on small portions of the array's capacity. This produces "hot" pages in the array which remain hot a large amount of the array's uptime. Users would see substantial benefits if these pages could be served from the fastest media in the array (ideally SSDs). As has been described in the MSA's tiering functionality, the MSA array's tiering engine will work to position the hottest pages on the fastest media at any given time.

The new I/O Workload graph will show a line labeled Capacity and a line plot for each selected workload percentage (100%, 80%, or Other% value). Below are two examples of user scenarios where the I/O Workload Graph might be useful and how to utilize the data the graph provides.

- New User or SSD Installation
  - Once the MSA array is installed and has had workloads running against it for a week's time, the I/O Workload data will give a representation of what Capacity is servicing 100% of I/O and 80% of I/O. Users may select a custom % value if desired. In a new installation or in an installation with no SSD tier installed, the 80% line is a reasonable starting point for an SSD tier. Based on SSD RAID settings, customers can then calculate a good starting point with regard to SSD tier sizing based on that week's workload. While not a hard-fast rule, it is a good starting point. These values should also be compared to the Best Practices "rule of thumb" which suggest that 5-15% of the array's capacity should be SSDs for tiered solutions.
- Users with existing SSD tiering or read caching installed and running
  - For arrays running with SSDs installed (tiered or read cache), the I/O Workload graph will have a dotted line which shows the installed SSD capacity. The I/O Workload graphs can be checked periodically to see where the 80% I/O line is with regard to the SSD capacity line. While there are no hard and fast rules which indicate good/bad situations, users can use the graph with other system performance tools to better understand specific dynamics of their installation and the normal dynamics of a system in the day-to-day activities for a specific environment.

Standard Features

Interpreting the I/O Workload graphs allow users to strike a balance between the SSD costs versus performance benefits. For example, some customers may be willing to have a couple of days where peak usage is far above the SSD capacity line as it may be acceptable to have slower performance as the system uses HDDs for a larger percentage of the workload I/O. This may be perfectly acceptable for systems sized to optimize $/TB due to budget constraints. Other users may want to optimize the system such that a sizeable percentage of daily I/O have the opportunity to reside on SSD media (sized to 80% or 90%). When combined with other performance monitoring tools, the new I/O Workload function gives users some representation as to how the workloads and the MSA are working together in a user's real-world environment.

HPE Complete –Zerto

HPE MSA Storage users can leverage Zerto Virtual Replication to replicate applications and data from one MSA array to another MSA array. Popular use cases include departmental MSA storage replicated to enterprise storage, enterprise storage replicated into MSA array, or protect MSA workloads into the cloud.

Zerto operates on the hypervisor level and includes orchestration and automation built-in to enable faster recovery of workloads (RTO in minutes) at much lower Recovery Point Objective (RPO of seconds) available through other data protection tools like backup. Zerto is also a workload mobility tool and allow IT to confidently move workloads and data across heterogeneous storage or cloud.
Ordering, configuring and installing Zerto is simple. Zerto is licensed by number of Virtual Machines that are being protected or moved.

For mobility use cases, order the appropriate number of migration licenses needed. For replication use cases, order the appropriate quantity of Zerto Virtual Replication licenses using a combination of the tiered licenses plus the corresponding maintenance part numbers. The license is independent of source and target array size, type or capacity being replicated. See the HPE Complete/Zerto Quickspec for a complete list of part numbers. A corresponding MSA Advanced Data Services LTU is not required for data replication when using Zerto Virtual Replication. An MSA Advanced Data Services LTU would be required if deploying MSA array-based replication.

Zerto installs as a virtual machine under VMware or Hyper-V or in the Cloud as a VM in AWS and Azure in minutes Zerto does not install any components in the guest operating system and does not depend on any specific configuration of the storage or use MSA array or VMware snapshots to replicate and recover applications.

Zerto virtual replication is available on HPE Catalog via HPE Complete program.
For more information on the HPE Complete – Zerto solution, visit;
https://h20195.www2.hpe.com/v2/getdocument.aspx?docname=a00006013enw

HPE Complete – Arxscan

Arxscan is an HPE Complete Partner delivering innovative software that drives value through unique enterprise data center monitoring and reporting. Arxscan provides infrastructure monitoring for Storage, Network, Servers and Applications. Arxscan is fully supported on the HPE MSA 1050, 2050 and 2052 storage arrays, and is available for purchase directly from HPE. Arxscan's intuitive dashboard delivers an unprecedented view of how organizations store, distribute and protect their data, providing relevant views around device quality and performance metrics. Benefits include:

- Remote delivery from any location to any location worldwide.
- Supports all SAN/NAS storage OEM product lines, SAN switch and server OS platforms without agents.
- Quickly installed in under two hours in SMB, midrange or enterprise customer environments.
- Presents views that are business operations and infrastructure/system operations centric.
- Creates global collaborative touch points for all users of local and remote data center resources.
- One Stop Shop – ability to purchase complete solutions from HPE that include both HPE products and best-in-class third party branded products, all on a single HPE purchase order.

For more information regarding Arxscan software, please refer to **HPE Complete** on **HPE.com**

Standard Features

MSA Health Check Tool

MSA Health Check is a cloud-based tool that provides users insight into the general health of their MSA array. The tool uses a powerful rules-based analytics engine which can predict failures before they happen. The MSA Health Check tool performs a full sweep of analytics and checking thousands of data points from sensors inside the MSA array. The analytics engine will pick up common failure signatures and check against MSA best practices producing a simple, easy to digest PDF report with status and suggested courses of action to correct anything found in the scan. The tool is free of charge to HPE MSA customers. The MSA Health Check tool is supported across all current MSA 1050/2050/2052 arrays as well as the prior two generations of arrays (MSA P2000 G3 and MSA 1040/2040/2042). The tool is available immediately at:
http://www.hpe.com/storage/MSAHealthCheck

Service and Support

Warranty
Three-year limited warranty, parts exchange Next Business day delivery
Disk enclosures, Hard drives, and Options for the MSA 1050 carry their own warranty. Refer to
Hewlett Packard Enterprise Limited Warranty Statement for more information.

The MSA 1050 has been designed with customer self-repairable parts to minimize repair time and provide greater flexibility in performing defective parts replacement. Please refer to Hewlett Packard Enterprise limited warranty Statement and parts replacement instructions for further details.
Notes:
- The warranty of the hard drive options purchased with the MSA 1050 models is different for SAS hard drives versus SAS MDL. SAS hard drive options have a three year warranty and SAS MDL have a one year warranty.
- Firmware updates beyond the 3 year warranty period requires a support contract.

Solid State Drives (SSD) Warranty
3/0/0 warranty; Customer Self Repair (CSR) subject to maximum usage and or maximum supported lifetime limitations, whichever occurs first. Maximum Supported Lifetime is the period in years set to equal the warranty for the device. Maximum usage limit is the maximum amount of data that can be written to the device before reaching the device's write endurance limit.

Service and Support
Protect your business beyond warranty with HPE Support Services
HPE Pointnext provides a comprehensive portfolio including Advisory and Transformational, Professional, and Operational Services to help accelerate your digital transformation. From the onset of your transformation journey, Advisory and Transformational Services focus on designing the transformation and creating a solution roadmap. Professional Services specializes in creative configurations with flawless and on-time implementation, and on-budget execution. Finally, operational services provide innovative new approaches like Flexible Capacity and Datacenter Care, to keep your business at peak performance. Hewlett Packard Enterprise is ready to bring together all the pieces of the puzzle for you, with an eye on the future, and make the complex simple.

Connect your devices
Unlock all 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 Proactive Care Service and HPE Datacenter 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 HPE support
Notes:
- [1] IDC
- [2] HP CSC reports 2014-2015

Optimized Care
HPE Proactive Care with 6 hour call-to-repair commitment, three year Support Service
HPE Proactive Care gives customers an enhanced call experience. When your products are connected to HPE, Proactive Care helps prevent problems and maintains IT stability by utilizing personalized proactive reports with recommendations and advice. This Service combines three years' proactive reporting and advice with our highest level of hardware support; the HPE 24x7, six hour hardware call-to-repair. Hewlett Packard Enterprise is the only leading manufacturer who makes this level of coverage available as a standard service offering for your most valuable servers and storage, including the HPE MSA 1050 SAN Storage.
https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA3-8855ENW.pdf

Service and Support

Standard Care
HPE Proactive Care with 24x7 coverage, three year Support Service
HPE Proactive Care gives customers an enhanced call experience. When your products are connected to HPE, Proactive Care helps prevent problems and maintains IT stability by utilizing personalized proactive reports with recommendations and advice This Service combines three years proactive reporting and advice with our 24x7 coverage, four hour hardware response time when there is a problem.
https://www.hpe.com/h20195/v2/GetPDF.aspx/4AA3-8855ENW.pdf

Basic Care
HPE Foundation Care 24x7, three-year Support Service
HPE Foundation Care 24x7 gives you access to HPE 24 hours a day, seven days a week for assistance on resolving issues. This service includes hardware onsite response within four hours. Simplify your support experience and make HPE your first call to help resolve hardware or software problems.
https://www.hpe.com/h20195/V2/GetDocument.aspx?docname=4AA4-8876ENW&cc=us&lc=en

Foundation Care
HPE Foundation Care 24x7, three-year Support Service
HPE Foundation Care 24x7 gives you access to HPE 24 hours a day, seven days a week for assistance on resolving issues. This service includes needs-based Hardware onsite response within four hours. In addition, collaborative software support is included in this service that provides troubleshooting assistance on industry leading software running on your HPE server. Simplify your support experience and make HPE your first call to help resolve hardware or software problems.
https://www.hpe.com/h20195/V2/GetDocument.aspx?docname=4AA4-8876ENW&cc=us&lc=en

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 quick-specs, 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.

Service and Support

Related Services

HPE Hardware Installation
Provides for the basic hardware installation of HPE branded servers, HPE storage including the MSA 1050 devices and networking options to assist you in bringing your new hardware into operation in a timely and professional manner.

HPE Installation and Startup Service
Provides for the installation and startup of HPE technology including BladeSystems, C-Class enclosure, HPE ProLiant c-Class and Integrity server blades, storage blades, SAN switch blades, HPE Virtual Connect modules (Ethernet and Fibre Channel), Ethernet network interconnects, and InfiniBand, as well as the installation of one supported operating system type (Windows® or Linux). Included the HPE MSA 1050.

HPE Datacenter Care service
Helps improve IT stability and security, increase the value of IT, and enable agility and innovation. It is a structured framework of repeatable, tested, and globally available services "building blocks." You can deploy, operate, and evolve your datacenter wherever you are on your IT journey. With HPE Datacenter Care, you benefit from a personalized relationship with HPE via a single point of accountability for HPE and others' products.

HPE Factory Express for Servers and Storage
HPE Factory Express offers configuration, customization, integration and deployment services for HPE servers and storage products. Customers can choose how their factory solutions are built, tested, integrated, shipped and deployed.

Factory Express offers service packages for simple configuration, racking, installation, complex configuration and design services as well as individual factory services, such as image loading, asset tagging, and custom packaging. HPE products supported through Factory Express include a wide array of servers and storage: HPE Integrity, HPE ProLiant, HPE Apollo, HPE ProLiant Server Blades, HPE BladeSystem, HPE 9000 servers as well as the HPE MSA Storage, HPE 3PAR Storage, HPE XP, rack-mount tape libraries and configurable network switches.

HPE Education Services
Keep your IT staff trained making sure they have the right skills to deliver on your business outcomes. Book on a class today and learn how to get the most from your technology investment. **http://www.hpe.com/ww/learn**

HPE Support Center
The HPE Support Center is a personalized online support portal with access to information, tools and experts to support HPE business products. Submit support cases online, chat with Hewlett Packard Enterprise experts, access support resources or collaborate with peers.
Learn more **http://www.hpe.com/support/hpesc**

HPE Insight Remote Support and HPE Support Center are available at no additional cost with a HPE warranty, HPE Support Service or HPE contractual support agreement.

For more information: **http://www.hpe.com/services**

Configuration Information

Step 1 - MSA 1050 Base Configurations
Pre-Configured Systems

Description	SKU
HPE MSA 1050 8Gb Fibre Channel Dual Controller LFF Storage	Q2R18B
Notes: Includes LFF Array Chassis, two MSA 1050 FC 2-port controllers, 4 8Gb SW FC SFPs installed, two .7m PDU cords (IEC C14), one rack-mount kit	
HPE MSA 1050 8Gb Fibre Channel Dual Controller SFF Storage	Q2R19B
Notes: Includes SFF Array Chassis, two MSA 1050 FC 2-port controllers, 4 8Gb SW FC SFPs installed, two .7m PDU cords (IEC C14), one rack-mount kit	
HPE MSA 1050 12Gb SAS Dual Controller LFF Storage	Q2R20B
Notes: Includes LFF Array Chassis, two MSA 1050 SAS 2-port controllers, two .7m PDU cords (IEC C14), one rack-mount kit, SFPs not needed with SAS controllers	
HPE MSA 1050 12Gb SAS Dual Controller SFF Storage	Q2R21B
Notes: Includes SFF Array Chassis, two MSA 1050 SAS 2-port controllers, two .7m PDU cords (IEC C14), one rack-mount kit, SFPs not needed with SAS controllers	
HPE MSA 1050 1GbE iSCSI Dual Controller LFF Storage	Q2R22B
Notes: Includes LFF Array Chassis, two MSA 1050 1GbE 2-port controllers, 4 1Gb RJ-45 iSCSI SFPs installed, two .7m PDU cords (IEC C14), one rack-mount kit	
HPE MSA 1050 1GbE iSCSI Dual Controller SFF Storage	Q2R23B
Notes: Includes SFF Array Chassis, two MSA 1050 1GbE 2-port controllers, 4 1Gb RJ-45 iSCSI SFPs installed, two .7m PDU cords (IEC C14), one rack-mount kit	
HPE MSA 1050 10GbE iSCSI Dual Controller LFF Storage	Q2R24B
Notes: Includes LFF Array Chassis, two MSA 1050 10GbE 2-port controllers, 4 10Gb SW iSCSI SFPs installed, two .7m PDU cords (IEC C14), one rack-mount kit. Direct attached copper cables are supported in 10GbE Controller systems	
HPE MSA 1050 10GbE iSCSI Dual Controller SFF Storage	Q2R25B
Notes: Includes SFF Array Chassis, two MSA 1050 10GbE 2-port controllers, 4 10Gb SW iSCSI SFPs installed, two .7m PDU cords (IEC C14), one rack-mount kit. Direct attached copper cables are supported in 10GbE Controller systems.	

Step 2 – Select Your Drives

MSA HDDs and SSDs drives are for use with MSA Storage Systems only.
Customers can mix SSD, SAS, and SAS MDL drives in the same array enclosure and disk enclosure

SFF SSDs

HPE MSA 800GB 12G SAS Mixed Use SFF (2.5in) 3yr Warranty Solid State Drive	N9X96A
HPE MSA 1.6TB 12G SAS Mixed Use SFF (2.5in) 3yr Warranty Solid State Drive	N9X91A
HPE MSA 3.2TB 12G SAS Mixed Use SFF (2.5in) 3yr Warranty Solid State Drive	N9X92A
HPE MSA 960GB SAS 12G Read Intensive SFF (2.5in) 3yr Wty SSD	R0Q35A
HPE MSA 1.92TB SAS 12G Read Intensive SFF (2.5in) 3yr Wty SSD	R0Q37A

Notes:

– Configurations which have a mixture of both SSDs and HDDs within the same system being used as a capacity Tier (excluding SSD Read Cache), will require the Advanced Data Service Suite LTU. This rule applies to the system level and therefore the license is required regardless of whether the drives are configured for auto-tiering within the same Pool.

– All SSD configurations and SSD Read Cache extension do not require a license on the MSA1050 array.

Configuration Information

Description	SKU
SFF HDDs	
12G SFF 15K SAS HDDs	
HPE MSA 600GB 12G SAS 15K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	J9F42A
HPE MSA 900GB 12G SAS 15K SFF (2.5in) Enterprise 3yr Warranty Hard Drive	Q1H47A
12G SFF 10K SAS HDDs	
HPE MSA 600GB 12G SAS 10K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	J9F46A
HPE MSA 1.2TB 12G SAS 10K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	J9F48A
HPE MSA 1.8TB 12G SAS 10K SFF (2.5in) 512e Enterprise 3yr Warranty Hard Drive	J9F49A
HPE MSA 2.4TB 12G SAS 10K SFF (2.5in) Enterprise 512e 3yr Warranty Hard Drive	Q2R41A
LFF SSDs	
HPE MSA 800GB 12G SAS Mixed Use LFF (3.5in) Converter Carrier 3yr Wty Solid State Drive	P9M80A
HPE MSA 960GB SAS 12G Read Intensive LFF (3.5in) 3yr Wty SSD	R0Q36A
HPE MSA 1.92TB SAS 12G Read Intensive LFF (3.5in) 3yr Wty SSD	R0Q38A

Notes:
- Configurations which have a mixture of both SSDs and HDDs within the same system being used as a capacity Tier (excluding SSD Read Cache), will require the Advanced Data Service Suite LTU. This rule applies to the system level and therefore the license is required regardless of whether the drives are configured for auto-tiering within the same Pool.
- All SSD configurations and SSD Read Cache extension do not require a license on the MSA2050 array.

Description	SKU
LFF HDDs	
12G LFF 7.2K SAS Midline Drives	
HPE MSA 4TB 12G SAS 7.2K LFF (3.5in) Midline 1yr Warranty Hard Drive	K2Q82A
HPE MSA 6TB 12G SAS 7.2K LFF(3.5in) Midline 1yr Warranty Hard Drive	J9F43A
HPE MSA 8TB 12G SAS 7.2K LFF (3.5in) 512e Midline 1yr Warranty Hard Drive	M0S90A
HPE MSA 10TB 12G SAS 7.2K rpm LFF (3.5in) Midline 512e 1yr Wty Hard Drive	P9M82A
HPE MSA 12TB 12G SAS 7.2K LFF (3.5in) Midline 512e 1yr Warranty Hard Drive	Q2R42A
HPE MSA 14TB SAS 12G Midline 7.2K LFF (3.5in) 1yr Wty 512e HDD	R0Q21A
6-Pack Drive Bundles	
SFF Drive Bundles	
HPE MSA 7.2TB SAS 12G Enterprise 10K SFF (2.5in) 3yr Wty 512n 6-pack HDD Bundle	R0P85A

Notes: Contains 6 x MSA 1.2TB 12G SAS 10K SFF Enterprise HDDs (J9F48A)

HPE MSA 10.8TB SAS 12G Enterprise 10K SFF (2.5in) 3yr Wty 512e 6-pack HDD Bundle	R0P86A

Notes: Contains 6 x MSA 1.8TB 12G SAS 10K SFF Enterprise HDDs (J9F49A)

HPE MSA 14.4TB SAS 12G Enterprise 10K SFF (2.5in) 3yr Wty 512e 6-pack HDD Bundle	R0P87A

Notes: Contains 6 x MSA 2.4TB 12G SAS 10K SFF Enterprise HDDs (Q2R41A)

HPE MSA 3.6TB SAS 12G Enterprise 15K SFF (2.5in) 3yr Wty 512n 6-pack HDD Bundle	R0P88A

Notes: Contains 6 x MSA 600GB 12G SAS 15K SFF Enterprise HDDs (J9F42A)

HPE MSA 5.4TB SAS 12G Enterprise 15K SFF (2.5in) 3yr Wty 512n 6-pack HDD Bundle	R0P89A

Notes: Contains 6 x MSA 900GB 12G SAS 15K SFF Enterprise HDDs (Q1H47A)

Configuration Information

Description	SKU
LFF Drive Bundles	
HPE MSA 48TB SAS 12G Midline 7.2K LFF (3.5in) 1yr Wty 512e 6-pack HDD Bundle	R0P90A
Notes: Contains 6 x MSA 8TB 12G SAS 7.2K LFF Midline HDDs (M0S90A)	
HPE MSA 60TB SAS 12G Midline 7.2K LFF (3.5in) 1yr Wty 512e 6-pack HDD Bundle	R0P91A
Notes:: Contains 6 x MSA 10TB 12G SAS 7.2K LFF Midline HDDs (P9M82A)	
HPE MSA 72TB SAS 12G Midline 7.2K LFF (3.5in) 1yr Wty 512e 6-pack HDD Bundle	R0P92A
Notes: Contains 6 x MSA 12TB 12G SAS 7.2K LFF Midline HDDs (Q2R42A)	
HPE MSA 84TB SAS 12G Midline 7.2K LFF (3.5in) 1yr Wty 512e 6-pack HDD Bundle	R0Q22A
Notes: Contains 6 x MSA 14TB 12G SAS 7.2K LFF Midline HDDs (R0Q21A)	

Step 3 – Options
Disk Enclosures

HPE MSA 2050 LFF Disk Enclosure	Q1J06B
HPE MSA 2050 SFF Disk Enclosure	Q1J07B

Notes:
- Each drive enclosure includes one rack-mount kit and two 0.5m MiniSAS to MiniSAS cables
- Add up to 3 additional drive enclosures
- MSA 2050 LFF Disk Enclosure can be connected to either the MSA 1050 SFF or LFF dual controller systems.
- MSA 2050 SFF Disk Enclosure can be connected to either the MSA 1050 SFF or LFF dual controller systems.

SAS Cables

HPE External Mini SAS 1m Cable ALL	407337-B21
HPE External Mini SAS 2m Cable	407339-B21

Notes: Connecting MSA 1050 Controller to a disk enclosure if a longer cable is desired.

Power Cords

HPE C13 - C14 WW 250V 10Amp 2.0m Jumper Cord	A0K02A
HPE C13 - C14 WW 250V 10Amp Flint Gray 2.0m Jumper Cord	AF573A
HPE C13 - AS3112-3 AU 250V 10Amp 2.5m Power Cord	AF569A
HPE C13 - BS-1363A UK/HK/SG 250V 10Amp 1.83m Power Cord	AF570A
HPE C13 - C14 WW 250V 10A Gray 0.7m Jumper Cord	A0K03A
HPE C13 - CEE-VII EU 250V 10Amp 1.83m Power Cord	AF568A
HPE C13 - CNS-690 TW 110V 13Amp 1.83m Power Cord	AF561A
HPE C13 - DK-2.5A DK 250V 10Amp 1.83m Power Cord	AF566A
HPE C13 - GB-1002 CN 250V 10Amp 1.83m Power Cord	AF557A
HPE C13 - IRAM -2073 AR 250V 10A 2.5m Power Cord	AF558A
HPE C13 - IS-1293 IN 240V 6Amp LV 2.0m Power Cord	AF562A
HPE C13 - JIS C8303 JP 100V 12Amp 2.0m Power Cord	AF572A
HPE C13 - KSC- 8305 KR 250V 10Amp 1.83m Power Cord	AF560A
HPE C13 - NBR-14136 BR 250V 10Amp 1.83m Power Cord	AF591A
HPE C13 - Nema 5-15P US/CA 110V 10Amp 1.83m Power Cord	AF556A

Configuration Information

Description	SKU
HPE C13 - SABS-164 ZA 250V 10Amp 2.5m Power Cord	AF567A
HPE C13 - SEV 1011 CH 250V 10Amp 1.83m Power Cord	AF565A
HPE C13 - SI-32 IL 250V 10Amp 1.83m Power Cord	AF564A
HPE C13-NEMA 6-15P 10A/250V 3.6m Black Power Cord	A0N33A

Notes: Two PDU cables: one 142263-008 (Black) and one 1422633-013 (Grey), ship standard with all AC-powered enclosures.

Step 4

Step 4a - Choose Supported Options For Fibre Channel Infrastructure
PremierFlexOM4 type cables

HPE Premier Flex LC/LC Multi-mode OM4 2 fiber 1m Cable	QK732A
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

OM3 FC LC-LC cables

HPE LC to LC Multi-mode OM3 2-Fiber 0.5m 1-Pack Fiber Optic Cable	AJ833A
HPE LC to LC Multi-mode OM3 2-Fiber 1.0m 1-Pack Fiber Optic Cable	AJ834A
HPE LC to LC Multi-mode OM3 2-Fiber 2.0m 1-Pack Fiber Optic Cable	AJ835A
HPE LC to LC Multi-mode OM3 2-Fiber 5.0m 1-Pack Fiber Optic Cable	AJ836A
HPE LC to LC Multi-mode OM3 2-Fiber 15.0m 1-Pack Fiber Optic Cable	AJ837A
HPE LC to LC Multi-mode OM3 2-Fiber 30.0m 1-Pack Fiber Optic Cable	AJ838A
HPE LC to LC Multi-mode OM3 2-Fiber 50.0m 1-Pack Fiber Optic Cable	AJ839A

Step 4b - Choose Supported Options For 10GbE Infrastructure

Direct Attach Copper Cables

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
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
HPE FlexNetwork X240 10G SFP+ to SFP+ 0.65m Direct Attach Copper Cable	JD095C
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 10G SFP+ SFP+ 7m Direct Attach Copper Cable	JC784C

Configuration Information

Step 4c - Choose Supported Options For SAS Infrastructure

Supported options

Description	SKU
Mini-SAS HD to Mini-SAS Fanout Cables	

Notes: Recommended to utilize Fanout cables when connecting to SAS HBAs for maximum future flexibility without downtime.

Description	SKU
Mini-SAS HD to Mini-SAS HD Fanout Cables	
HPE Mini SAS High Density to Dual 2-lane Mini SAS High Density External Fanout 1 Meter Cable	K2Q99A

Notes: Recommended to utilize Fanout cables when connecting to SAS HBAs for maximum future flexibility without downtime.

Description	SKU
Mini SAS Cables	
HPE 1.0m External Mini SAS High Density to Mini SAS Cable	716189-B21
HPE 2.0m External Mini SAS High Density to Mini SAS Cable	716191-B21

Notes: These cables are used to connect 6Gb SAS initiator to MSA 1050 SAS controller. These are not used for connecting to a disk enclosure.

Description	SKU
HPE External 1.0m (3ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	716195-B21
HPE External 2.0m (6ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	716197-B21

Notes: These cables are used to connect 12Gb SAS initiator to MSA 1050 SAS controller. These are not used for connecting to a disk enclosure.

Description	SKU
HPE 4.0m External Mini SAS High Density to Mini SAS Cable	716193-B21

Notes: This cable is used to connect 6Gb SAS initiator to MSA 1050 SAS controller. This is not used for connecting to a disk enclosure.

Description	SKU
HPE External 4.0m (13ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	716199-B21

Notes: This cable is used to connect 12Gb SAS initiator to MSA 1050 SAS controller. This is not used for connecting to a disk enclosure.

Description	SKU
SAS Controllers/HBAs	
HPE Smart Array E208e-p SR Gen10 (8 External Lanes/No Cache) 12G SAS PCIe Plug-in Controller	804398-B21
HPE Smart Array P408e-p SR Gen10 (8 External Lanes/4GB Cache) 12G SAS PCIe Plug-in Controller	804405-B21
HPE Smart Array P408e-m SR Gen10 (8 External Lanes/2GB Cache) 12G SAS Mezzanine Controller	804381-B21

Step 5 – Software

The MSA Advanced Data Services Suite software is available as an option on the MSA 1050.

HPE MSA Advanced Data Services Suite LTU	Q0H99A
HPE MSA Advanced Data Services Suite E-LTU	Q0H99AAE

Notes:

- The Advanced Data Services Suite includes a Performance Tiering LTU, 512 Snapshot Software LTU, and the Remote Snap Software LTU. Individual Software titles are not available for sale on the MSA 1050.
- Configurations which have a mixture of both SSDs and HDDs within the same system being used as a capacity Tier (excluding SSD Read Cache), will require the Advanced Data Service Suite LTU. This rule applies to the system level and therefore the license is required regardless of whether the drives are configured for auto-tiering within the same Pool.
- All SSD configurations and SSD Read Cache extension do not require a license on the MSA2050 array.

Technical Specifications

MSA 1050	
Power Requirements	
Input Power Requirements (typical-running I/O) SFF/LFF arrays	110VAC 3.20A, 343W; 220VAC 1.67A,337W
Max Input Power	100-240 VAC, 50/60 Hz., 4.20-1.77A
Heat Dissipation	1174 BTU/hr
Temperature And Humidity Ranges	
Operating Temperature	41°F to 104°F (5°C to 40°C)
Shipping Temperature	-40°F to 158°F (-40°C to 70°C)
Operating Humidity	10% to 90% RH @ 104°F (40°C) non-condensing
Non-Operating Humidity	Up to 93% RH @ 104°F (40°C)
Declared Acoustic Noise Levels	
Sound Power	A weighted sound power LWAd=6,75 B
Sound Pressure	A weighted sound pressure LpAm - 55dB
Shock And Vibration	
Shock, Operational	3G's for 11 milliseconds
Shock, Non-Operational	Per NEBS GR-63-CORE UNPACKAGED EQUIPMENT SHOCK CRITERIA (4.3.2)
Vibration, Operational	5-500Hz, 0.14 Grms shaped
Vibration, Non-Operational	3-365-3Hz, 1.22 Grms,z-axis,0.85 Grms, X&Y axis shaped spectrum
Physical	
Height	3.5 in/ 8.9 cm
Depth (excluding cables) (back of ear to back of controller handle)	SFF 24-bay array: 19.5 in / 49.5 cm LFF 12-bay array: 22.5in. / 57.2 cm
Width (body only)	17.6 in / 44.7 cm (w/ ears 19 in / 48.26 cm)
Weight (Includes chassis and 2 controllers)	MSA 1050 LFF chassis: 40.6 lbs (18.4kg) MSA 1050 SFF chassis: 38.7 lbs (17.6kg)

Technical Specifications

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. These numbers are subject to change without notice.

MSA 1050 End-to-End Performance Results (using VE270 firmware release)		
MSA 1050 Array Performance [1]	**HPE MSA 1050** **8Gb Fibre Channel with HDDs**	**HPE MSA 1050** **8Gb Fibre Channel with SSDs**
MSA 1050 RAID 1 SSD Performance Results [2]		
Random Reads (IOPs)		91,856
Random Writes (IOPs)		39,146
MSA 1050 RAID 5 Performance Results [3,4]		
Segmented Sequential Reads (MB/s)	3,079	
Segmented Sequential Writes (MB/s)	2,771	

Notes: End-to-End performance

- [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 using VE270 firmware.
- [2] Dual Controller configuration, (4) SSDs, RAID: 1, two drives per Disk Group; one Disk Group per pool, 2 volumes per pool, block size: 8k, average latency under 5ms, Windows Server 2016 host, 8Gb FC connect to array
- [3] Dual Controller configuration, (36) 15k HDD, RAID: 5, nine drives per Disk Group, 2 Disk Groups per pool, 2 volumes per pool, block size: 256k, average latency under 30ms, Windows Server 2016 host, 8Gb FC 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.

Technical Specifications

End-to-End Performance Figures using Virtual Storage (using VE270 firmware)								
HPE MSA 1050 End-to-End Performance Figures [1]								
Controller Model	HPE MSA 1050 SAN						HPE MSA 1050 SAS	
Host Protocol [2]	8 Gb FC		10 GbE iSCSI		1 GbE iSCSI		12 Gb SAS	
Drive Technology	HDD	SSD	HDD	SSD	HDD	SSD	HDD	SSD
MSA 1050 RAID 10 Performance Results [3,4,9,10,11] **Notes:** RAID 1 was used for SSD testing.								
Random Reads IOPS	31,800	91,856	31,700	86,981	31,500	53,523	31,900	93,548
Random Writes IOPS	29,653	39,146	29,496	37,461	26,502	34,565	28,124	38,935
Random Mix 60/40 IOPS	26,992	55,796	27,050	52,709	26,847	49,065	26,622	55,751
Sequential Reads MB/s	3,079		3,760		441		4,682	
Sequential Writes MB/s	2,771		2,971		430		2,961	
MSA 1050 RAID 5 Performance Results [5,6,9,10,11]								
Random Reads IOPS	29,903	85,876	29,657	81,636	29,421	53,517	29,100	87,691
Random Writes IOPS	14,154	20,938	14,525	20,369	14,179	19,326	13,562	20,869
Random Mix 60/40 IOPS	17,378	36,294	17,642	34,869	17,486	32,942	16,932	36,147
Sequential Reads MB/s	3,078		3,675		441		3,846	
Sequential Writes MB/s	2,850		2,420		441		3,125	
Controller Model	HPE MSA 1050 SAN						HPE MSA 1050 SAS	
MSA 1050 RAID 6 Performance Results [7,8,9,10,11]								
Random Reads IOPS	29,930	85,706	29,713	80,895	29,569	53,512	29,918	86,401
Random Writes IOPS	10,197	17,992	10,192	17,471	10,163	16,732	7,597	17,902
Random Mix 60/40 IOPS	12,767	32,697	13,336	31,329	13,308	29,895	12,310	32,496
Sequential Reads MB/s	3,078		3,728		441		4,263	
Sequential Writes MB/s	2,683		2,320		441		2,783	

Notes: 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 1050 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.
- [2] Fibre Channel results were measured using 8 Gb FC Host Bus Adapters. SAS results were measured using 6 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).
- [3] MSA 1050 RAID 10 Hard Disk Drive random results: Dual Controller configuration, (96) 15K HDD, 12 drives per disk group, 4 disk groups per pool, 2 volumes per pool.
- [4] MSA 1050 RAID 10 Hard Disk Drive) sequential results: Dual Controller configuration, (48) 15K HDD, 12 drives per disk group, 2 disk groups per pool, 2 volumes per pool.
- [5] MSA 1050 RAID 5 Hard Disk Drive random results: Dual Controller configuration, (96) 15K HDD, 12 drives per disk group, 4 disk groups per pool, 2 volumes per pool.

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– [6]MSA 1050 RAID 5 Hard Disk Drive sequential results: Dual Controller configuration, (36) 15K HDD, 9 drives per disk group, 2 disk groups per pool, 2 volumes per pool.

– [7]MSA 1050 RAID 6 Hard Disk Drive random results: Dual Controller configuration, (96) 15K HDD, 12 drives per disk group, 4 disk groups per pool, 2 volumes per pool.

– [8]MSA 1050 RAID 6 Hard Disk Drive sequential results: Dual Controller configuration, (40) 15K HDD, 10 drives per disk group, 2 disk groups per pool, 2 volumes per pool.

– [9]MSA 1050 RAID 1 Solid State Drive (SSD) results: Dual Controller configuration, (4) SSDs, 2 SSDs per disk group, 1 disk group per pool, 2 volumes per pool.

– [10]MSA 1050 RAID 5 Solid State Drive results: Dual Controller configuration, (6) SSDs, 3 SSDs per disk group, 1 disk group per pool, 2 volumes per pool.

– [11]MSA 1050 RAID 6 Solid State Drive results: Dual Controller configuration, (8) SSDs, 4 SSDs per disk group, 1 disk group per pool, 2 volumes per pool.

MSA 1050 Regulatory Info

Safety
- UL 60950-1 (USA)
- CAN/CSA-C22.2 No.60950-1-03 (Canada)
- EN 60950-1 (European Union)
- GS mark (Germany)
- IEC 60950-1 (International)
- CCC Mark (power supply only, China PRC)

Electromagnetic Compatibility
- VCCI:2008-04 Class A (Japan)
- FCC 15:109(g) Class A (USA)
- ICES-003:2004 Class A (Canada)
- EN55022 : (European Union Class A); CISPR 22 (International Class A)
- EN61000-3-2 : (Harmonics) (European Union)
- EN61000-3-3 : (Flicker) (European Union)
- EN 55024 (European Union, Immunity, Class A); CISPR 24 (International Immunity, Class A)
- AS/NZS CISPR 22, Class A (Australia, New Zealand)
- CNS 13438 Taiwan, Class A (Taiwan)
- KN22 Class A (Emissions Class A); KN24 (Immunity) (S Korea)

RoHS and WEEE
RoHS-6/6 Compliance, China RoHS, WEEE

Country Approvals
United States, Australia/New Zealand, Canada, China (PRC), European Union, Germany (GS Mark), Japan, South Korea, Taiwan

Summary of Changes

Date	Version History	Action	Description of Change
18-Jan-2021	Version 16	Changed	Removed all "A" SKUs for arrays and expansion enclosure models and other textual edits.
03-Aug-2020	Version 15	Changed	Adjusted regional availability of the "B" SKUs.
04-May-2020	Version 14	Changed	Overview, Standard Features and Configuration Information sections were updated
02-Mar-2020	Version 13	Changed	Added "B" variants for EMEA countries only. Removed EOL SKUs.
07-Oct-2019	Version 12	Changed	Added Arxscan support
06-May-2019	Version 11	Changed	14TB HDD and Bundle added Max capacity of array increase.
02-Apr-2019	Version 10	Changed	RAID 0 added. Edits made throughout the QuickSpecs
04-Mar-2019	Version 9	Changed	Added Drive 6 Packs Added Read Intensive SSDs Removed EOL HDDs and DAC cables Added Windows Server 2019 Support Overview, Standard Features, Software and Configuration Information sections were updated.
15-Oct-2018	Version 8	Changed	SKUs descriptions were updated.
04-Sep-2018	Version 7	Added	Added HPE Storage File Controller support. Added HPE Complete/Zerto replication support.
06-Aug-2018	Version 6	Changed	Standard Features, Software, Configuration Information, and Technical Specifications.
02-Jul-2018	Version 5	Added	Added Performance Improvements and LDAP Support.
05-Mar-2018	Version 4	Added	Added End-to-End Performance Metrics.
05-Feb-2018	Version 3	Added	Added new MSA 2.4TB 12G SAS 10K SFF and 12TB 12G SAS 7,2K LFF hard drives.
		Changed	Features, Software, Configuration Information, and Technical Specifications.
06-Nov-2017	Version 2	Changed	Changes made throughout the QuickSpecs.
25-Sept2017	Version 1	New	New QuickSpecs

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